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Station

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May 1998

# Annual Data Summary for 1995 CHL Field Research Facility

## Volume II: Appendixes C Through E

by *Michael W. Leffler, Clifford F. Baron, Brian L. Scarborough,  
Paul R. Hodges, C. Ray Townsend*



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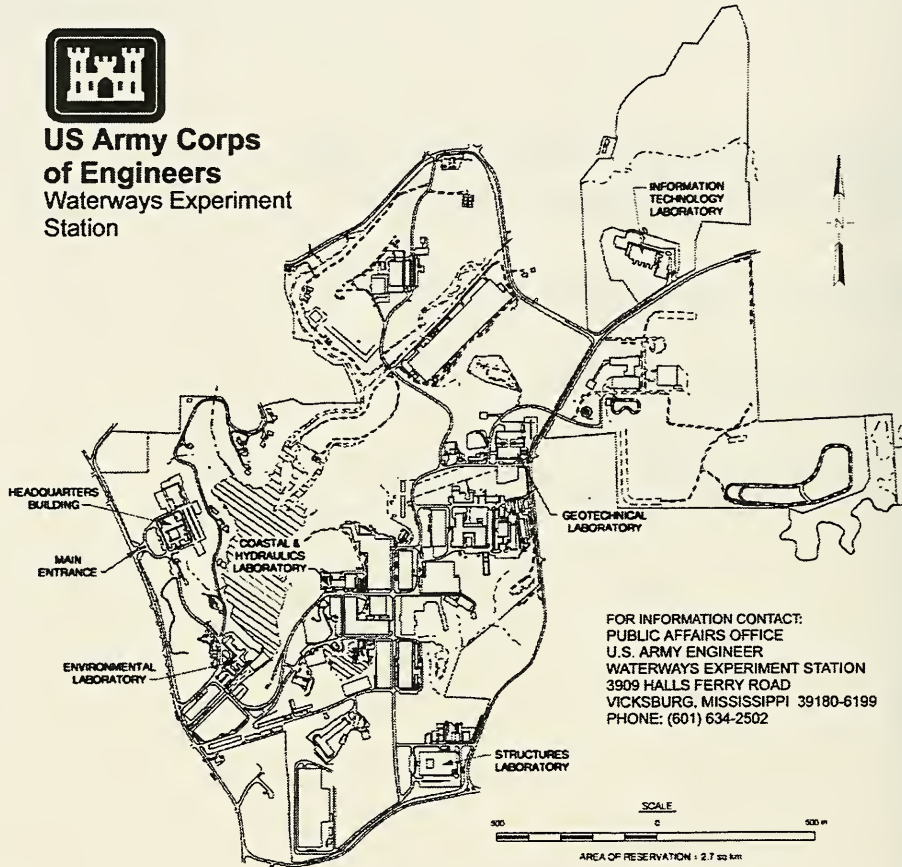


Final report

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# Appendix C

## Wave Data for Gauge 111

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Wave data summaries for Gauge 111 for 1995 and for 1980 through 1995 are presented in the following pages. Substituted for Gauge 111 was data from 640 for 1985 and 1986. Also used was data from Gauge 141 from 1987 and Gauge 511 from Jan-Aug 1993. In 1997 data from Gauge 121 was used from Sept-Dec.

### Daily $H_{mo}$ and $T_p$

Figure C1 displays the individual wave height  $H_{mo}$  and peak spectral wave period  $T_p$  values, along with the monthly mean values.

### Joint Distributions of $H_{mo}$ and $T_p$

Annual and monthly joint distribution tables are presented in Tables C1 and C2, and data for 1980 through 1995 are in Tables C3 and C4. Each table gives the frequency (in parts per 10,000) for which the wave height and peak period were within the specified intervals; these values can be converted to percentages by dividing by 100. Marginal totals are also included. The row total gives the number of observations out of 10,000 that fell within each specified peak period interval. The column total gives the number of observations out of 10,000 that fell within each specified wave height interval.

### Cumulative Distributions of Wave Height

Annual and monthly wave height distributions for 1995 are plotted in cumulative form in Figures C2 and C3. Data for 1980 through 1995 are plotted in Figure C4.

## Peak Spectral Wave Period Distributions

Annual and monthly peak wave period  $T_p$  distribution histograms for 1995 are presented in Figures C5 and C6. Data for 1980 through 1995 are presented in Figure C7.

## Persistence of Wave Heights

Table C5 shows the number of times in 1995 when the specified wave height was equaled or exceeded at least once during each day for the duration (consecutive days). Data for 1980 through 1995 are averaged and given in Table C6. An example is shown below:

Height m	Consecutive Day(s) or Longer																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+
0.5	18	15		14	13	12		11	10	9				8		7			
1.0	50	34	24	21	18	14	12	8	7	3			2						
1.5	41	19	8	6	2	1													
2.0	22	9	5	1															
2.5	10	5	2																
3.0	6	1																	
3.5		1																	
4.0	1																		

This example indicates that wave heights equaled or exceeded 1.0 m 50 times for at least 1 day; 34 times for at least 2 days; 24 times for at least 3 days, etc. Therefore, on 16 occasions the height equaled or exceeded 1.0 m for 1 day exactly ( $50 - 34 = 16$ ); on 10 occasions for 2 days; on 3 occasions for 3 days, etc. Note that the height exceeded 1 m 50 times for 1 day or longer, while heights exceeded 0.5 m only 18 times for this same duration. This change in durations occurred because the longer durations of lower waves may be interspersed with shorter, but more frequent, intervals of higher waves. For example, one of the times that the wave heights exceeded 0.5 m for 16 days may have represented three times the height exceeded 1 m for shorter durations.

## Spectra

Monthly spectra for the pressure gauge (Gauge 111) are presented in Figure C8. The plots show "relative" energy density as a function of wave frequency. These figures summarize the large number of spectra for each month.

The figures emphasize the higher energy density associated with storms, as well as the general shifts in energy density to different frequencies. As used here, "relative" indicates the spectra have been smoothed by the three-dimensional surface drawing routine. Consequently, extremely high- and low-energy density values are modified to produce a smooth surface. The figures are not intended for quantitative measurements; however, they do provide the energy density as a function of frequency relative to the other spectra for the month.

Monthly and annual wave statistics for Gauge 111 for 1995 and for 1980 through 1995 are presented in Table C7.

Figure C9 plots monthly time-histories of wave height and period.

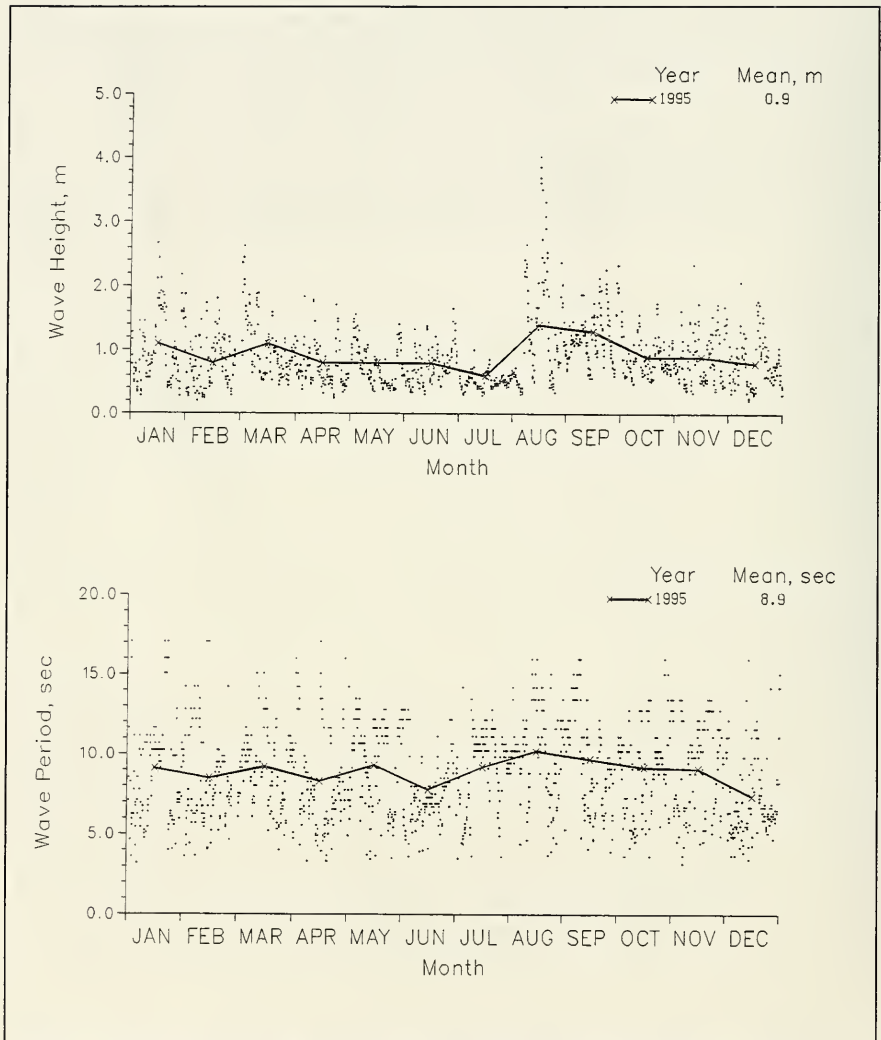


Figure C1. 1995 daily wave height and period values with monthly means for Gauge 111



**Table C1**  
**Annual Joint Distribution of  $H_{mo}$  versus  $T_p$**

Annual 1995, Gauge 111														Total
Percent Occurrence (X100) of Height and Period														
Height (m)	Period (sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	.	55	62	69	159	166	152	214	538	83	331	48	1877	
0.50 - 0.99	.	138	297	607	711	393	545	649	876	200	449	14	4879	
1.00 - 1.49	.	7	138	338	317	242	221	159	455	138	166	.	2181	
1.50 - 1.99	.	.	.	76	159	104	83	104	166	21	28	.	741	
2.00 - 2.49	.	.	.	.	41	35	28	48	48	14	14	.	228	
2.50 - 2.99	.	.	.	.	.	.	.	7	28	.	14	.	49	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	14	.	.	14	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	7	21	.	28	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	7	.	.	7	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>0</b>	<b>200</b>	<b>497</b>	<b>1090</b>	<b>1387</b>	<b>940</b>	<b>1029</b>	<b>1181</b>	<b>2111</b>	<b>484</b>	<b>1023</b>	<b>62</b>		

**Table C2**  
**Monthly Joint Distribution of  $H_{mo}$  versus  $T_p$**

January 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	.	81	81	.	163	81	163	81	163	.	732	325	1870
0.50 - 0.99	.	81	407	1057	650	163	244	244	1220	.	81	81	4228
1.00 - 1.49	.	.	.	244	325	325	163	81	325	.	.	.	1463
1.50 - 1.99	.	.	.	81	163	325	.	488	894	.	.	.	1951
2.00 - 2.49	.	.	.	.	.	81	.	.	244	.	.	.	325
2.50 - 2.99	.	.	.	.	.	.	.	.	163	.	.	.	163
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	162	488	1382	1301	975	570	894	3009	0	813	406	

February 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	.	89	.	.	.	179	446	536	357	446	714	179	2946
0.50 - 0.99	.	89	536	536	625	625	446	714	446	.	89	89	4195
1.00 - 1.49	.	.	89	446	1071	446	357	89	.	.	.	.	2498
1.50 - 1.99	.	.	.	89	89	89	89	.	.	.	.	.	356
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	178	625	1071	1785	1339	1338	1339	803	446	803	268	

March 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	.	.	.	.	.	83	.	.	83	.	.	.	166
0.50 - 0.99	.	.	165	579	413	413	744	1157	1322	331	413	.	5537
1.00 - 1.49	.	.	.	165	331	83	496	248	744	83	331	.	2481
1.50 - 1.99	.	.	.	83	331	331	83	331	248	.	.	.	1407
2.00 - 2.49	.	.	.	.	83	83	.	165	.	.	.	.	331
2.50 - 2.99	.	.	.	.	.	.	.	83	.	.	.	.	83
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	0	165	827	1158	993	1323	1984	2397	414	744	0	

(Continued)

(Sheet 1 of 4)

**Table C2 (Continued)**

April 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	.	167	250	83	250	333	83	417	83	333	83	2082	
0.50 - 0.99	.	333	667	750	917	667	917	417	333	417	750	.	6168	
1.00 - 1.49	.	.	167	250	167	500	250	83	.	.	.	.	1417	
1.50 - 1.99	.	.	.	83	167	83	.	.	.	.	.	.	333	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	0	333	1001	1333	1334	1500	1500	583	750	500	1083	83		

May 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	.	.	161	726	242	161	242	887	.	403	.	2822	
0.50 - 0.99	.	403	81	323	323	242	323	484	1290	161	1210	.	4840	
1.00 - 1.49	.	.	161	242	242	161	161	242	887	81	81	.	2258	
1.50 - 1.99	.	.	.	.	.	81	.	.	.	.	.	.	81	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	0	403	242	726	1291	726	645	968	3064	242	1694	0		

June 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	84	84	.	336	252	84	504	168	.	672	.	2184	
0.50 - 0.99	.	84	336	1008	1849	1008	1261	168	252	.	84	.	6050	
1.00 - 1.49	.	.	.	336	420	84	420	84	252	.	84	.	1680	
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	84	.	84	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	0	168	420	1344	2605	1344	1765	756	672	0	924	0		

(Continued)

(Sheet 2 of 4)

**Table C2 (Continued)**

July 1995, Gauge 111  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)											Total	
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-		16.0-
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9		Longer
0.00 - 0.49	.	83	250	.	167	667	167	583	2417	83	333	.	4750
0.50 - 0.99	.	167	250	583	333	333	583	1000	1667	83	167	.	5166
1.00 - 1.49	.	.	.	83	.	.	.	.	.	.	.	.	83
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	250	500	666	500	1000	750	1583	4084	166	500	0	

August 1995, Gauge 111  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)											Total	
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-		16.0-
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9		Longer
0.00 - 0.49	.	.	.	.	81	242	161	161	887	81	81	.	1694
0.50 - 0.99	.	161	81	81	161	161	645	484	323	323	403	.	2743
1.00 - 1.49	.	.	242	323	81	.	81	81	806	242	323	.	2179
1.50 - 1.99	.	.	.	.	161	161	81	.	565	161	81	.	1210
2.00 - 2.49	.	.	.	.	161	81	161	242	323	161	161	.	1290
2.50 - 2.99	.	.	.	.	.	.	.	.	161	.	161	.	322
3.00 - 3.49	.	.	.	.	.	.	.	.	.	161	.	.	161
3.50 - 3.99	.	.	.	.	.	.	.	.	.	81	242	.	323
4.00 - 4.49	.	.	.	.	.	.	.	.	.	81	.	.	81
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	161	323	404	565	645	1129	968	3065	1291	1452	0	

September 1995, Gauge 111  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)											Total	
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-		16.0-
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9		Longer
0.00 - 0.49	.	.	.	.	.	.	.	.	.	.	.	.	0
0.50 - 0.99	.	83	167	83	167	83	250	750	1167	83	.	.	2833
1.00 - 1.49	.	.	250	167	83	417	417	1083	1083	833	833	.	4750
1.50 - 1.99	.	.	.	417	750	83	167	250	.	.	167	.	1834
2.00 - 2.49	.	.	.	.	250	83	83	167	.	.	.	.	583
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	83	417	667	1250	666	917	1584	2250	1166	1000	0	

(Continued)

(Sheet 3 of 4)

**Table C2 (Concluded)**

October 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	.	.	.	.	.	.	.	81	.	.	.	81	
0.50 - 0.99	.	81	161	484	565	403	726	1613	1048	565	1290	.	6936	
1.00 - 1.49	.	81	161	726	242	161	.	161	968	.	81	.	2581	
1.50 - 1.99	.	.	.	81	.	.	242	.	81	.	.	.	404	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	162	322	1291	807	564	968	1774	2178	565	1371	0		

November 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	169	.	.	.	.	85	169	593	85	508	.	1609	
0.50 - 0.99	.	.	169	339	593	508	85	508	1186	424	847	.	4659	
1.00 - 1.49	.	.	339	508	847	339	169	254	169	169	169	.	2963	
1.50 - 1.99	.	.	.	85	254	.	169	85	.	85	.	.	578	
2.00 - 2.49	.	.	.	.	.	.	85	.	.	.	.	.	85	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	169	508	932	1694	847	593	1016	1948	763	1524	0		

December 1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	161	161	403	323	.	242	242	403	242	242	.	2419	
0.50 - 0.99	.	161	565	1452	2016	161	323	242	242	.	.	.	5162	
1.00 - 1.49	.	.	242	565	81	403	161	161	161	.	81	.	1855	
1.50 - 1.99	.	.	.	.	.	81	161	81	161	.	.	.	484	
2.00 - 2.49	.	.	.	.	.	81	.	.	.	.	.	.	81	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	322	968	2420	2420	726	887	726	967	242	323	0		

**Table C3**  
**Annual Joint Distribution of  $H_{mo}$  versus  $T_p$  (All Years)**

		Annual 1985-1995, Gauge 111 Percent Occurrence (X100) of Height and Period													
Height (m)	Period (sec)													Total	
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-			
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer			
0.00 - 0.49	5	72	44	72	131	232	639	494	433	147	263	16		2548	
0.50 - 0.99	2	131	261	424	591	413	880	758	658	132	294	16		4470	
1.00 - 1.49	.	10	119	333	279	154	237	196	281	43	98	1		1751	
1.50 - 1.99	.	.	6	100	179	80	78	72	127	25	52	1		720	
2.00 - 2.49	.	.	.	5	53	44	35	34	51	18	32	1		273	
2.50 - 2.99	.	.	.	.	7	13	11	17	34	10	24	.		116	
3.00 - 3.49	.	.	.	.	2	5	7	12	19	8	5	.		58	
3.50 - 3.99	.	.	.	.	.	1	6	5	15	6	8	1		42	
4.00 - 4.49	.	.	.	.	.	.	1	2	7	3	5	3		21	
4.50 - 4.99	.	.	.	.	.	.	.	.	1	1	.	.		2	
5.00 - Greater	.	.	.	.	.	.	.	.	1	.	.	.		1	
Total	7	213	430	934	1152	942	1894	1591	1626	393	781	39			

**Table C4**  
**Monthly Joint Distribution of  $H_{mo}$  versus  $T_p$  (All Years)**

January 1985-1995, Gauge 111														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period(sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	.	98	15	53	45	196	339	640	451	105	241	45	2228	
0.50 - 0.99	.	128	211	512	504	324	647	722	790	53	196	15	4102	
1.00 - 1.49	.	8	143	519	459	143	196	211	301	15	38	.	2033	
1.50 - 1.99	.	.	8	135	263	105	83	105	203	38	15	.	955	
2.00 - 2.49	.	.	.	.	60	90	83	30	83	8	38	.	392	
2.50 - 2.99	.	.	.	.	8	8	38	23	98	.	23	.	198	
3.00 - 3.49	.	.	.	.	.	15	8	30	8	8	.	.	69	
3.50 - 3.99	.	.	.	.	.	.	.	15	.	8	.	.	23	
4.00 - 4.49	.	.	.	.	.	.	.	.	8	.	.	.	8	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	234	377	1219	1339	866	1401	1739	1971	235	567	60		

February 1985-1995, Gauge 111														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period(sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	.	50	33	41	91	91	356	521	364	66	199	17	1829	
0.50 - 0.99	.	83	289	380	529	405	744	778	868	58	174	17	4325	
1.00 - 1.49	.	8	108	447	463	248	331	298	356	41	132	.	2432	
1.50 - 1.99	.	.	8	132	273	99	91	66	124	8	17	.	818	
2.00 - 2.49	.	.	.	17	83	83	8	17	33	.	41	.	282	
2.50 - 2.99	.	.	.	.	8	17	.	25	50	25	33	.	158	
3.00 - 3.49	.	.	.	.	8	.	17	41	17	8	17	.	108	
3.50 - 3.99	.	.	.	.	.	.	.	17	25	8	.	.	50	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	141	438	1017	1455	943	1547	1763	1837	214	613	34		

March 1985-1995, Gauge 111														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period(sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	7	22	15	45	90	127	307	209	307	90	127	.	1346	
0.50 - 0.99	.	90	142	419	479	494	815	815	920	127	359	.	4650	
1.00 - 1.49	.	7	180	337	411	172	247	262	479	15	172	.	2282	
1.50 - 1.99	.	.	7	97	187	120	75	97	209	15	120	.	927	
2.00 - 2.49	.	.	.	7	67	22	52	112	67	.	90	.	417	
2.50 - 2.99	.	.	.	.	7	15	15	37	45	30	30	.	179	
3.00 - 3.49	.	.	.	.	.	7	.	15	37	7	.	.	66	
3.50 - 3.99	.	.	.	.	.	.	7	.	52	7	7	.	73	
4.00 - 4.49	.	.	.	.	.	.	.	.	22	.	15	.	37	
4.50 - 4.99	.	.	.	.	.	.	.	.	7	.	.	.	7	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	7	119	344	905	1241	957	1518	1547	2145	291	920	0		

(Continued)

(Sheet 1 of 4)

Table C4 (Continued)

April 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	8	31	23	77	69	131	432	309	340	224	355	15	2014	
0.50 - 0.99	.	170	232	432	502	463	1012	988	749	239	494	8	5289	
1.00 - 1.49	.	23	69	216	201	154	263	278	162	31	93	.	1490	
1.50 - 1.99	.	.	15	93	116	62	77	69	185	15	54	.	686	
2.00 - 2.49	.	.	.	15	46	.	15	46	100	.	31	.	253	
2.50 - 2.99	.	.	.	.	8	.	15	15	39	54	.	.	131	
3.00 - 3.49	.	.	.	.	8	8	8	8	23	8	8	.	71	
3.50 - 3.99	.	.	.	.	.	.	.	.	8	8	8	.	32	
4.00 - 4.49	.	.	.	.	.	.	8	8	8	.	.	.	24	
4.50 - 4.99	.	.	.	.	.	.	.	.	8	.	.	.	8	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	8	224	339	833	950	818	1838	1721	1622	579	1043	23		

May 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	8	77	38	138	284	238	682	437	575	238	429	.	3144	
0.50 - 0.99	.	161	284	276	429	460	1034	743	621	92	284	15	4399	
1.00 - 1.49	.	23	92	192	130	138	330	230	276	15	77	.	1503	
1.50 - 1.99	.	.	8	61	77	23	54	107	146	23	38	8	545	
2.00 - 2.49	.	.	.	.	69	23	46	46	23	31	15	.	253	
2.50 - 2.99	.	.	.	.	31	8	15	8	15	8	23	.	108	
3.00 - 3.49	.	.	.	.	.	.	8	8	15	8	15	.	54	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	8	261	422	667	1020	890	2169	1579	1671	415	881	23		

June 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	16	133	47	47	265	437	1390	812	476	125	219	8	3975	
0.50 - 0.99	8	109	242	461	671	492	1311	882	343	125	187	16	4847	
1.00 - 1.49	.	8	47	195	180	101	125	55	133	.	47	.	891	
1.50 - 1.99	.	.	16	16	39	39	23	16	31	.	39	.	219	
2.00 - 2.49	.	.	.	.	8	8	31	.	8	.	16	.	71	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	24	250	352	719	1163	1077	2880	1765	991	250	508	24		

(Continued)

(Sheet 2 of 4)



Table C4 (Continued)

July 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height(m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	8	139	162	124	239	710	1761	1181	888	239	425	15	5891	
0.50 - 0.99	.	170	301	440	355	448	911	479	347	93	154	15	3713	
1.00 - 1.49	.	.	23	77	39	62	8	39	.	.	15	.	302	
1.50 - 1.99	.	.	.	8	8	8	15	31	23	.	.	.	93	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	8	309	486	649	641	1205	2749	1699	1297	332	594	30		

August 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height(m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	16	63	55	94	211	375	953	617	563	156	164	8	3275	
0.50 - 0.99	.	172	227	492	578	453	1063	672	508	172	320	55	4712	
1.00 - 1.49	.	.	148	227	156	117	273	109	172	39	78	.	1319	
1.50 - 1.99	.	.	.	63	70	39	8	16	109	55	23	.	383	
2.00 - 2.49	.	.	.	.	23	16	16	39	63	23	23	.	203	
2.50 - 2.99	.	.	.	.	.	.	8	.	16	.	16	.	40	
3.00 - 3.49	.	.	.	.	8	.	.	.	.	16	.	.	24	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	8	23	.	31	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	8	8	.	16	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	16	235	430	876	1046	1000	2321	1453	1431	477	655	63		

September 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height(m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	40	8	24	32	119	445	278	397	159	286	.	1788	
0.50 - 0.99	.	143	262	365	429	381	953	937	858	151	270	.	4749	
1.00 - 1.49	.	8	111	357	159	207	365	262	342	159	167	.	2137	
1.50 - 1.99	.	.	.	135	214	127	151	71	56	24	71	8	857	
2.00 - 2.49	.	.	.	.	71	87	24	40	.	48	40	16	326	
2.50 - 2.99	.	.	.	.	.	56	16	16	8	.	8	.	104	
3.00 - 3.49	.	.	.	.	.	.	8	.	.	.	.	.	8	
3.50 - 3.99	.	.	.	.	.	.	.	8	24	.	.	.	32	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	191	381	881	905	977	1962	1612	1685	541	842	24		

(Continued)

(Sheet 3 of 4)

Table C4 (Concluded)

October 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>	
0.00 - 0.49	.	15	45	23	45	83	219	196	211	76	166	15	1094
0.50 - 0.99	.	106	332	302	468	363	846	869	778	219	483	8	4774
1.00 - 1.49	.	15	219	476	287	106	196	234	498	60	136	.	2227
1.50 - 1.99	.	.	8	181	264	45	181	83	211	53	68	.	1094
2.00 - 2.49	.	.	.	8	60	83	38	38	113	15	23	.	378
2.50 - 2.99	.	.	.	.	8	15	15	23	53	.	30	.	144
3.00 - 3.49	.	.	.	.	.	15	30	30	38	8	15	.	136
3.50 - 3.99	.	.	.	.	.	.	30	8	38	15	8	8	107
4.00 - 4.49	.	.	.	.	.	.	.	.	8	.	.	30	38
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	8	.	.	.	.	8
Total	0	136	604	990	1132	710	1555	1489	1948	446	929	61	

November 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>	
0.00 - 0.49	.	78	23	85	62	155	465	372	310	140	225	62	1977
0.50 - 0.99	8	116	310	427	520	403	721	590	497	186	318	8	4104
1.00 - 1.49	.	8	163	473	465	225	326	178	326	78	109	.	2351
1.50 - 1.99	.	.	.	147	295	140	93	132	109	16	23	.	955
2.00 - 2.49	.	.	.	16	39	85	93	23	62	.	16	.	334
2.50 - 2.99	.	.	.	.	8	23	8	23	23	.	31	.	116
3.00 - 3.49	.	.	.	.	.	8	.	31	39	8	.	.	86
3.50 - 3.99	.	.	.	.	.	.	.	16	.	16	.	.	32
4.00 - 4.49	.	.	.	.	.	.	.	8	16	.	16	.	40
4.50 - 4.99	.	.	.	.	.	.	.	.	.	8	.	.	8
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	8	202	496	1148	1389	1039	1706	1373	1382	452	738	70	

December 1985-1995, Gauge 111  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>	
0.00 - 0.49	.	119	63	111	143	111	325	365	317	151	317	.	2022
0.50 - 0.99	8	119	310	587	556	262	500	619	619	63	278	32	3953
1.00 - 1.49	.	16	119	484	397	206	143	230	278	63	111	8	2055
1.50 - 1.99	.	.	.	127	349	151	79	71	103	48	159	.	1087
2.00 - 2.49	.	.	.	.	111	32	8	16	56	95	48	.	366
2.50 - 2.99	.	.	.	.	8	16	.	32	56	8	95	.	215
3.00 - 3.49	.	.	.	.	.	16	.	8	32	32	.	.	88
3.50 - 3.99	.	.	.	.	.	8	24	16	16	16	48	8	136
4.00 - 4.49	.	.	.	.	.	.	.	8	32	24	16	.	80
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	8	254	492	1309	1564	802	1079	1365	1509	500	1072	48	

(Sheet 4 of 4)

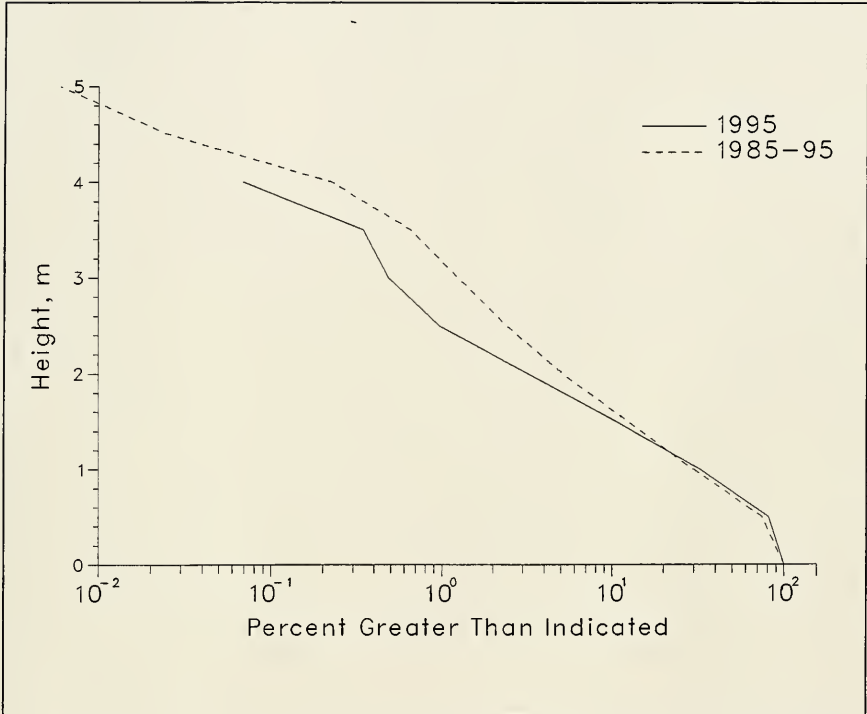


Figure C2. Annual cumulative wave height distributions for Gauge 111

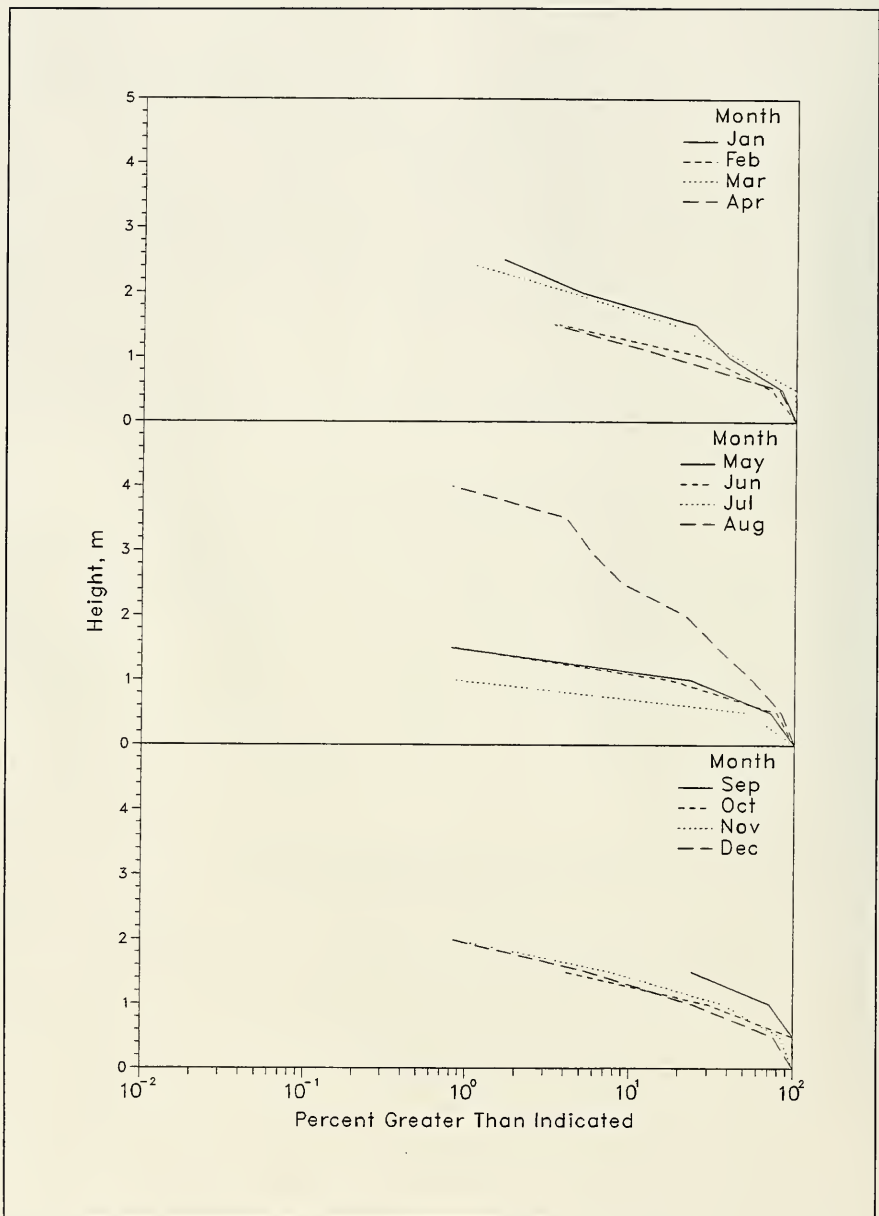


Figure C3. 1995 monthly wave height distributions for Gauge 111

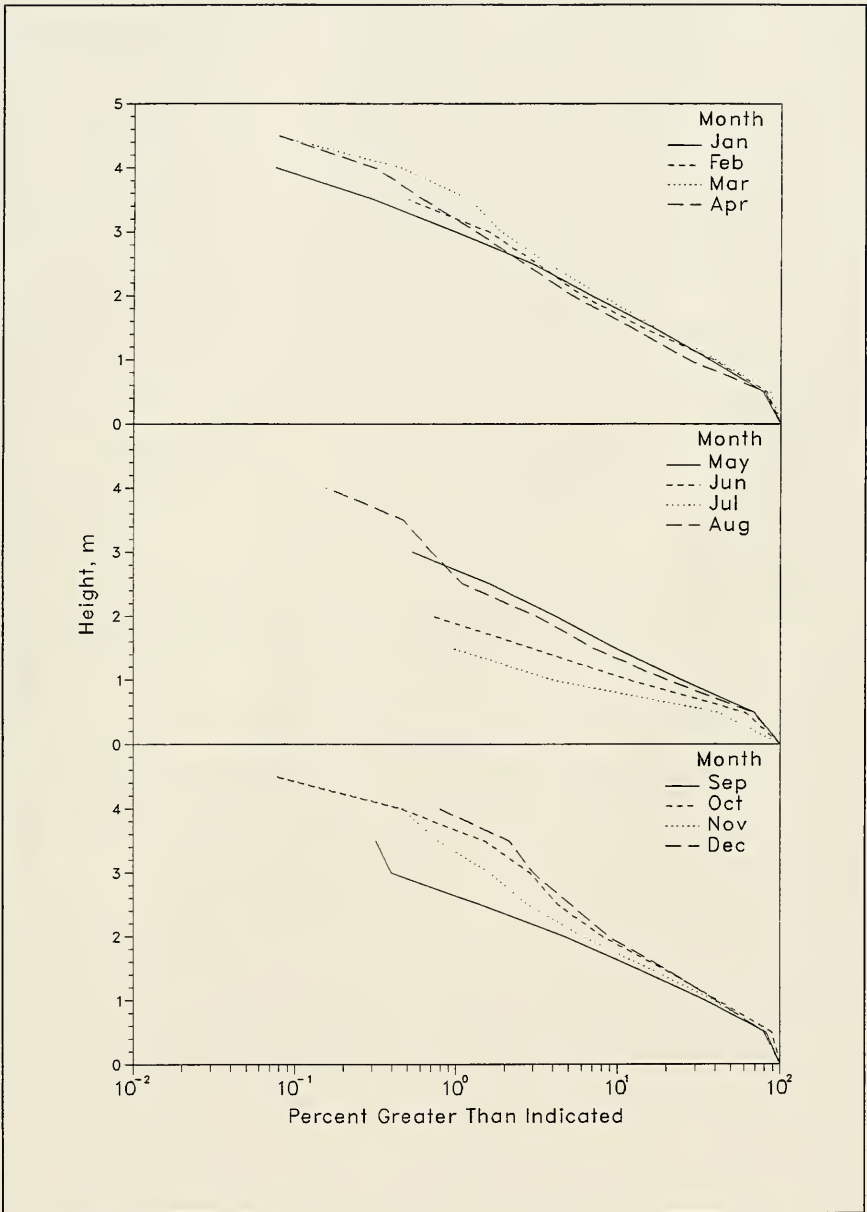


Figure C4. 1980-1995 monthly wave height distributions for Gauge 111

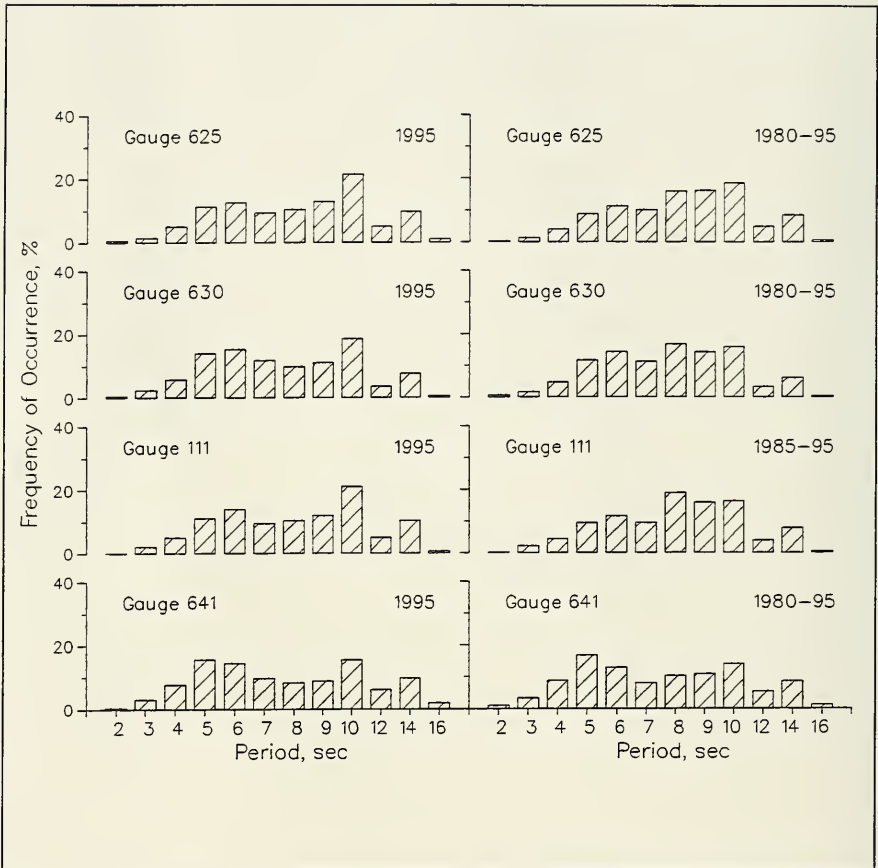


Figure C5. Annual wave period distributions for all gauges

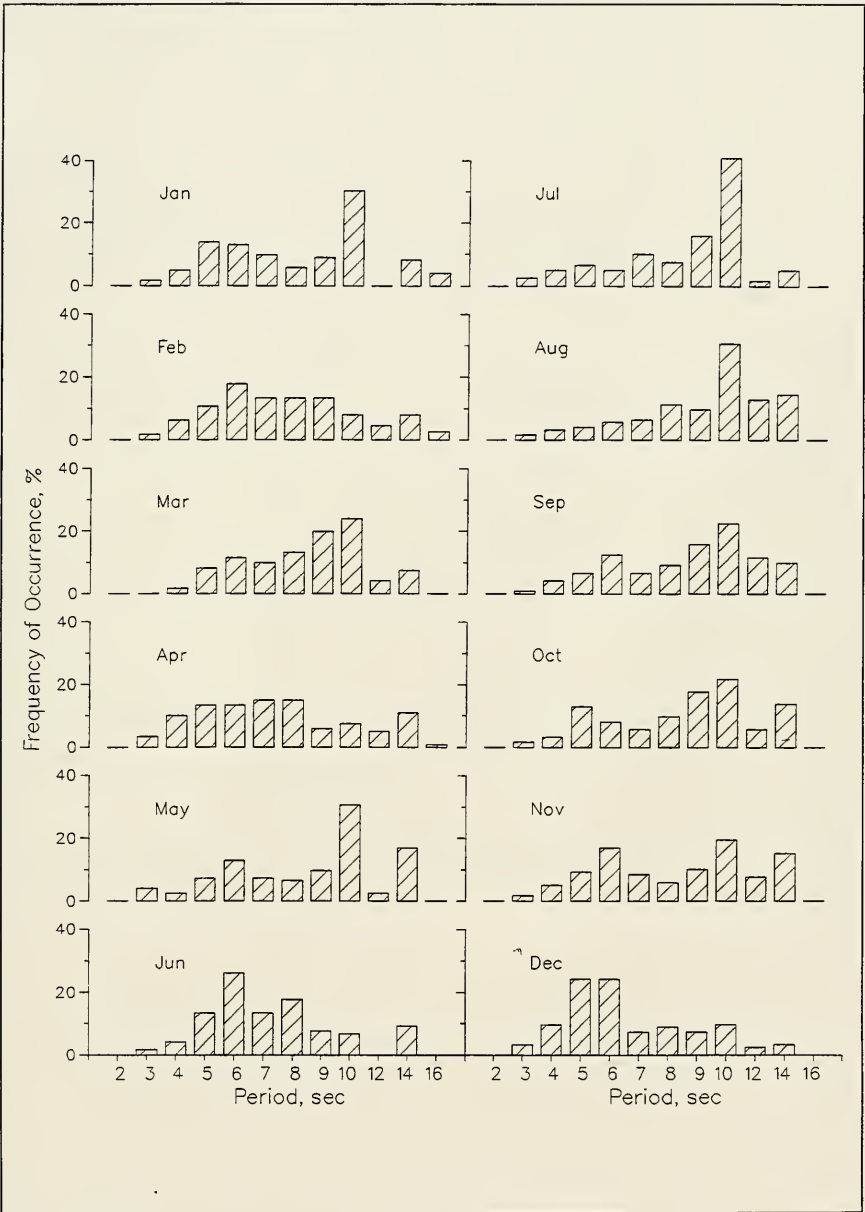


Figure C6. 1995 monthly wave period distributions for Gauge 111

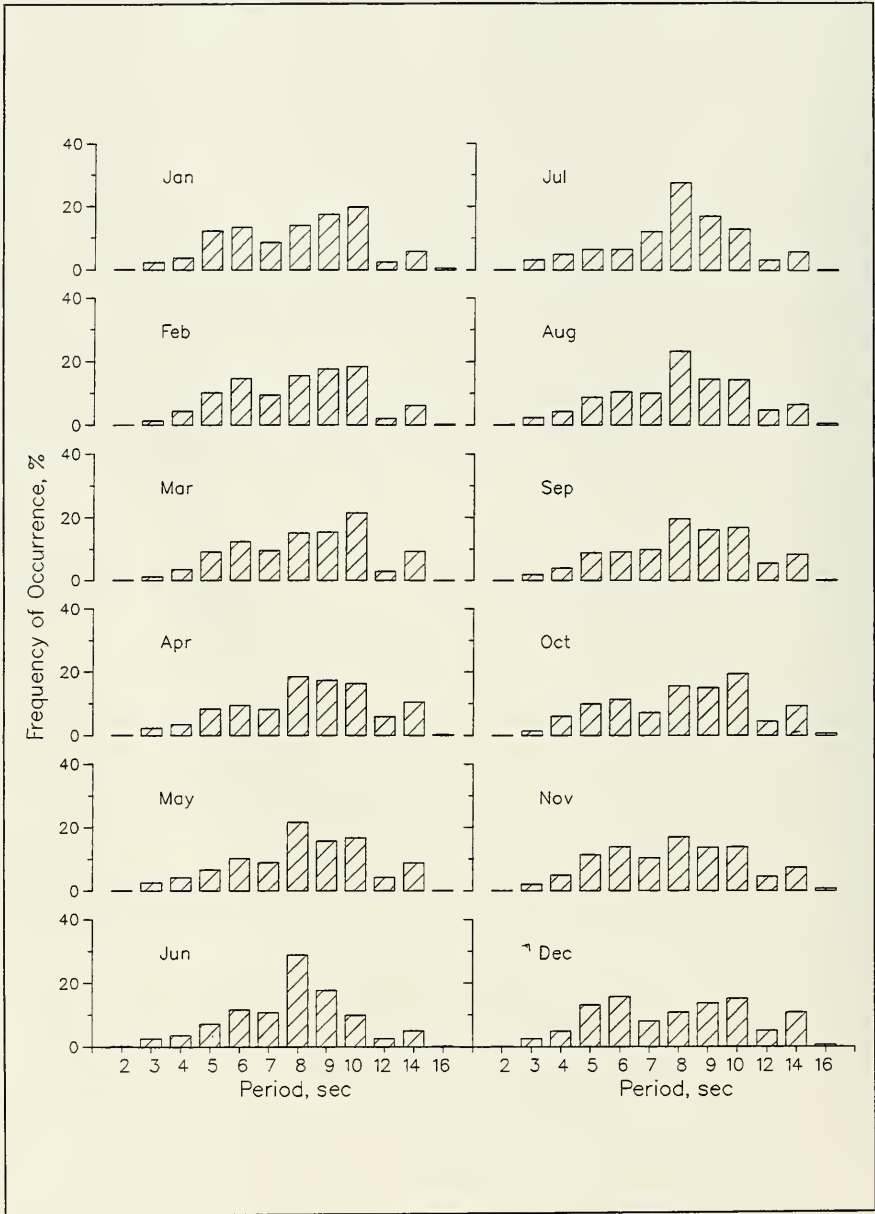


Figure C7. 1980-1995 monthly wave period distributions for Gauge 111



**Table C5**  
**1995 persistence of  $H_{mo}$  for Gauge 111**

Height (m)	Consecutive Day(s) or Longer																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+
0.5	26	22	20	19	18	14	12	11	10	9	8			7	5	4			3
1.0	58	37	27	17	11	7	6	5			2	1							
1.5	32	15	8		3	2		1											
2.0	11	6	2			1													
2.5	5	2																	
3.0	2	1																	
3.5		1																	
4.0																			

**Table C6**  
**1980 through 1995 persistence of  $H_{mo}$  for Gauge 111**

Height (m)	Consecutive Day(s) or Longer																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+
0.5	20		16	15	13	12		10	9	8	7		6		5			4	3
1.0	34	23	16	10		7	5	3	2		1								
1.5	23	13	6	3		2		1											
2.0	11	6	3			1													
2.5	6	3	2	1															
3.0	4	2	1																
3.5	2	1																	
4.0	1																		

\* Data from Gauge 640 from 1985 and 1986 as well as data from Gauge 141 for 1987 were used for comparison with Gauge 111. Gauge 511 used for Jan-Aug 1993.

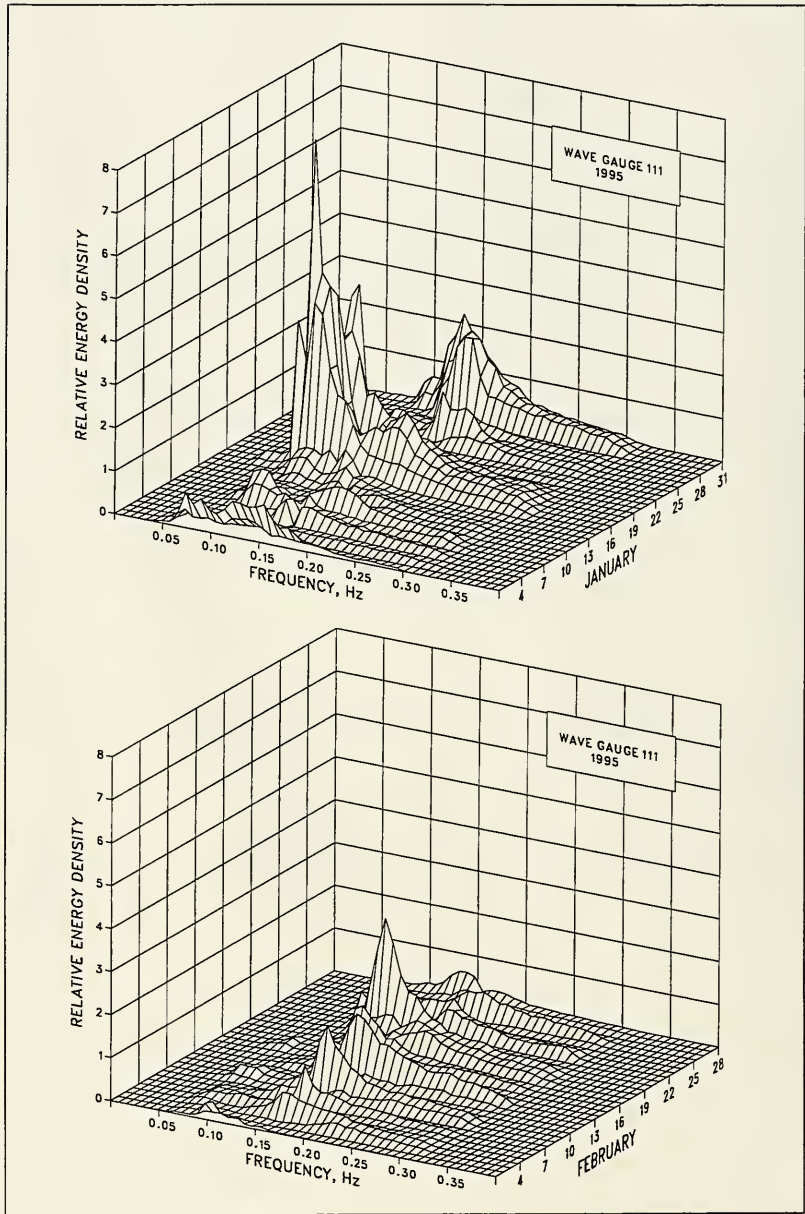


Figure C8. 1995 monthly spectra for Gauge 111 (Sheet 1 of 6)

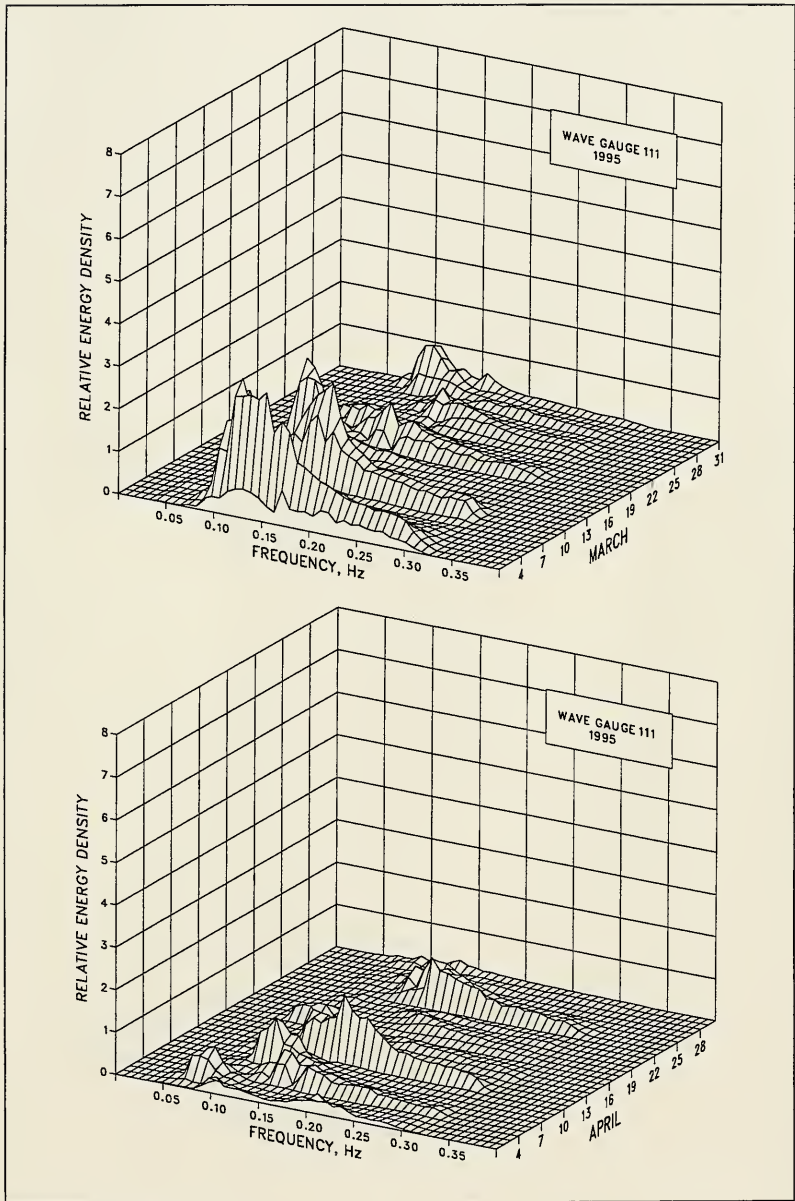


Figure C8. (Sheet 2 of 6)

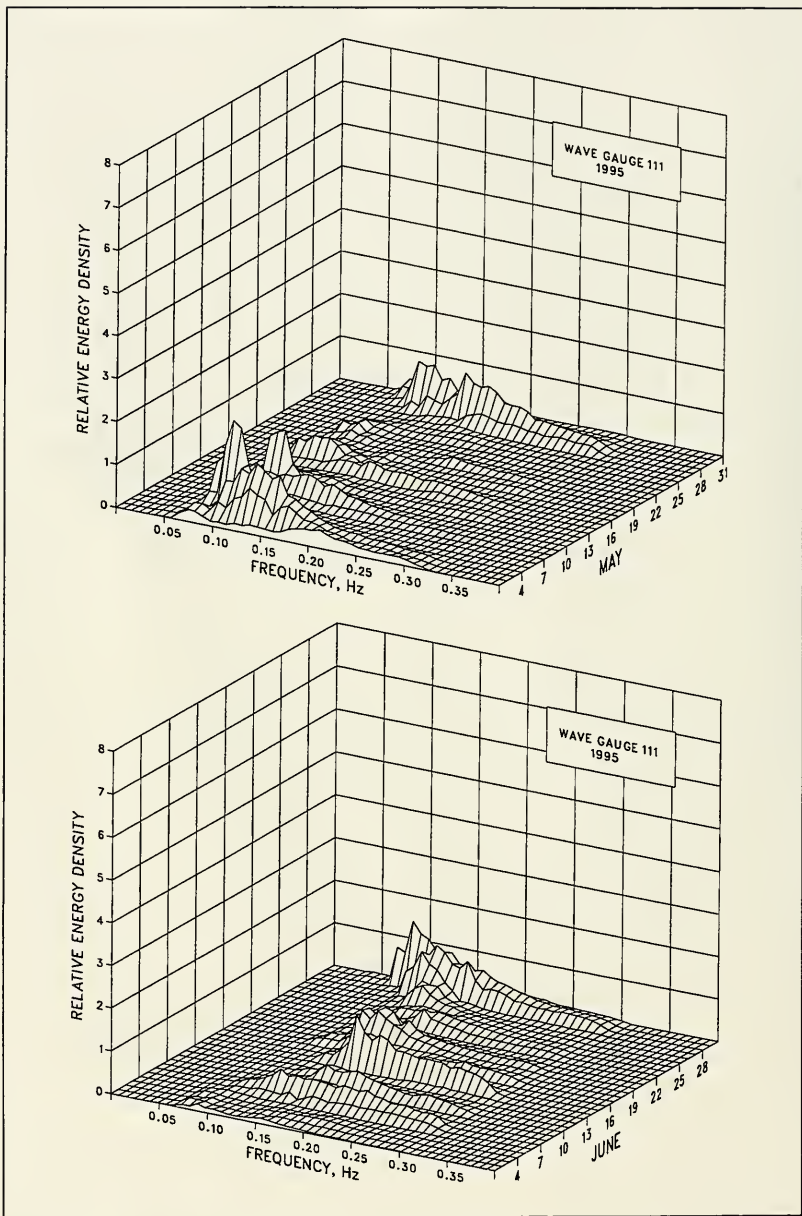


Figure C8. (Sheet 3 of 6)

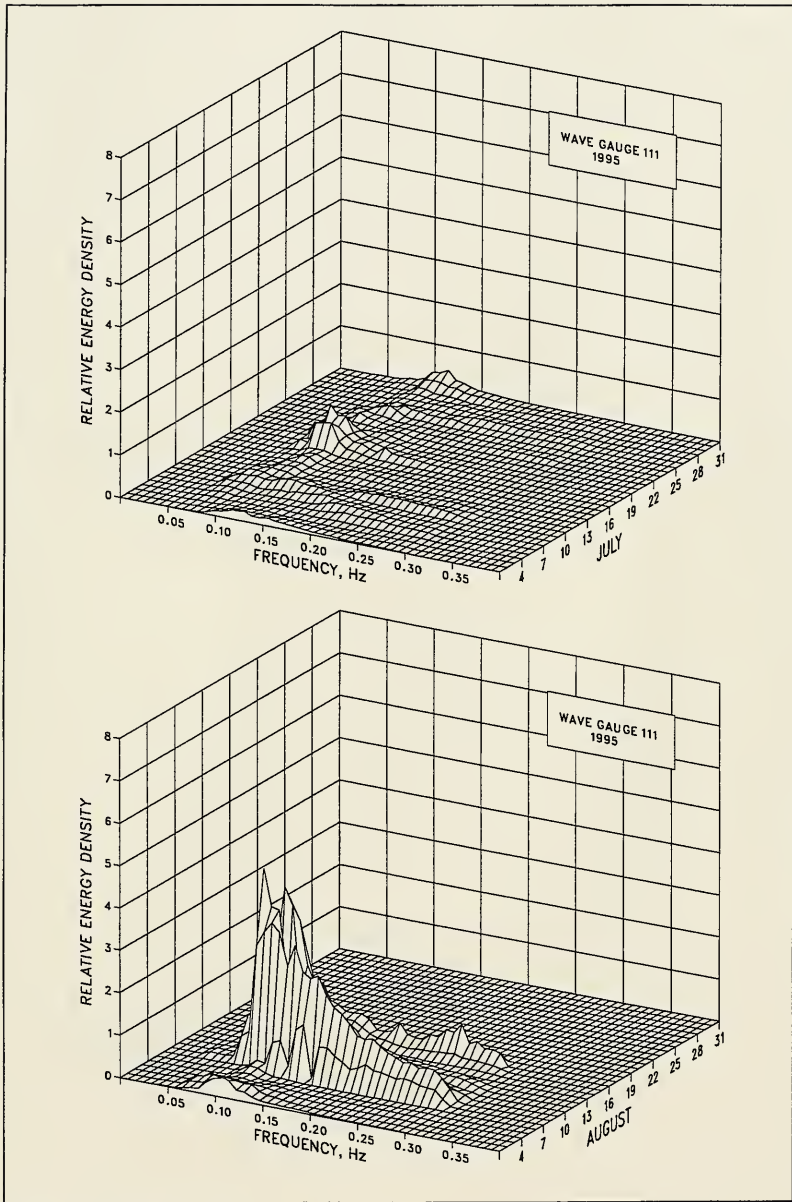


Figure C8. (Sheet 4 of 6)

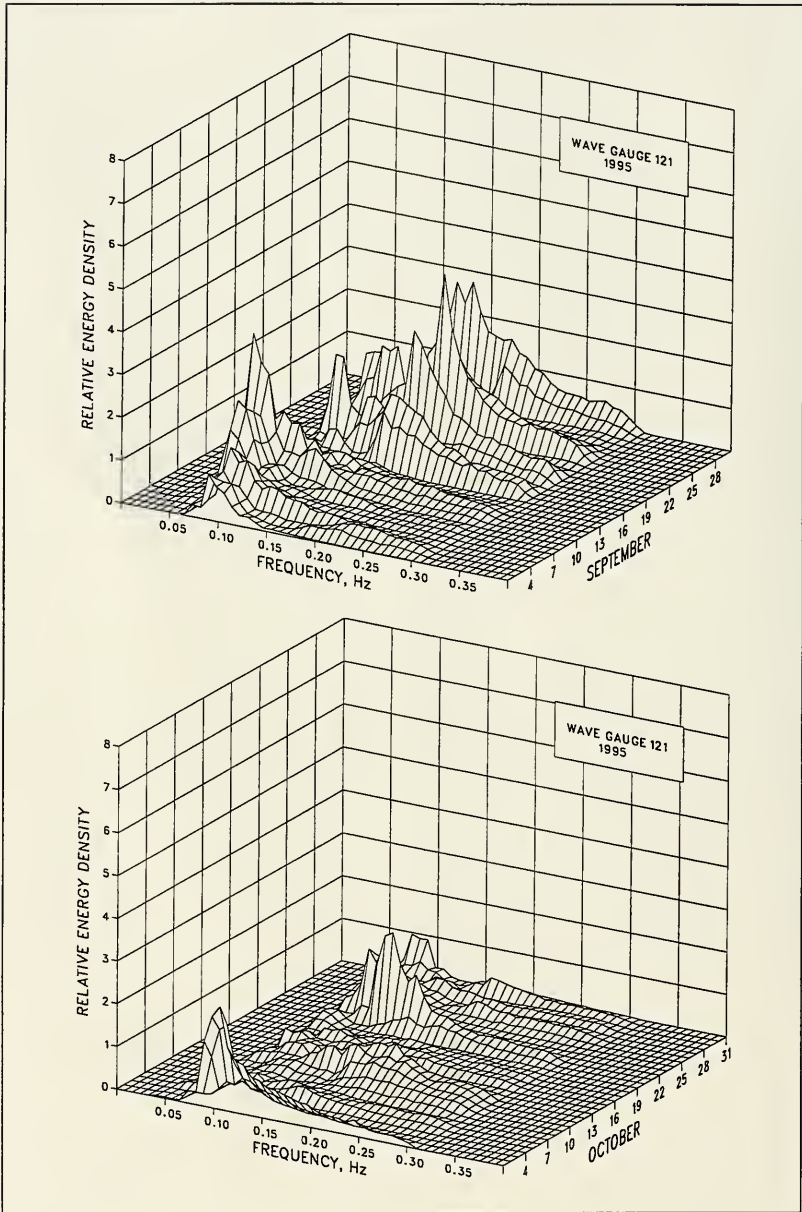


Figure C8. (Sheet 5 of 6)



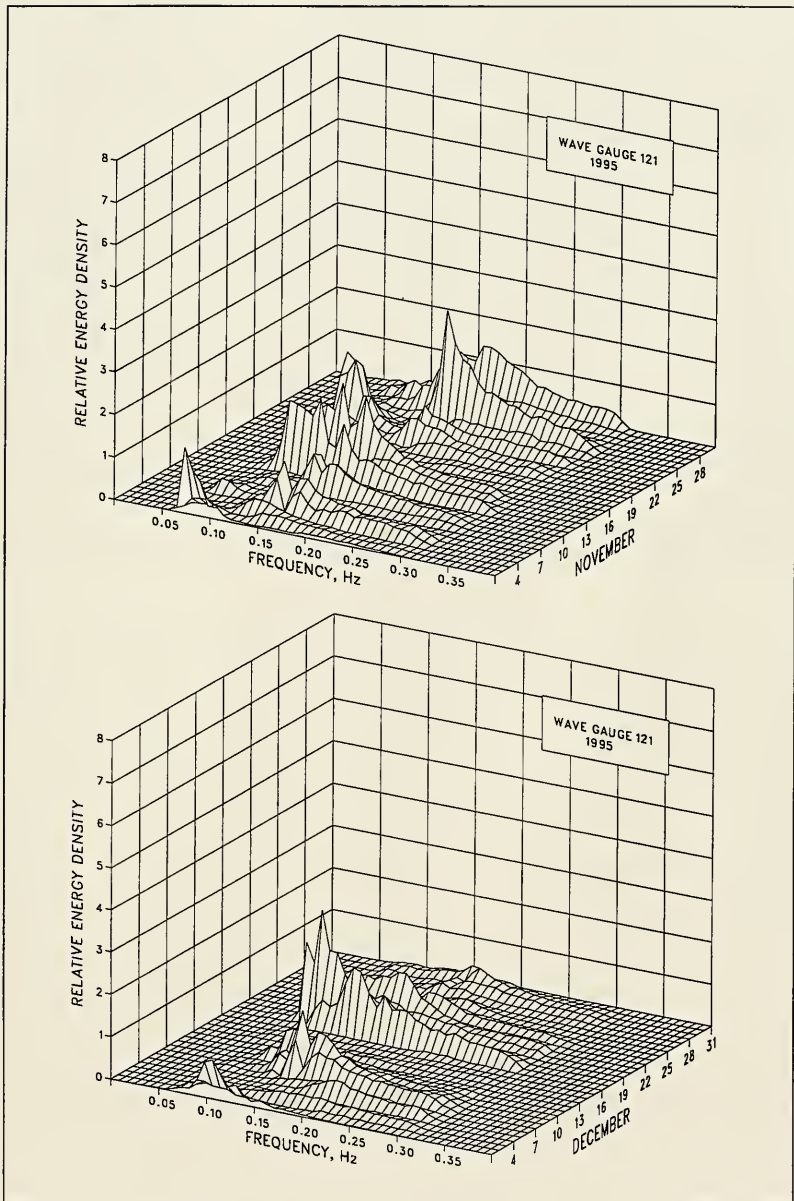


Figure C8. (Sheet 6 of 6)

**Table C7**  
**Wave statistics for Gauge 111**

Month	1995							1985-1995						
	Height			Period				Height			Period			
	Mean	Std. Dev.	Extreme	Mean	Std. Dev.	Number	Mean	Std. Dev.	Extreme	Mean	Std. Dev.	Number		
	m	m	m	Date	sec	sec	Obs.	m	m	m	Date	sec	sec	Obs.
Jan	1.1	0.6	2.7	15	9.1	3.4	123	1.0	0.7	4.0	1992	8.6	2.7	1329
Feb	0.8	0.4	1.8	18	8.5	3.0	112	1.0	0.6	4.0	1989	8.6	2.5	1209
Mar	1.1	0.5	2.6	2	9.2	2.4	121	1.1	0.7	4.5	1987	8.9	2.5	1337
Apr	0.8	0.4	1.8	5	8.3	3.2	120	0.9	0.6	4.8	1988	9.2	2.8	1295
May	0.8	0.4	1.6	3	9.3	2.7	124	0.9	0.6	3.3	1994	8.9	2.7	1305
Jun	0.8	0.3	1.7	28	7.8	2.2	119	0.7	0.4	2.4	1986	8.5	2.4	1281
Jul	0.6	0.2	1.0	9	9.2	2.4	120	0.6	0.3	1.9	1986	8.7	2.5	1295
Aug	1.4	0.9	4.0	16	10.2	2.9	124	0.8	0.5	4.3	1991	8.7	2.7	1280
Sep	1.3	0.5	2.3	30	9.7	3.1	120	1.0	0.6	4.0	1992	9.0	2.7	1259
Oct	0.9	0.3	1.8	21	9.2	2.8	124	1.1	0.7	5.0	1991	8.9	2.8	1324
Nov	0.9	0.5	2.3	11	9.1	2.9	118	1.0	0.7	4.6	1994	8.6	2.8	1289
Dec	0.8	0.4	2.1	7	7.4	2.6	124	1.1	0.8	4.5	1989	8.8	3.1	1260
Annual	0.9	0.5	4.0	Aug	8.9	2.9	1449	0.9	0.6	5.0	Oct 1991	8.8	2.7	15463



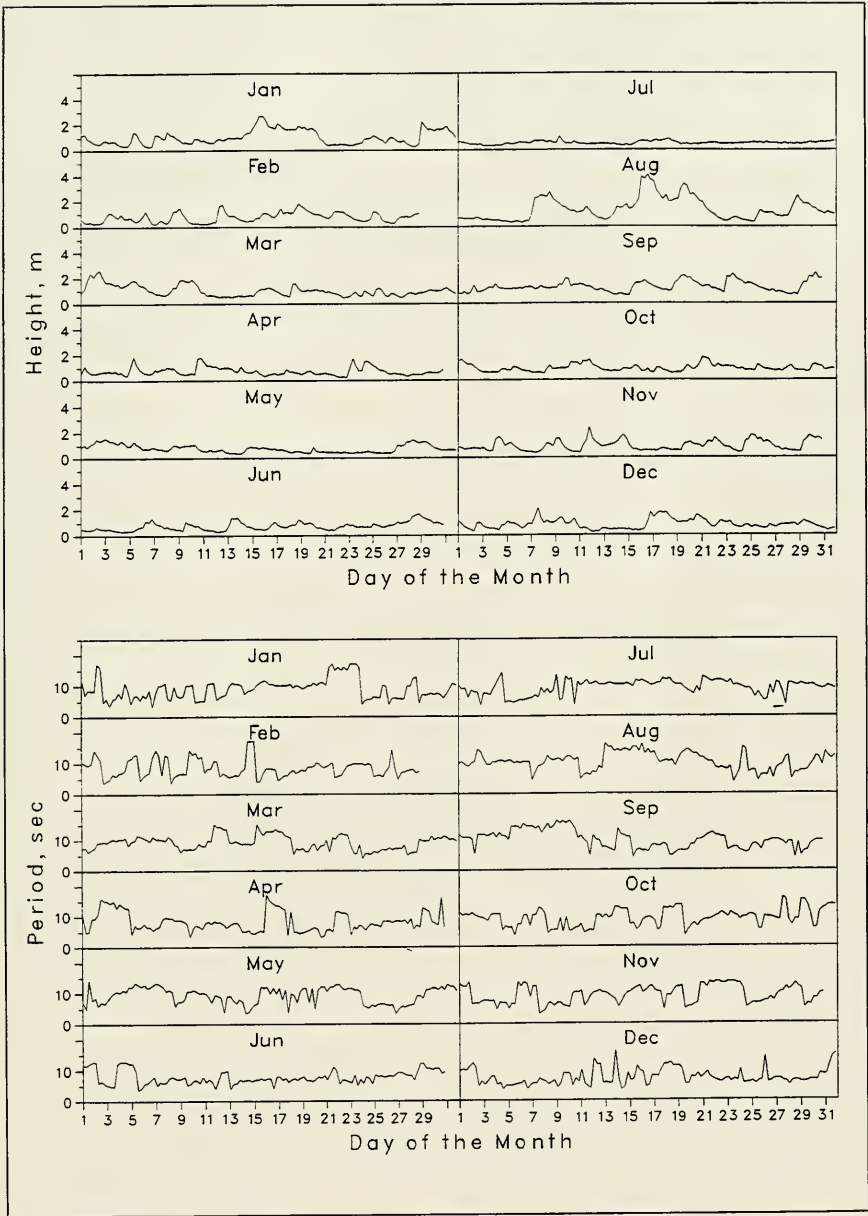


Figure C9. Time-histories of wave height and period for Gauge 111



# Appendix D

## Wave Data for Gauge 625

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Wave data summaries for Gauge 625 for 1995 and for 1980 through 1995 are presented in the following pages:

### Daily $H_{mo}$ and $T_p$

Figure D1 displays the individual wave height  $H_{mo}$  and peak spectral wave period  $T_p$  values, along with the monthly mean values.

### Joint Distributions of $H_{mo}$ and $T_p$

Annual and monthly joint distribution tables are presented in Tables D1 and D2, and data for 1980 through 1995 are in Tables D3 and D4. Each table gives the frequency (in parts per 10,000) for which the wave height and peak period were within the specified intervals; these values can be converted to percentages by dividing by 100. Marginal totals are also included. The row total gives the number of observations out of 10,000 that fell within each specified peak period interval. The column total gives the number of observations out of 10,000 that fell within each specified wave height interval.

### Cumulative Distributions of Wave Height

Annual and monthly wave height distributions for 1995 are plotted in cumulative form in Figures D2 and D3. Data for 1980 through 1995 are plotted in Figure D4.

## Peak Spectral Wave Period Distributions

Annual and monthly peak wave period  $T_p$  distribution histograms for 1995 are presented in Figures D5 and D6. Data for 1980 through 1995 are presented in Figure D7.

## Persistence of Wave Heights

Table D5 shows the number of times in 1995 when the specified wave height was equaled or exceeded at least once during each day for the duration (consecutive days). Data for 1980 through 1995 are averaged and given in Table D6. An example is shown below:

Height m	Consecutive Day(s) or Longer																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+
0.5	18	15		14	13	12		11	10	9					8		7		
1.0	50	34	24	21	18	14	12	8	7	3			2						
1.5	41	19	8	6	2	1													
2.0	22	9	5	1															
2.5	10	5	2																
3.0	6	1																	
3.5		1																	
4.0	1																		

This example indicates that wave heights equaled or exceeded 1.0 m 50 times for at least 1 day; 34 times for at least 2 days; 24 times for at least 3 days, etc. Therefore, on 16 occasions the height equaled or exceeded 1.0 m for 1 day exactly ( $50 - 34 = 16$ ); on 10 occasions for 2 days; on 3 occasions for 3 days, etc. Note that the height exceeded 1 m 50 times for 1 day or longer, while heights exceeded 0.5 m only 18 times for this same duration. This change in durations occurred because the longer durations of lower waves may be interspersed with shorter, but more frequent, intervals of higher waves. For example, one of the times that the wave heights exceeded 0.5 m for 16 days may have represented three times the height exceeded 1 m for shorter durations.

## Spectra

Monthly spectra for the offshore staff gauge (Gauge 625) are presented in Figure D8. The plots show "relative" energy density as a function of wave frequency. These figures summarize the large number of spectra for each

month. The figures emphasize the higher energy density associated with storms, as well as the general shifts in energy density to different frequencies. As used here, "relative" indicates the spectra have been smoothed by the three-dimensional surface drawing routine. Consequently, extremely high- and low-energy density values are modified to produce a smooth surface. The figures are not intended for quantitative measurements; however, they do provide the energy density as a function of frequency relative to the other spectra for the month.

Monthly and annual wave statistics for Gauge 625 for 1995 and for 1980 through 1995 are presented in Table D7.

Figure D9 plots monthly time-histories of wave height and period.

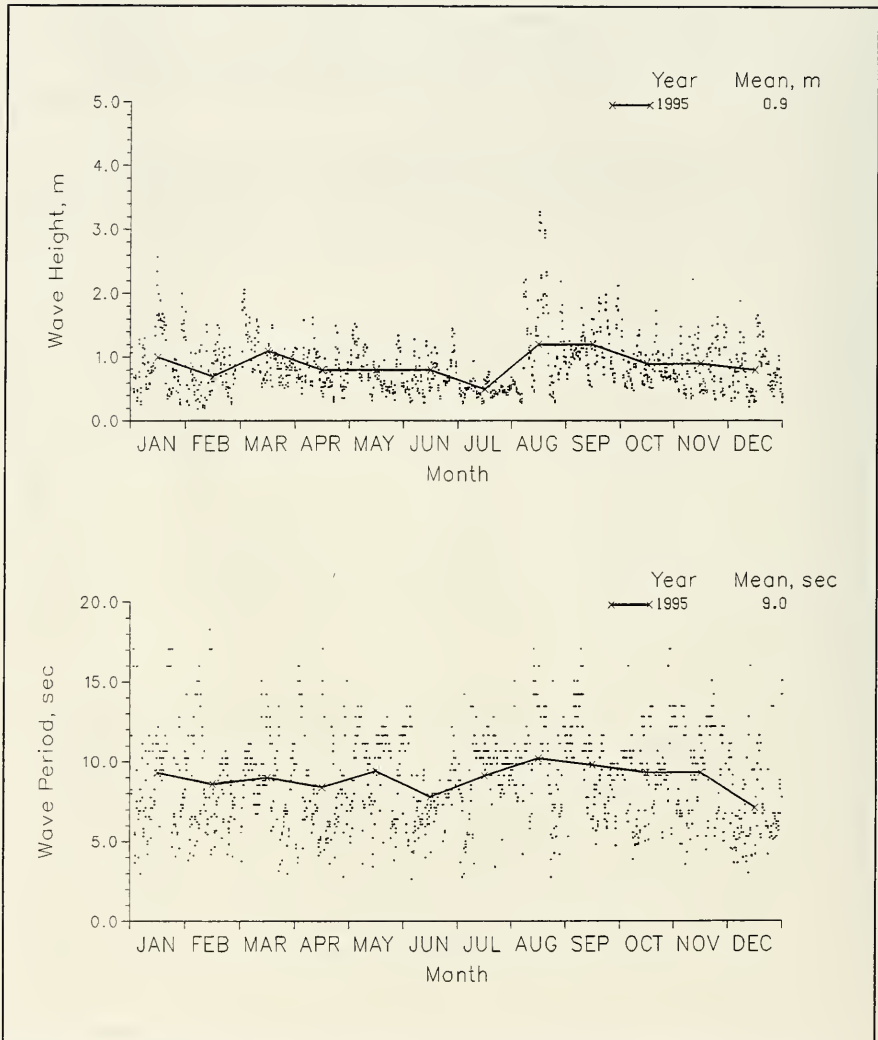


Figure D1. 1995 daily wave height and period values with monthly means for Gauge 625

**Table D1**  
**Annual Joint Distribution of  $H_{mo}$  versus  $T_p$**

		Annual 1995, Gauge 625													
		Percent Occurrence (X100) of Height and Period													
Height (m)	Period (sec)													Total	
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer			
0.00 - 0.49	28	21	42	76	160	167	187	250	583	76	250	69	1909		
0.50 - 0.99	28	111	347	632	611	416	597	701	916	243	479	14	5095		
1.00 - 1.49	.	14	111	361	361	243	194	187	451	125	160	7	2214		
1.50 - 1.99	.	.	.	56	111	104	49	111	125	14	42	.	612		
2.00 - 2.49	.	.	.	.	14	.	14	28	42	7	7	.	112		
2.50 - 2.99	.	.	.	.	.	.	.	.	7	21	7	.	35		
3.00 - 3.49	.	.	.	.	.	.	.	.	.	14	14	.	28		
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0		
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0		
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0		
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0		
Total	56	146	500	1125	1257	930	1041	1277	2124	500	959	90			

**Table D2**  
**Monthly Joint Distribution of  $H_{mo}$  versus  $T_p$**

January 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	81	.	.	.	81	163	81	325	163	.	732	325	1951
0.50 - 0.99	.	81	569	813	732	488	244	81	894	.	325	81	4308
1.00 - 1.49	.	.	.	244	244	325	244	163	650	.	.	.	1870
1.50 - 1.99	.	.	.	81	.	325	163	325	569	.	81	.	1544
2.00 - 2.49	.	.	.	.	81	.	.	.	163	.	.	.	244
2.50 - 2.99	.	.	.	.	.	.	.	.	81	.	.	.	81
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
<b>Total</b>	<b>81</b>	<b>81</b>	<b>569</b>	<b>1138</b>	<b>1138</b>	<b>1301</b>	<b>732</b>	<b>894</b>	<b>2520</b>	<b>0</b>	<b>1138</b>	<b>406</b>	<b>0</b>

February 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	.	.	.	89	179	268	446	357	714	357	357	357	3124
0.50 - 0.99	.	89	804	268	982	625	446	714	625	89	179	.	4821
1.00 - 1.49	.	.	.	804	625	268	179	.	.	.	.	.	1876
1.50 - 1.99	.	.	.	.	89	89	.	.	.	.	.	.	178
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
<b>Total</b>	<b>0</b>	<b>89</b>	<b>804</b>	<b>1161</b>	<b>1875</b>	<b>1250</b>	<b>1071</b>	<b>1071</b>	<b>1339</b>	<b>446</b>	<b>536</b>	<b>357</b>	<b>0</b>

March 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	.	.	.	.	.	.	.	.	.	.	.	.	0
0.50 - 0.99	83	248	83	579	496	413	1074	992	1074	248	496	.	5786
1.00 - 1.49	.	83	.	248	331	331	331	413	909	331	83	.	3060
1.50 - 1.99	.	.	.	83	83	248	.	413	165	.	.	.	992
2.00 - 2.49	.	.	.	.	.	.	83	83	.	.	.	.	166
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
<b>Total</b>	<b>83</b>	<b>331</b>	<b>83</b>	<b>910</b>	<b>910</b>	<b>992</b>	<b>1488</b>	<b>1901</b>	<b>2148</b>	<b>579</b>	<b>579</b>	<b>0</b>	<b>0</b>

(Continued)

(Sheet 1 of 4)



Table D2 (Continued)

April 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	.	.	.	83	.	83	167	167	250	.	167	83	1000	
0.50 - 0.99	83	167	917	917	1083	667	917	417	167	667	1083	.	7085	
1.00 - 1.49	.	.	167	167	667	167	167	333	.	.	.	.	1668	
1.50 - 1.99	.	.	.	83	83	83	.	.	.	.	.	.	249	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	83	167	1084	1250	1833	1000	1251	917	417	667	1250	83		

May 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	.	.	.	81	484	161	161	.	645	.	81	.	1613	
0.50 - 0.99	.	161	242	484	242	403	161	403	2419	242	968	.	5725	
1.00 - 1.49	.	81	81	161	242	403	242	323	887	81	81	.	2582	
1.50 - 1.99	.	.	.	.	.	.	81	.	.	.	.	.	81	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	242	323	726	968	967	645	726	3951	323	1130	0		

June 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	.	.	89	89	714	179	268	268	268	89	446	.	2410	
0.50 - 0.99	89	.	268	1071	1161	1250	1339	446	179	89	89	.	5981	
1.00 - 1.49	.	.	179	179	.	446	268	179	268	.	89	.	1608	
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	89	0	536	1339	1875	1875	1875	893	715	178	624	0		

(Continued)

(Sheet 2 of 4)

Table D2 (Continued)

July 1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	244	81	163	.	81	325	732	1301	2520	163	163	.	5773	
0.50 - 0.99	.	163	163	732	163	163	650	732	1220	81	163	.	4230	
1.00 - 1.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	244	244	326	732	244	488	1382	2033	3740	244	326	0		

August 1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	.	.	.	.	81	403	323	81	806	.	161	81	1936	
0.50 - 0.99	81	81	161	323	81	.	484	806	403	161	403	.	2984	
1.00 - 1.49	.	.	81	242	242	.	81	81	645	323	484	.	2179	
1.50 - 1.99	.	.	.	.	81	242	81	161	565	161	242	.	1533	
2.00 - 2.49	.	.	.	.	.	.	.	161	323	81	81	.	727	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	242	81	.	323	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	161	161	.	322	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	81	81	242	565	566	645	969	1290	2742	1129	1613	81		

September 1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
0.50 - 0.99	.	.	.	.	83	417	500	583	1500	167	83	.	3333	
1.00 - 1.49	.	.	167	333	417	333	417	333	1250	750	750	83	4833	
1.50 - 1.99	.	.	.	333	750	167	83	250	.	.	167	.	1750	
2.00 - 2.49	.	.	.	.	.	.	.	83	.	.	.	.	83	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	0	167	666	1250	917	1000	1249	2750	917	1000	83		

(Continued)

(Sheet 3 of 4)

**Table D2 (Concluded)**

October 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	.	.	.	.	.	.	.	.	81	.	.	.	81	
0.50 - 0.99	.	81	161	323	565	323	726	2258	1210	645	1129	81	7502	
1.00 - 1.49	.	.	242	887	161	161	81	161	403	.	81	.	2177	
1.50 - 1.99	.	.	.	.	.	.	161	81	.	.	.	.	242	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>0</b>	<b>81</b>	<b>403</b>	<b>1210</b>	<b>726</b>	<b>484</b>	<b>968</b>	<b>2500</b>	<b>1694</b>	<b>645</b>	<b>1210</b>	<b>81</b>		

November 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	.	.	.	.	.	169	.	339	1271	169	678	.	2626	
0.50 - 0.99	.	85	169	254	593	254	254	593	678	424	763	.	4067	
1.00 - 1.49	.	.	169	593	1017	339	85	254	169	.	339	.	2965	
1.50 - 1.99	.	.	.	85	169	.	.	.	.	.	.	.	254	
2.00 - 2.49	.	.	.	.	.	.	85	.	.	.	.	.	85	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>0</b>	<b>85</b>	<b>338</b>	<b>932</b>	<b>1779</b>	<b>762</b>	<b>424</b>	<b>1186</b>	<b>2118</b>	<b>593</b>	<b>1780</b>	<b>0</b>		

December 1995, Gauge 625  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	.	167	250	583	333	250	83	167	250	167	250	.	2500	
0.50 - 0.99	.	167	667	1833	1250	83	417	333	500	83	.	.	5333	
1.00 - 1.49	.	.	250	500	417	167	250	.	167	.	.	.	1751	
1.50 - 1.99	.	.	.	.	83	83	.	83	167	.	.	.	416	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>0</b>	<b>334</b>	<b>1167</b>	<b>2916</b>	<b>2083</b>	<b>583</b>	<b>750</b>	<b>583</b>	<b>1084</b>	<b>250</b>	<b>250</b>	<b>0</b>		

**Table D3**  
**Annual Joint Distribution of  $H_{mc}$  versus  $T_p$  (All Years)**

Annual 1980-1995, Gauge 625														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period(sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	12	23	42	67	116	238	556	527	439	180	261	23	2484	
0.50 - 0.99	8	100	263	449	461	419	716	763	812	163	299	28	4481	
1.00 - 1.49	.	5	99	302	329	200	200	194	334	49	133	2	1847	
1.50 - 1.99	.	.	2	64	171	94	64	66	135	36	66	3	701	
2.00 - 2.49	.	.	.	1	35	42	26	33	68	36	42	1	284	
2.50 - 2.99	.	.	.	.	2	10	17	23	44	17	31	1	145	
3.00 - 3.49	.	.	.	.	.	.	4	6	16	9	13	1	49	
3.50 - 3.99	.	.	.	.	.	.	.	.	2	1	2	.	5	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	20	128	406	883	1114	1003	1583	1612	1850	491	847	59		

**Table D4**  
**Monthly Joint Distribution of  $H_{mo}$  versus  $T_p$  (All Years)**

January 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	12	30	36	65	95	178	303	547	399	113	202	36	2016
0.50 - 0.99	.	155	268	452	529	291	571	500	827	107	214	24	3938
1.00 - 1.49	.	.	107	523	541	220	202	184	434	6	65	.	2282
1.50 - 1.99	.	.	.	77	220	202	83	125	196	36	36	.	975
2.00 - 2.49	.	.	.	.	59	119	48	48	155	30	83	.	542
2.50 - 2.99	.	.	.	.	6	12	24	36	71	18	30	.	197
3.00 - 3.49	.	.	.	.	.	.	.	6	18	12	.	.	36
3.50 - 3.99	.	.	.	.	.	.	.	.	6	6	.	.	12
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	12	185	411	1117	1450	1022	1231	1446	2106	328	630	60	

February 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	6	12	30	42	61	91	267	388	358	91	176	24	1546
0.50 - 0.99	12	55	218	370	412	382	655	740	1061	61	255	6	4227
1.00 - 1.49	.	6	109	388	473	261	291	230	503	49	176	.	2486
1.50 - 1.99	.	.	.	115	291	109	73	97	182	55	79	.	1001
2.00 - 2.49	.	.	.	.	30	73	36	42	73	67	97	.	418
2.50 - 2.99	.	.	.	.	.	12	12	30	85	18	79	.	236
3.00 - 3.49	.	.	.	.	.	.	18	6	24	6	6	.	60
3.50 - 3.99	.	.	.	.	.	.	.	.	6	6	12	.	24
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	18	73	357	915	1267	928	1352	1533	2292	353	880	30	

March 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer	
0.00 - 0.49	16	5	5	65	76	92	291	210	302	108	167	.	1337
0.50 - 0.99	16	81	205	502	470	502	669	685	998	130	378	.	4636
1.00 - 1.49	.	11	135	281	356	264	189	227	594	59	286	.	2402
1.50 - 1.99	.	.	.	70	157	86	76	97	243	54	140	5	928
2.00 - 2.49	.	.	.	5	43	43	38	43	103	59	54	.	388
2.50 - 2.99	.	.	.	.	.	5	22	16	76	32	54	.	205
3.00 - 3.49	.	.	.	.	.	.	11	11	43	11	27	.	103
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	32	97	345	923	1102	992	1296	1289	2359	453	1106	5	

(Continued)

(Sheet 1 of 4)

Table D4 (Continued)

April 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height(m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	11	17	11	57	40	141	436	368	374	192	374	6	2027	
0.50 - 0.99	11	85	215	419	407	419	883	945	1064	243	549	11	5251	
1.00 - 1.49	.	6	96	215	249	181	187	266	289	34	141	.	1664	
1.50 - 1.99	.	.	6	40	113	45	68	91	221	11	68	.	663	
2.00 - 2.49	.	.	.	6	23	6	28	23	91	28	6	.	211	
2.50 - 2.99	.	.	.	.	6	17	23	17	40	28	6	.	137	
3.00 - 3.49	.	.	.	.	.	.	.	6	28	.	17	.	51	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	22	108	328	737	838	809	1625	1716	2107	536	1161	17		

May 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height(m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	21	21	37	96	202	308	621	605	557	207	345	5	3025	
0.50 - 0.99	5	143	318	393	472	472	924	950	764	106	249	11	4807	
1.00 - 1.49	.	5	64	149	133	180	287	223	329	21	74	.	1465	
1.50 - 1.99	.	.	.	69	80	27	58	58	101	11	48	.	452	
2.00 - 2.49	.	.	.	.	48	27	21	21	5	27	16	5	170	
2.50 - 2.99	.	.	.	.	.	.	11	11	27	16	11	.	76	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	5	.	5	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	26	169	419	707	935	1014	1922	1868	1783	388	748	21		

June 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height(m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	24	42	72	72	307	463	1288	842	505	132	187	12	3946	
0.50 - 0.99	12	120	277	505	487	529	1143	975	602	96	120	30	4896	
1.00 - 1.49	.	.	54	144	138	126	120	108	162	.	36	6	894	
1.50 - 1.99	.	.	.	24	42	18	12	6	90	.	36	.	228	
2.00 - 2.49	.	.	.	.	6	12	6	6	6	.	.	.	36	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	36	162	403	745	980	1148	2569	1937	1365	228	379	48		

(Continued)

(Sheet 2 of 4)

**Table D4 (Continued)**

July 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	25	74	142	124	192	655	1477	1323	878	352	358	49	5649	
0.50 - 0.99	12	136	278	433	507	476	655	575	402	204	155	49	3882	
1.00 - 1.49	.	.	31	105	93	68	43	25	31	.	12	.	408	
1.50 - 1.99	.	.	.	.	6	12	12	12	6	6	.	.	54	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	37	210	451	668	804	1211	2187	1929	1317	556	525	98		

August 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	30	47	59	201	484	992	791	614	207	213	12	3650	
0.50 - 0.99	24	112	272	490	514	579	880	803	585	189	284	53	4785	
1.00 - 1.49	.	.	77	183	171	118	195	83	112	35	41	.	1015	
1.50 - 1.99	.	.	.	30	77	47	18	18	89	24	41	.	344	
2.00 - 2.49	.	.	.	.	18	6	.	12	47	6	35	.	124	
2.50 - 2.99	.	.	.	.	.	.	6	6	6	18	6	.	42	
3.00 - 3.49	.	.	.	.	6	.	.	6	6	12	12	.	42	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	24	142	396	762	987	1234	2091	1719	1459	491	632	65		

September 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	6	32	19	52	110	271	367	361	232	258	39	1747	
0.50 - 0.99	.	84	251	316	380	470	651	767	1044	161	393	.	4517	
1.00 - 1.49	.	.	77	354	322	271	303	303	432	148	213	6	2429	
1.50 - 1.99	.	.	.	116	258	129	84	97	64	39	90	6	883	
2.00 - 2.49	.	.	.	.	13	90	45	32	19	58	45	6	308	
2.50 - 2.99	.	.	.	.	.	6	19	19	32	.	19	.	95	
3.00 - 3.49	.	.	.	.	.	.	.	.	19	.	.	.	19	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	90	360	805	1025	1076	1373	1585	1971	638	1018	57		

(Continued)

(Sheet 3 of 4)

**Table D4 (Concluded)**

October 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	5	5	21	42	21	105	237	232	279	84	221	26	1278	
0.50 - 0.99	.	95	258	342	374	316	632	837	943	242	353	32	4424	
1.00 - 1.49	.	5	163	442	405	158	142	263	458	105	211	11	2363	
1.50 - 1.99	.	.	21	84	237	74	105	68	205	90	100	16	1000	
2.00 - 2.49	.	.	.	.	63	74	53	79	132	53	47	5	506	
2.50 - 2.99	.	.	.	.	11	37	47	47	53	21	58	16	290	
3.00 - 3.49	.	.	.	.	.	.	.	16	16	32	26	11	117	
3.50 - 3.99	.	.	.	.	.	.	.	.	11	5	.	5	21	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>5</b>	<b>105</b>	<b>463</b>	<b>910</b>	<b>1111</b>	<b>764</b>	<b>1232</b>	<b>1542</b>	<b>2097</b>	<b>632</b>	<b>1016</b>	<b>122</b>		

November 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	6	11	34	67	39	134	342	398	336	218	308	50	1943	
0.50 - 0.99	6	62	347	482	510	359	588	644	627	241	314	28	4208	
1.00 - 1.49	.	22	129	364	566	308	246	207	291	84	140	6	2363	
1.50 - 1.99	.	.	.	84	252	185	118	78	95	62	45	11	930	
2.00 - 2.49	.	.	.	.	62	28	28	17	62	39	39	.	275	
2.50 - 2.99	.	.	.	.	.	11	22	45	56	22	39	.	195	
3.00 - 3.49	.	.	.	.	.	.	6	6	22	11	28	.	73	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	11	.	11	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>12</b>	<b>95</b>	<b>510</b>	<b>997</b>	<b>1429</b>	<b>1025</b>	<b>1350</b>	<b>1395</b>	<b>1489</b>	<b>677</b>	<b>924</b>	<b>95</b>		

December 1980-1995, Gauge 625  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	12	30	48	95	125	131	244	345	345	238	322	24	1959	
0.50 - 0.99	.	71	238	691	471	244	328	703	798	161	304	95	4104	
1.00 - 1.49	.	.	131	476	494	244	191	185	334	48	179	.	2282	
1.50 - 1.99	.	.	.	48	316	203	54	48	95	48	101	.	913	
2.00 - 2.49	.	.	.	.	42	36	6	71	107	60	83	.	405	
2.50 - 2.99	.	.	.	.	6	18	18	48	77	30	66	.	263	
3.00 - 3.49	.	.	.	.	.	.	.	18	12	18	30	.	78	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>12</b>	<b>101</b>	<b>417</b>	<b>1310</b>	<b>1454</b>	<b>876</b>	<b>841</b>	<b>1418</b>	<b>1768</b>	<b>603</b>	<b>1085</b>	<b>119</b>		

(Sheet 4 of 4)



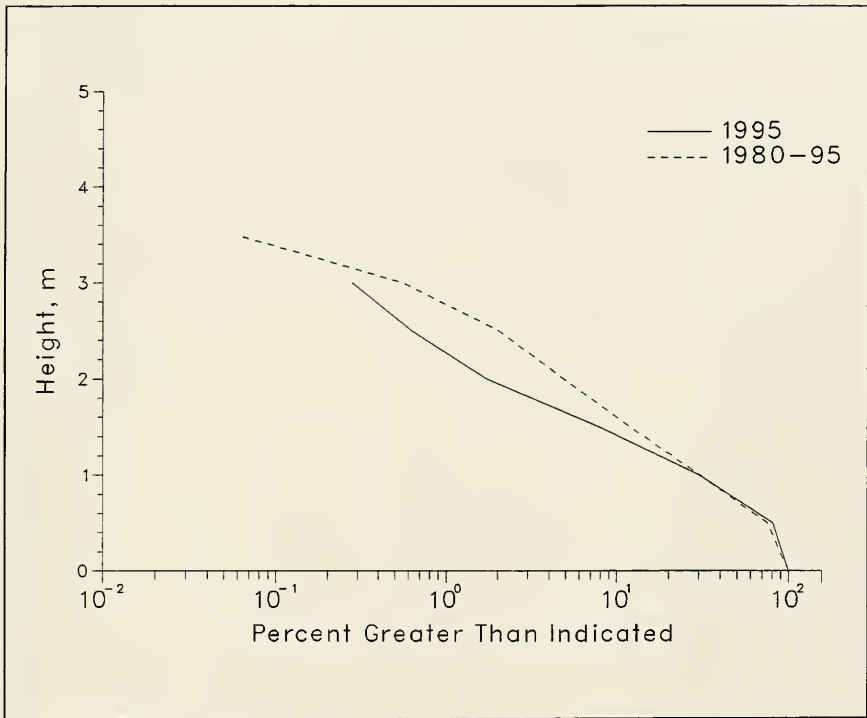


Figure D2. Annual cumulative wave height distributions for Gauge 625

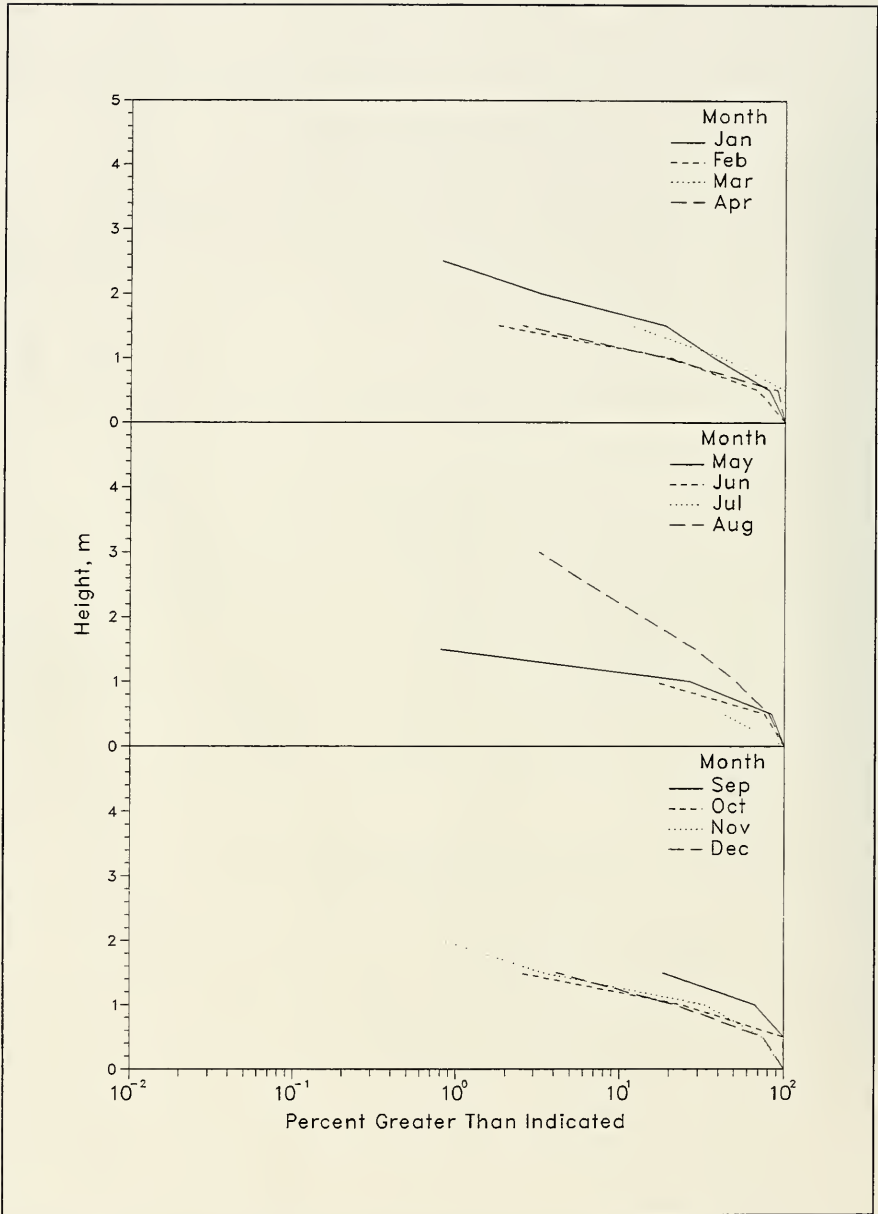


Figure D3. 1995 monthly wave height distributions for Gauge 625

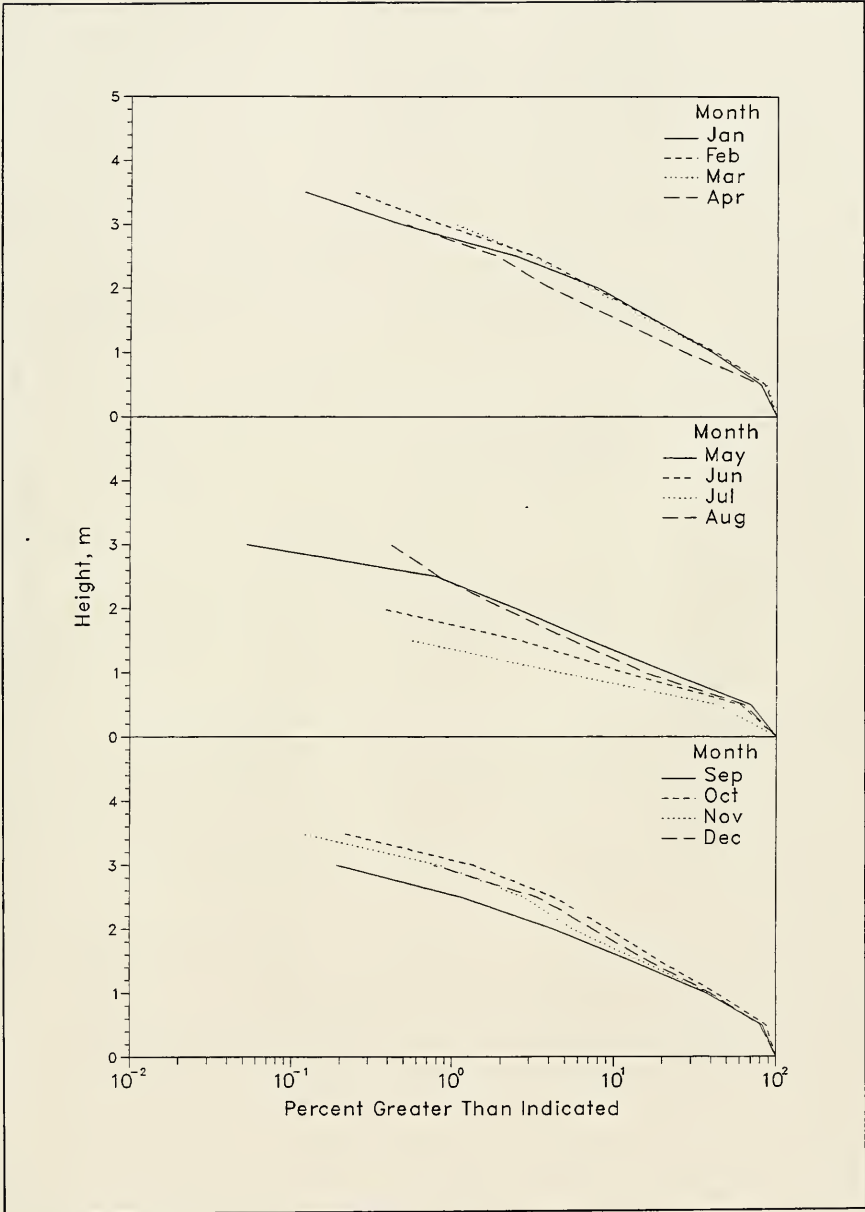


Figure D4. 1980-1995 monthly wave height distributions for Gauge 625

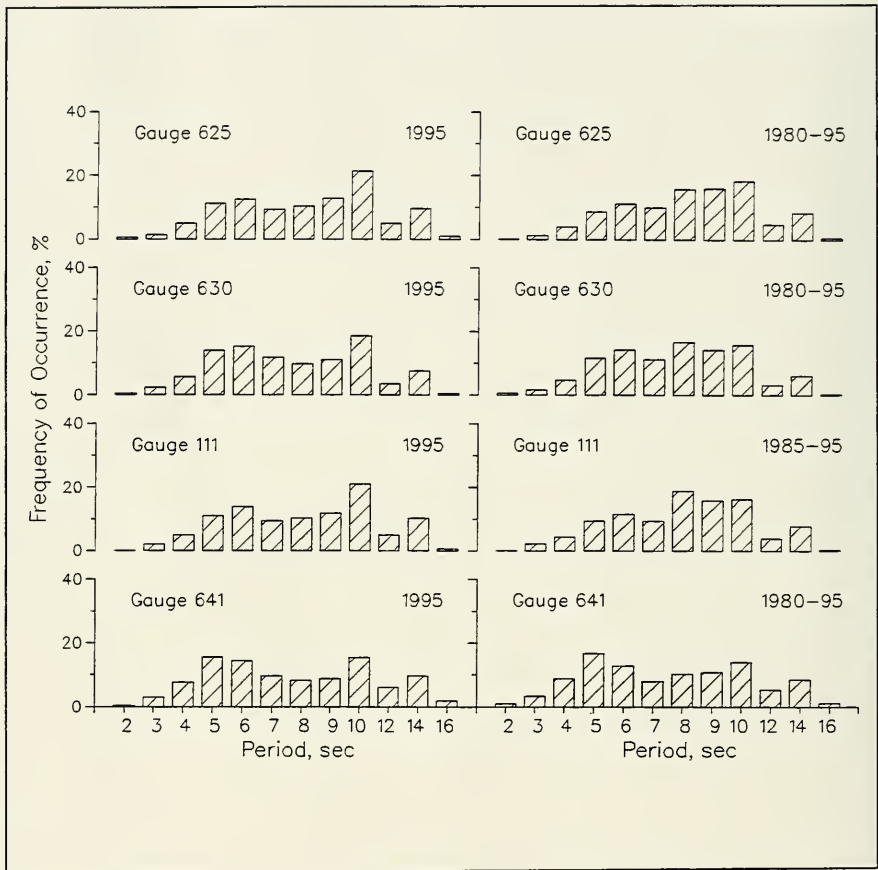


Figure D5. Annual wave period distributions for all gauges

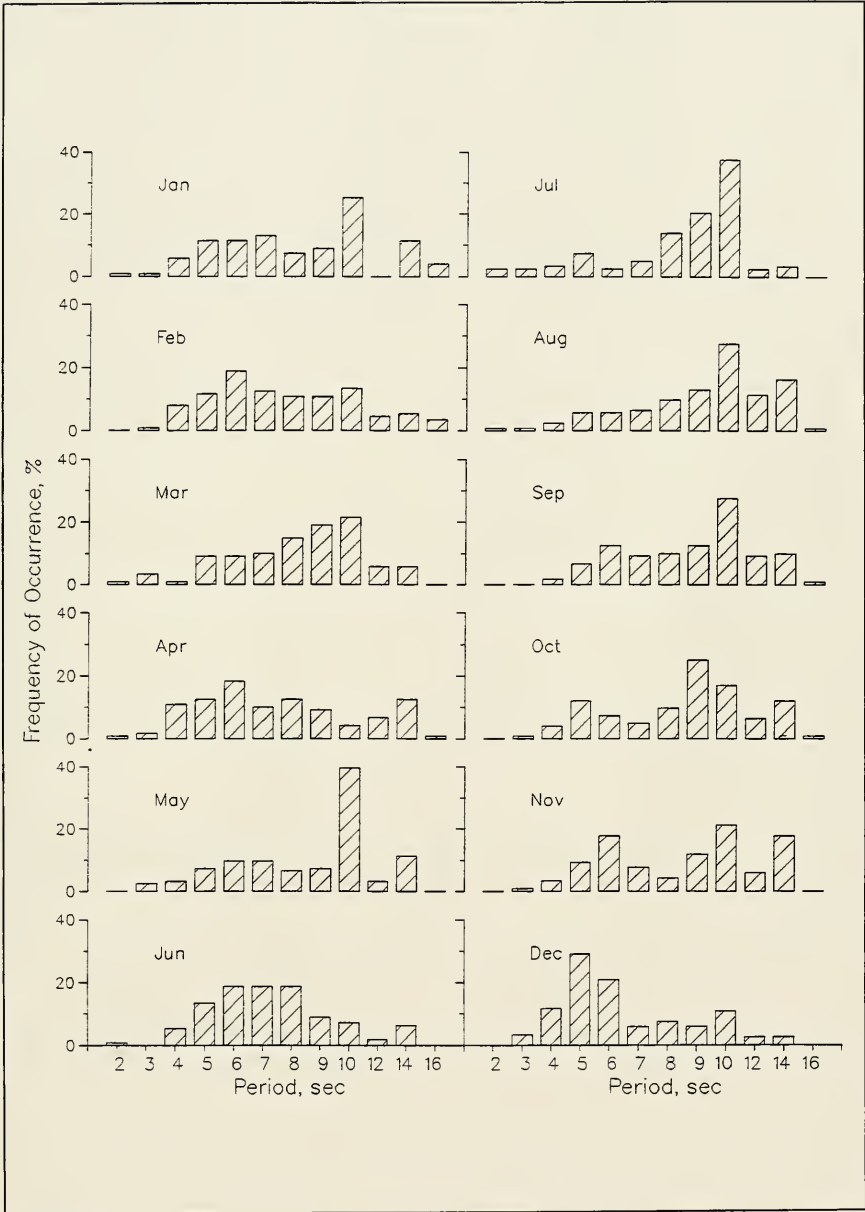


Figure D6. 1995 monthly wave period distributions for Gauge 625

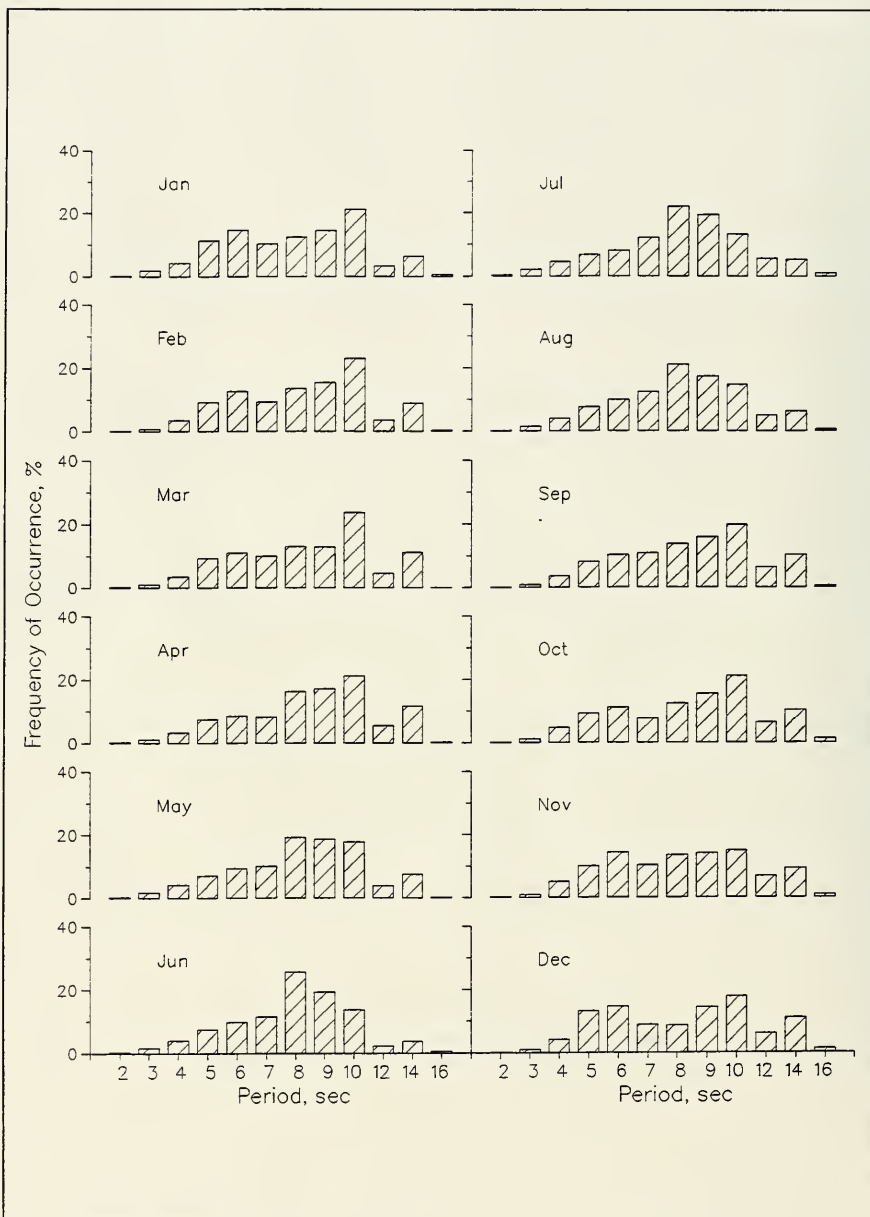


Figure D7. 1980-1995 monthly wave period distributions for Gauge 625

**Table D5**  
**1995 persistence of  $H_{mo}$  for Gauge 625**

Height (m)	Consecutive Day(s) or Longer																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+
0.5	24	21	16	15		14	12	11	10		8			6	5	4			3
1.0	55	38	25	18	9	6	5	2			1								
1.5	25	12	7			2	1												
2.0		9	3																
2.5		3	1																
3.0			1																
3.5																			

**Table D6**  
**1980 through 1995 persistence of  $H_{mo}$  for Gauge 625**

Height (m)	Consecutive Day(s) or Longer																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+
0.5	29	26	22	20	17	16	13	12	11	10	9	8	7		6	5			4
1.0	45	31	21		14	7	5	4	3	2			1						
1.5	29	16	9		5	2	1												
2.0	14	7	4		1														
2.5		7	3	2	1														
3.0		3	1																
3.5			1																
4.0																			

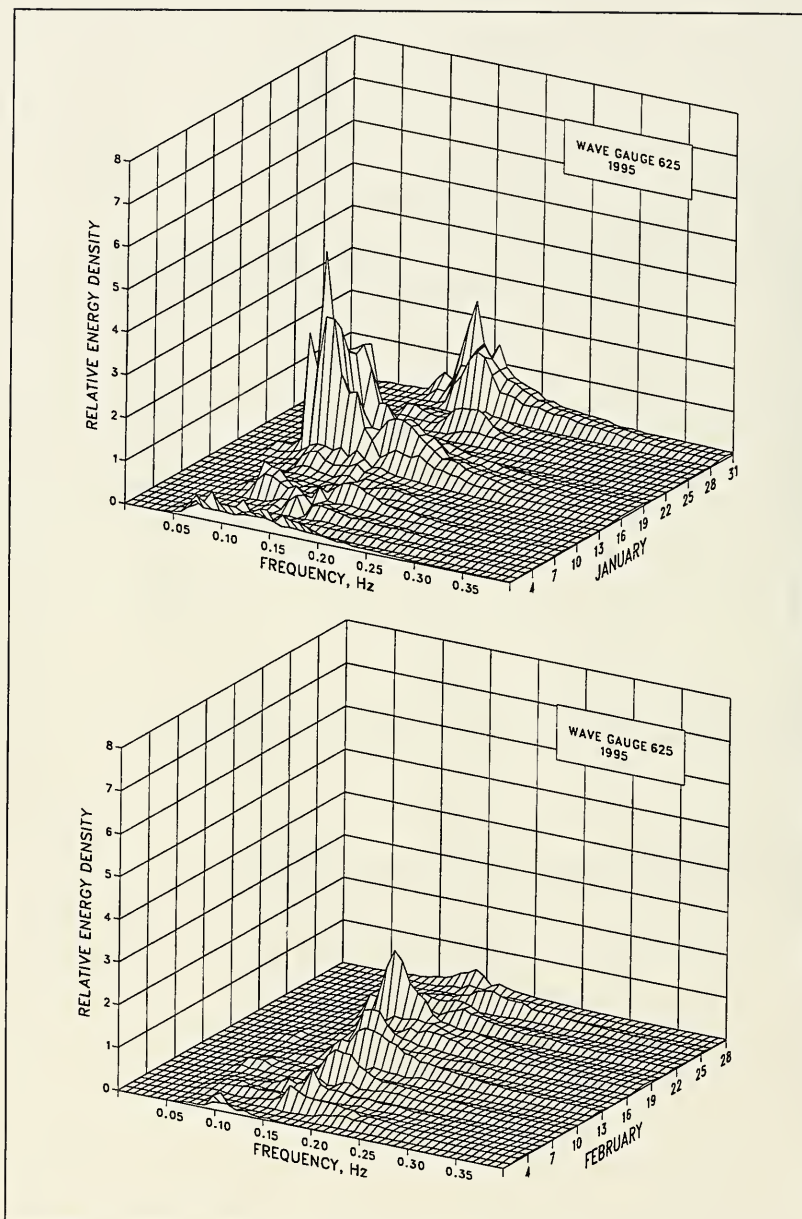


Figure D8. 1995 monthly spectra for Gauge 625 (Sheet 1 of 6)



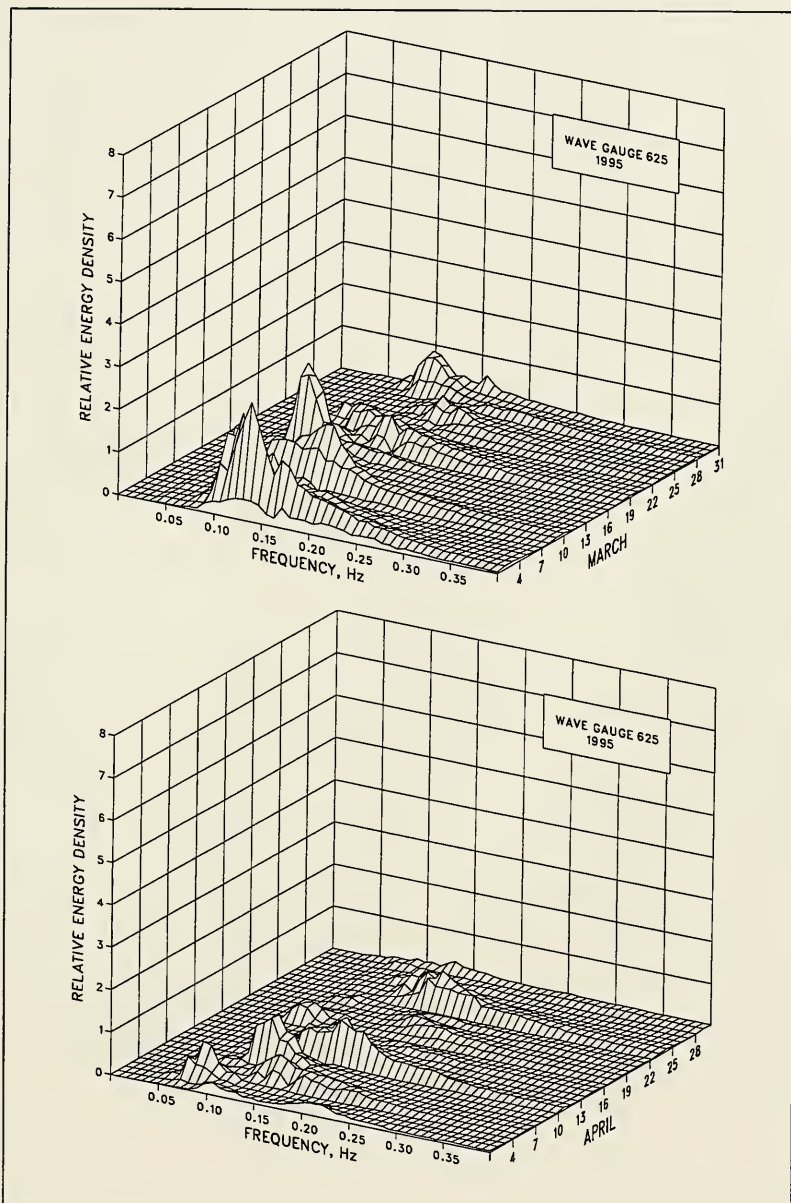


Figure D8. (Sheet 2 of 6)

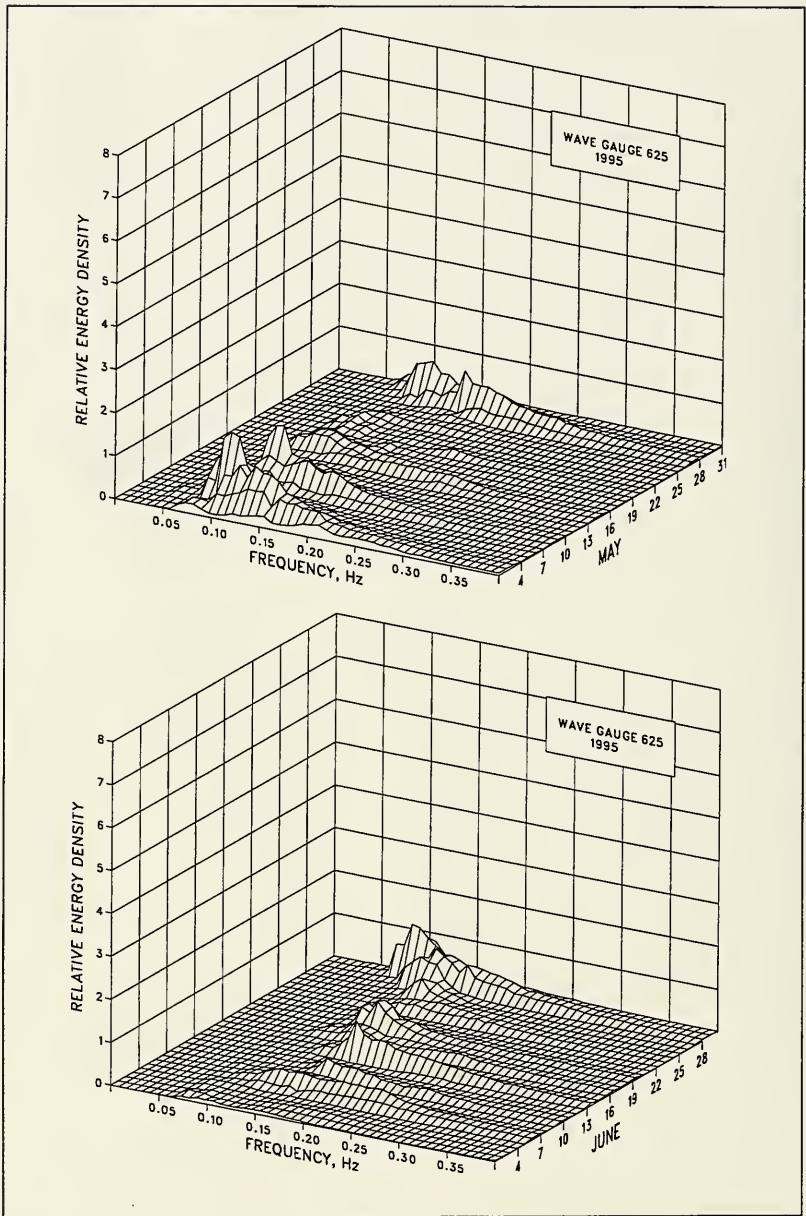


Figure D8. (Sheet 3 of 6)

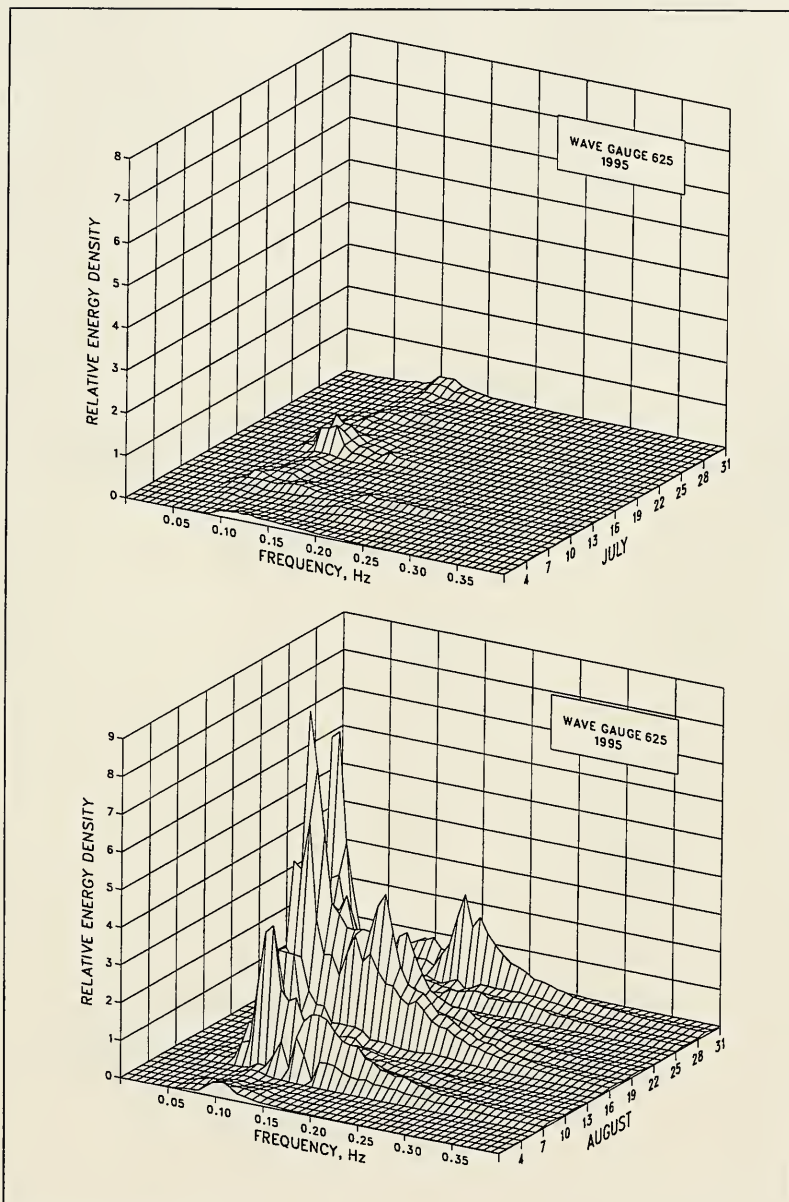


Figure D8. (Sheet 4 of 6)

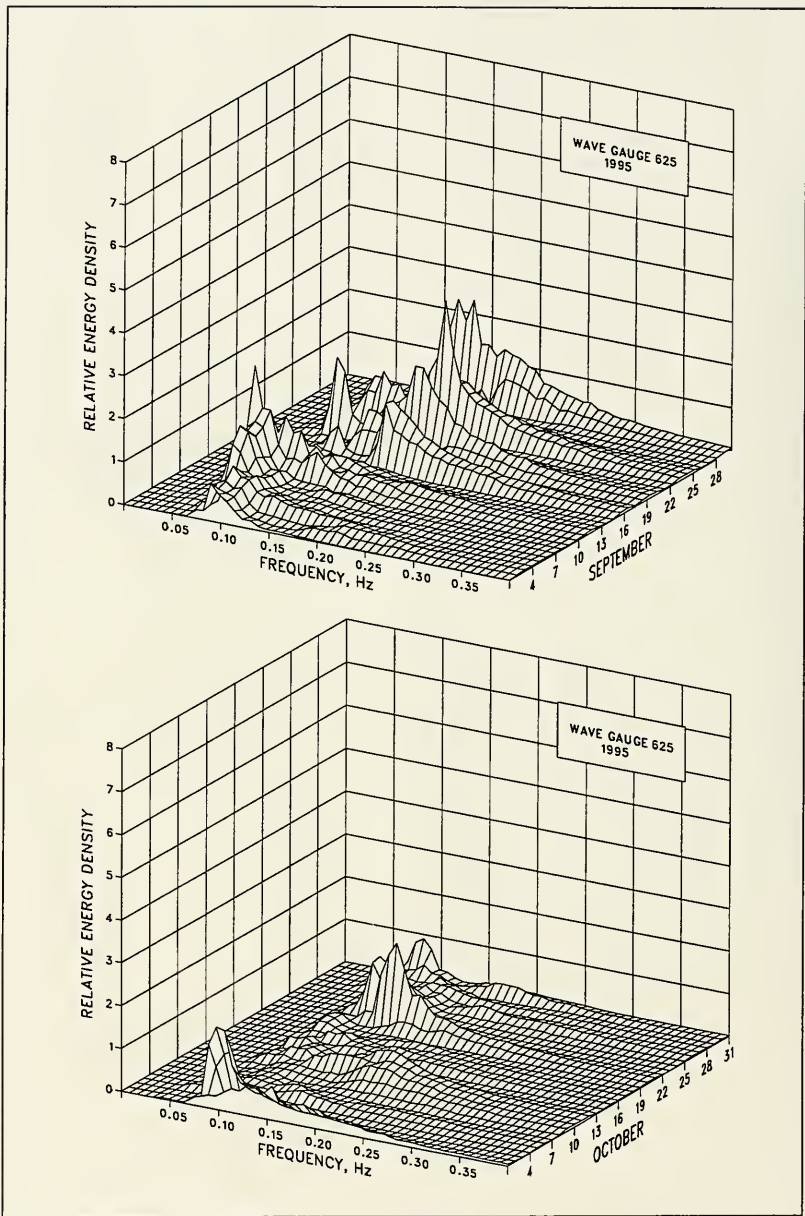


Figure D8. (Sheet 5 of 6)

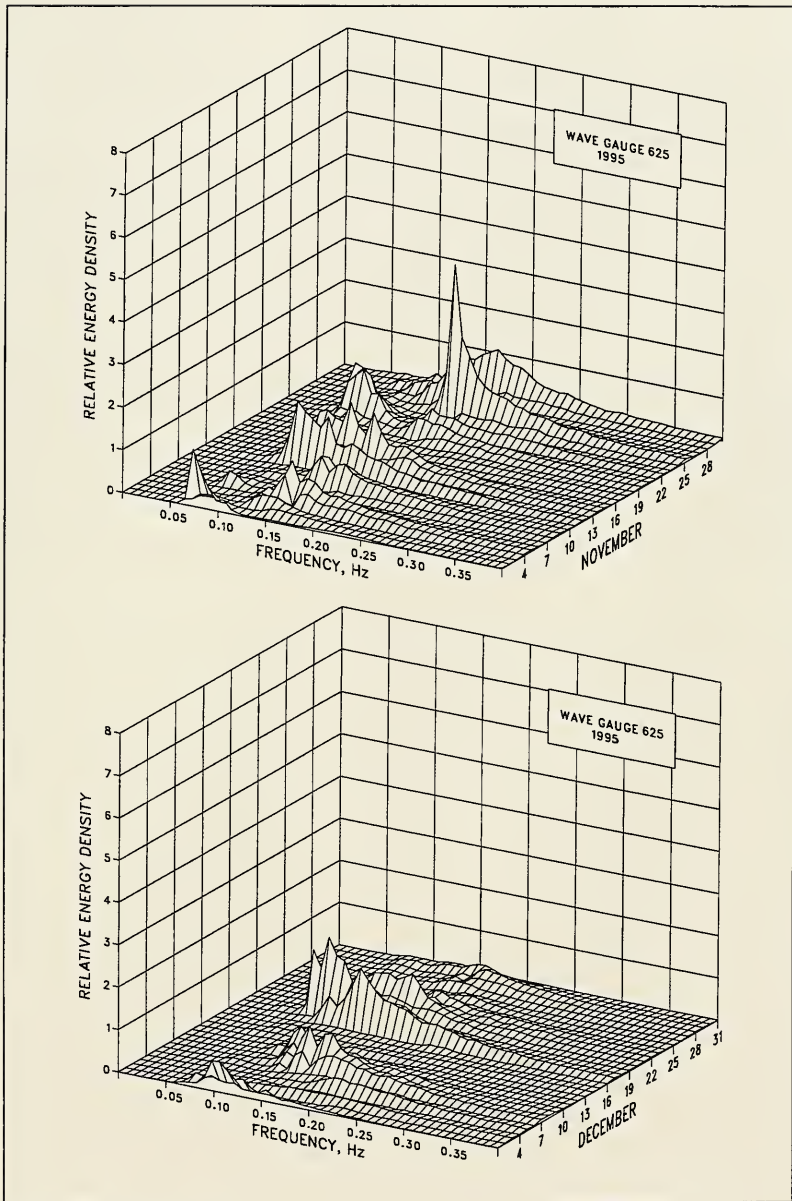


Figure D8. (Sheet 6 of 6)

**Table D7**  
**Wave statistics for Gauge 625**

Month	1995							1980-1995						
	Height			Date	Period			Date	Height			Period		
	Mean	Std. Dev.	Extreme		Mean	Std. Dev.	Number		Mean	Std. Dev.	Extreme	Mean	Std. Dev.	Number
	m	m	m	sec	sec	Obs.	m	m	m	sec	sec	Obs.		
Jan	1.0	0.5	2.6	15	9.3	3.6	123	1.0	0.6	3.6	1992	8.6	2.7	1681
Feb	0.7	0.4	1.5	12	8.6	3.3	112	1.1	0.6	3.8	1989	8.9	2.6	1649
Mar	1.1	0.4	2.1	2	9.0	2.5	121	1.1	0.6	3.4	1983	9.0	2.7	1853
Apr	0.8	0.3	1.6	10	8.4	3.4	120	0.9	0.5	3.4	1988	9.3	2.7	1767
May	0.8	0.3	1.5	3	9.4	2.6	124	0.8	0.5	3.0	1986	8.8	2.6	1884
Jun	0.8	0.3	1.5	28	7.8	2.3	112	0.7	0.4	2.3	1983	8.4	2.3	1662
Jul	0.5	0.2	0.9	9	9.1	2.4	123	0.6	0.3	1.8	1985	8.8	2.7	1618
Aug	1.2	0.8	3.3	16	10.2	3.0	124	0.7	0.5	3.3	1995	8.7	2.7	1693
Sep	1.2	0.4	2.1	30	9.8	2.9	120	1.0	0.5	3.2	1992	9.1	2.8	1552
Oct	0.9	0.3	1.7	21	9.3	2.8	124	1.1	0.7	3.5	1991	9.1	2.9	1899
Nov	0.9	0.4	2.2	11	9.3	2.8	118	1.0	0.6	3.5	1981	8.8	3.0	1785
Dec	0.8	0.4	1.9	7	7.1	2.7	120	1.0	0.6	3.4	1994	8.9	3.1	1679
Annual	0.9	0.5	3.3	Aug	9.0	3.0	1441	0.9	0.6	3.8	Feb 1992	8.9	2.8	20722



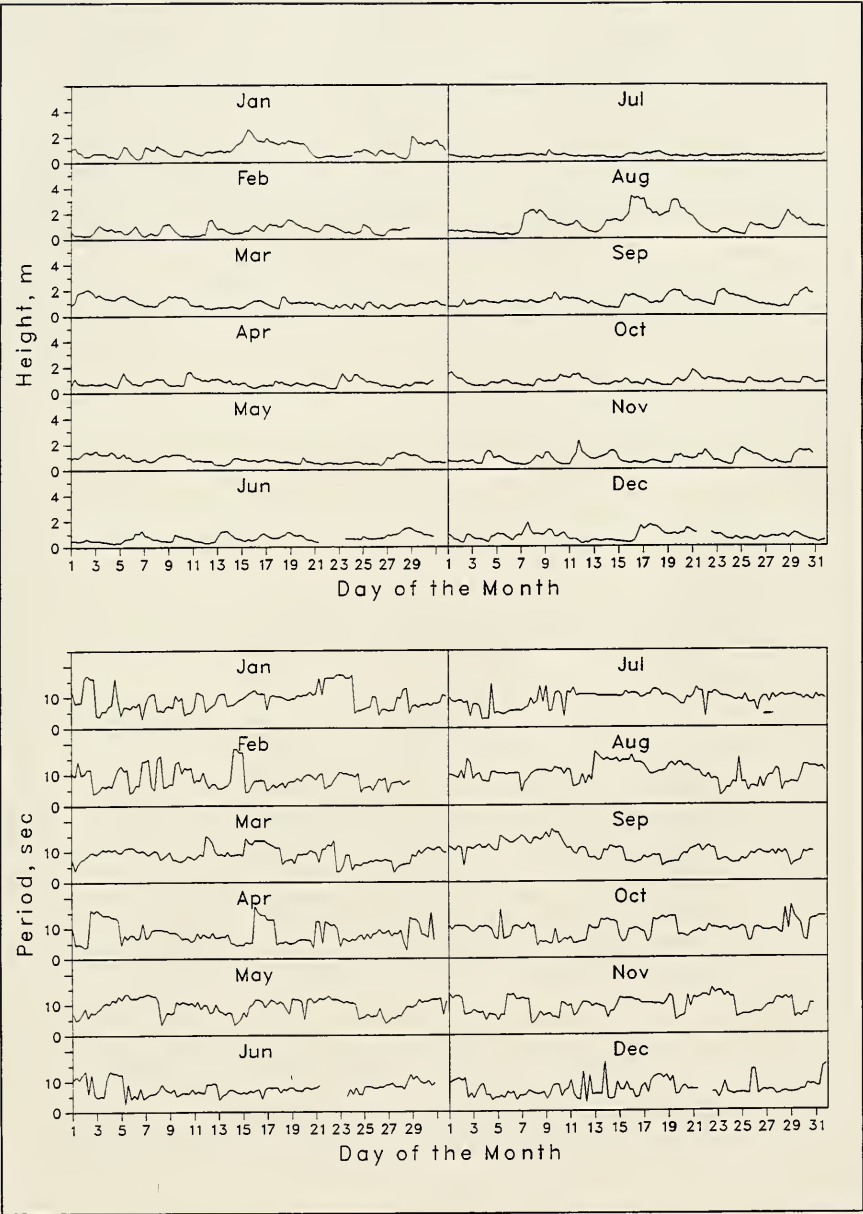


Figure D9. Time-histories of wave height and period for Gauge 625





# Appendix E

## Wave Data for Gauge 641

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Wave data summaries for Gauge 641 for 1995 and for 1980 through 1995 are presented in the following pages:

### Daily $H_{mo}$ and $T_p$

Figure E1 displays the individual wave height  $H_{mo}$  and peak spectral wave period  $T_p$  values, along with the monthly mean values.

### Joint Distributions of $H_{mo}$ and $T_p$

Annual and monthly joint distribution tables are presented in Tables E1 and E2, and data for 1980 through 1995 are in Tables E3 and E4. Each table gives the frequency (in parts per 10,000) for which the wave height and peak period were within the specified intervals; these values can be converted to percentages by dividing by 100. Marginal totals are also included. The row total gives the number of observations out of 10,000 that fell within each specified peak period interval. The column total gives the number of observations out of 10,000 that fell within each specified wave height interval.

### Cumulative Distributions of Wave Height

Annual and monthly wave height distributions for 1995 are plotted in cumulative form in Figures E2 and E3. Data for 1980 through 1995 are plotted in Figure E4.

## Peak Spectral Wave Period Distributions

Annual and monthly peak wave period  $T_p$  distribution histograms for 1995 are presented in Figures E5 and E6. Data for 1980 through 1995 are presented in Figure E7.

## Persistence of Wave Heights

Table E5 shows the number of times in 1995 when the specified wave height was equaled or exceeded at least once during each day for the duration (consecutive days). Data for 1980 through 1995 are averaged and given in Table E6. An example is shown below:

Height m	Consecutive Day(s) or Longer																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+
0.5	18	15		14	13	12		11	10						8				
1.0	50	34	24	21	18	14	12	8	7	3			2						
1.5	41	19	8	6	2	1													
2.0	22	9	5	1															
2.5	10	5	2																
3.0	6	1																	
3.5		1																	
4.0	1																		

This example indicates that wave heights equaled or exceeded 1.0 m 50 times for at least 1 day; 34 times for at least 2 days; 24 times for at least 3 days, etc. Therefore, on 16 occasions the height equaled or exceeded 1.0 m for 1 day exactly ( $50 - 34 = 16$ ); on 10 occasions for 2 days; on 3 occasions for 3 days, etc. Note that the height exceeded 1 m 50 times for 1 day or longer, while heights exceeded 0.5 m only 18 times for this same duration. This change in durations occurred because the longer durations of lower waves may be interspersed with shorter, but more frequent, intervals of higher waves. For example, one of the times that the wave heights exceeded 0.5 m for 16 days may have represented three times the height exceeded 1 m for shorter durations.

## Spectra

Monthly spectra for the inshore pressure gauge (Gauge 641) are presented in Figure E8. The plots show "relative" energy density as a function of wave frequency. These figures summarize the large number of spectra for each

month. The figures emphasize the higher energy density associated with storms, as well as the general shifts in energy density to different frequencies. As used here, "relative" indicates the spectra have been smoothed by the three-dimensional surface drawing routine. Consequently, extremely high- and low-energy density values are modified to produce a smooth surface. The figures are not intended for quantitative measurements; however, they do provide the energy density as a function of frequency relative to the other spectra for the month.

Monthly and annual wave statistics for Gauge 641 for 1995 and for 1980 through 1995 are presented in Table E7.

Figure E9 plots monthly time-histories of wave height and period.

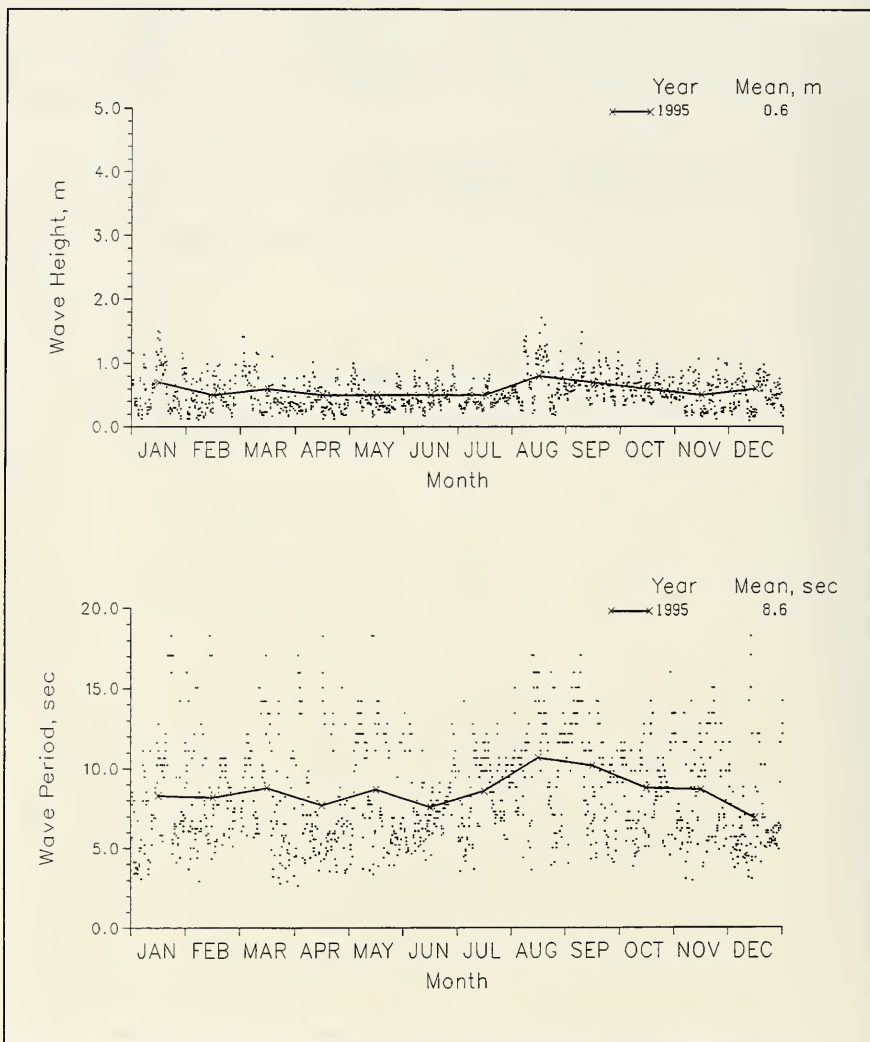


Figure E1. 1995 daily wave height and period values with monthly means for Gauge 641

**Table E1**  
**Annual Joint Distribution of  $H_{mo}$  versus  $T_p$**

Height (m)	Annual 1995, Gauge 641 Percent Occurrence (X100) of Height and Period												Total
	Period (sec)												
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer	
0.00 - 0.49	35	263	463	677	560	477	435	463	822	359	525	166	5245
0.50 - 0.99	.	35	283	850	809	415	346	359	601	124	352	14	4188
1.00 - 1.49	.	.	7	28	69	62	28	48	111	104	83	7	547
1.50 - 1.99	.	.	.	.	.	.	.	.	7	14	.	.	21
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
<b>Total</b>	<b>35</b>	<b>298</b>	<b>753</b>	<b>1555</b>	<b>1438</b>	<b>954</b>	<b>809</b>	<b>870</b>	<b>1541</b>	<b>601</b>	<b>960</b>	<b>187</b>	

**Table E2**  
**Monthly Joint Distribution of  $H_{mo}$  versus  $T_p$**

January 1995, Gauge 641													Total
Percent Occurrence(X100) of Height and Period													
Height (m)	Period (sec)												
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer	
0.00 - 0.49	.	894	650	813	325	163	407	244	407	81	81	813	4878
0.50 - 0.99	.	.	163	569	1138	325	325	244	732	.	81	.	3577
1.00 - 1.49	.	.	.	81	.	244	163	163	732	.	81	.	1464
1.50 - 1.99	.	.	.	.	.	.	.	.	81	.	.	.	81
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	894	813	1463	1463	732	895	651	1952	81	243	813	0

February 1995, Gauge 641													Total
Percent Occurrence(X100) of Height and Period													
Height (m)	Period (sec)												
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer	
0.00 - 0.49	89	89	357	893	714	446	893	604	1250	89	714	268	6606
0.50 - 0.99	.	.	89	1071	982	893	268	89	.	.	.	.	3392
1.00 - 1.49	.	.	.	.	.	.	.	.	.	.	.	.	0
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	89	89	446	1964	1696	1339	1161	893	1250	89	714	268	0

March 1995, Gauge 641													Total
Percent Occurrence(X100) of Height and Period													
Height (m)	Period (sec)												
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer	
0.00 - 0.49	172	517	690	603	345	345	345	603	1034	1034	345	86	6119
0.50 - 0.99	.	86	.	431	690	172	345	86	862	259	259	.	3190
1.00 - 1.49	.	.	86	86	172	172	86	86	.	.	.	.	688
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	172	603	776	1120	1207	689	776	775	1896	1293	604	86	0

(Continued)

(Sheet 1 of 4)

Table E2 (Continued)

April 1995, Gauge 641  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	Longer	
0.00 - 0.49	84	504	1092	1345	1008	504	588	.	168	840	840	252	7225
0.50 - 0.99	.	84	504	924	504	252	.	420	.	.	.	.	2688
1.00 - 1.49	.	.	.	.	84	.	.	.	.	.	.	.	84
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	84	588	1596	2269	1596	756	588	420	168	840	840	252	

May 1995, Gauge 641  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	Longer	
0.00 - 0.49	.	403	484	645	1129	806	323	.	1048	645	1452	161	7096
0.50 - 0.99	.	81	403	1048	81	242	81	161	565	161	.	.	2823
1.00 - 1.49	.	.	.	.	81	.	.	.	.	.	.	.	81
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	484	887	1693	1291	1048	404	161	1613	806	1452	161	

June 1995, Gauge 641  
Percent Occurrence (X100) of Height and Period

Height (m)	Period (sec)												Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-	
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	Longer	
0.00 - 0.49	.	.	500	750	917	1250	833	583	250	83	333	.	5499
0.50 - 0.99	.	.	250	583	1083	917	500	417	417	.	167	.	4334
1.00 - 1.49	.	.	.	83	.	83	.	.	.	.	.	.	166
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	0	750	1416	2000	2250	1333	1000	667	83	500	0	

(Continued)

(Sheet 2 of 4)

Table E2 (Continued)

July 1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	163	407	976	976	732	732	1138	1626	163	407	.	.	7320
0.50 - 0.99	.	.	.	244	325	325	163	650	894	.	81	.	.	2682
1.00 - 1.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	163	407	1220	1301	1057	895	1788	2520	163	488	0	.	

August 1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	161	.	81	81	645	403	403	806	.	323	242	.	3145
0.50 - 0.99	.	.	161	565	323	161	161	323	1129	161	1210	.	.	4194
1.00 - 1.49	.	.	.	.	81	81	81	161	565	726	806	.	.	2501
1.50 - 1.99	.	.	.	.	.	.	.	.	.	161	.	.	.	161
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	161	161	646	485	887	645	887	2500	1048	2339	242	.	

September 1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	.	.	250	83	83	167	.	250	917	83	.	.	.	1833
0.50 - 0.99	.	.	417	750	583	500	667	750	1167	667	1500	167	.	7168
1.00 - 1.49	.	.	.	.	83	83	.	167	.	500	83	83	.	999
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	0	0	667	833	749	750	667	1167	2084	1250	1583	250	.	

(Continued)

(Sheet 3 of 4)



**Table E2 (Concluded)**

October 1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	.	.	81	161	242	.	403	565	968	403	484	.	3307	
0.50 - 0.99	.	81	323	1129	1048	565	1048	887	968	161	323	.	6533	
1.00 - 1.49	.	.	.	81	.	81	.	.	.	.	.	.	162	
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	81	404	1371	1290	646	1451	1452	1936	564	807	0		

November 1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	85	169	254	254	254	424	169	847	1102	763	932	.	5253	
0.50 - 0.99	.	.	254	1102	3525	424	254	254	254	85	254	.	4406	
1.00 - 1.49	.	.	.	.	339	.	.	.	.	.	.	.	339	
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	85	169	508	1356	2118	848	423	1101	1356	848	1186	0		

December 1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	<u>2.9</u>	<u>3.9</u>	<u>4.9</u>	<u>5.9</u>	<u>6.9</u>	<u>7.9</u>	<u>8.9</u>	<u>9.9</u>	<u>11.9</u>	<u>13.9</u>	<u>15.9</u>	<u>Longer</u>		
0.00 - 0.49	.	242	806	1532	645	242	161	161	323	161	403	161	4837	
0.50 - 0.99	.	81	806	1774	1452	242	323	.	161	.	323	.	5162	
1.00 - 1.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
1.50 - 1.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	0	323	1612	3306	2097	484	484	161	484	161	726	161		

**Table E3**  
**Annual Joint Distribution of  $H_{mo}$  versus  $T_p$  (All Years)**

Annual 1980-1995, Gauge 641														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period(sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	70	182	379	501	316	330	608	661	703	302	427	83	4562	
0.50 - 0.99	18	148	452	894	616	287	291	308	469	121	235	19	3858	
1.00 - 1.49	.	1	46	269	303	141	98	80	168	80	131	6	1323	
1.50 - 1.99	.	.	.	8	38	26	17	26	49	26	46	4	240	
2.00 - 2.49	.	.	.	.	1	2	1	1	4	3	4	.	16	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>88</b>	<b>331</b>	<b>877</b>	<b>1672</b>	<b>1274</b>	<b>786</b>	<b>1015</b>	<b>1076</b>	<b>1393</b>	<b>532</b>	<b>843</b>	<b>112</b>		

**Table E4**  
**Monthly Joint Distribution of  $H_{mo}$  versus  $T_p$  (All Years)**

January 1980-1995, Gauge 641														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period (sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	74	244	403	460	221	176	329	619	658	199	278	159		3820
0.50 - 0.99	23	165	488	999	749	210	244	301	539	85	199	11		4013
1.00 - 1.49	.	.	85	482	471	233	193	79	261	23	125	.		1952
1.50 - 1.99	.	.	.	6	17	11	11	17	68	34	40	.		204
2.00 - 2.49	.	.	.	.	.	.	.	.	.	6	6	.		12
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.		0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.		0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.		0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.		0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.		0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.		0
Total	97	409	976	1947	1458	630	777	1016	1526	347	648	170		

February 1980-1995, Gauge 641														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period (sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	108	138	335	401	203	203	419	449	766	108	359	24		3513
0.50 - 0.99	36	144	443	963	634	305	227	341	586	102	221	.		4002
1.00 - 1.49	.	.	42	461	568	221	108	96	257	144	191	.		2088
1.50 - 1.99	.	.	.	12	78	48	30	24	42	36	108	.		378
2.00 - 2.49	.	.	.	.	6	.	.	.	6	6	6	.		24
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.		0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.		0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.		0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.		0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.		0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.		0
Total	144	282	820	1837	1489	777	784	910	1657	396	885	24		

March 1980-1995, Gauge 641														Total
Percent Occurrence(X100) of Height and Period														
Height (m)	Period (sec)													
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	125	152	320	390	266	201	396	439	586	211	407	5		3498
0.50 - 0.99	38	174	423	916	569	282	266	363	634	190	363	5		4223
1.00 - 1.49	.	5	92	342	342	146	114	98	206	130	249	.		1724
1.50 - 1.99	.	.	.	11	49	38	33	76	141	70	98	.		516
2.00 - 2.49	.	.	.	.	5	5	5	.	.	11	11	.		37
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.		0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.		0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.		0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.		0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.		0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.		0
Total	163	331	835	1659	1231	672	814	976	1567	612	1128	10		

(Continued)

(Sheet 1 of 4)

Table E4 (Continued)

April 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer	
0.00 - 0.49	63	189	367	528	373	413	557	534	683	402	563	40	4712
0.50 - 0.99	23	212	436	821	471	270	327	316	557	80	293	6	3812
1.00 - 1.49	.	6	40	201	235	92	92	103	224	52	126	.	1171
1.50 - 1.99	.	.	.	11	40	29	46	23	69	29	23	.	270
2.00 - 2.49	.	.	.	.	.	.	.	11	17	.	6	.	34
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	86	407	843	1561	1119	804	1022	987	1550	563	1011	46	

May 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer	
0.00 - 0.49	83	211	372	533	367	456	756	767	833	328	594	61	5361
0.50 - 0.99	17	150	561	844	583	322	294	289	433	78	128	17	3716
1.00 - 1.49	.	.	33	150	144	33	72	89	128	33	72	.	754
1.50 - 1.99	.	.	.	17	50	22	6	17	28	11	11	.	162
2.00 - 2.49	.	.	.	.	.	.	6	.	.	.	.	.	6
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	100	361	966	1544	1144	833	1134	1162	1422	450	805	78	

June 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)												Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer	
0.00 - 0.49	85	194	468	941	577	625	1105	971	674	316	279	97	6332
0.50 - 0.99	18	134	395	795	443	273	316	285	310	43	49	18	3079
1.00 - 1.49	.	.	30	128	128	49	49	30	103	.	43	.	560
1.50 - 1.99	.	.	.	.	18	6	6	.	.	.	.	.	30
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0
Total	103	328	893	1864	1166	953	1476	1286	1087	359	371	115	

(Continued)

(Sheet 2 of 4)

**Table E4 (Continued)**

July 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	59	232	582	772	523	576	1490	1223	885	374	457	125	7298	
0.50 - 0.99	.	119	321	582	457	238	243	196	190	59	48	36	2489	
1.00 - 1.49	.	.	6	107	30	12	18	.	30	.	6	.	209	
1.50 - 1.99	.	.	.	.	6	.	.	.	.	.	.	.	6	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>59</b>	<b>351</b>	<b>909</b>	<b>1461</b>	<b>1016</b>	<b>826</b>	<b>1751</b>	<b>1419</b>	<b>1105</b>	<b>433</b>	<b>511</b>	<b>161</b>		

August 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	41	203	366	523	552	494	935	1092	952	308	459	64	5989	
0.50 - 0.99	6	151	459	761	505	267	285	226	302	46	197	.	3205	
1.00 - 1.49	.	.	23	128	139	64	52	23	99	81	122	.	731	
1.50 - 1.99	.	.	.	.	12	17	6	.	17	23	.	.	75	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>47</b>	<b>354</b>	<b>848</b>	<b>1412</b>	<b>1208</b>	<b>842</b>	<b>1278</b>	<b>1341</b>	<b>1370</b>	<b>458</b>	<b>778</b>	<b>64</b>		

September 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period (sec)													Total
	2.0-	3.0-	4.0-	5.0-	6.0-	7.0-	8.0-	9.0-	10.0-	12.0-	14.0-	16.0-		
	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	11.9	13.9	15.9	Longer		
0.00 - 0.49	67	134	340	431	182	304	431	522	668	334	474	61	3948	
0.50 - 0.99	30	164	419	729	492	401	413	407	528	261	504	24	4372	
1.00 - 1.49	.	.	36	364	285	182	128	115	115	103	121	18	1467	
1.50 - 1.99	.	.	.	12	36	49	12	6	12	18	43	6	194	
2.00 - 2.49	.	.	.	.	.	.	.	.	.	6	12	.	18	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
<b>Total</b>	<b>97</b>	<b>298</b>	<b>795</b>	<b>1536</b>	<b>995</b>	<b>936</b>	<b>984</b>	<b>1050</b>	<b>1323</b>	<b>722</b>	<b>1154</b>	<b>109</b>		

(Continued)

(Sheet 3 of 4)

**Table E4 (Concluded)**

October 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	36	172	243	231	178	148	337	397	586	337	391	47	3103	
0.50 - 0.99	6	83	414	870	657	255	426	420	782	184	296	30	4423	
1.00 - 1.49	.	.	36	332	367	261	154	160	320	154	172	18	1974	
1.50 - 1.99	.	.	.	12	53	47	24	53	107	47	71	41	455	
2.00 - 2.49	.	.	.	.	.	6	.	.	18	12	12	.	48	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	42	255	693	1445	1255	717	941	1030	1813	734	942	136		

November 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	36	133	368	368	151	217	368	380	525	344	429	139	3458	
0.50 - 0.99	12	115	507	1171	864	399	278	314	411	181	217	48	4517	
1.00 - 1.49	.	6	36	260	495	236	115	72	145	139	139	24	1667	
1.50 - 1.99	.	.	.	12	54	30	12	72	79	24	66	.	349	
2.00 - 2.49	.	.	.	.	.	.	.	.	6	.	.	.	6	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	48	254	911	1811	1564	882	773	838	1166	688	851	211		

December 1980-1995, Gauge 641  
Percent Occurrence(X100) of Height and Period

Height (m)	Period(sec)													Total
	2.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- Longer		
0.00 - 0.49	57	175	385	453	204	158	215	555	623	368	424	181	3798	
0.50 - 0.99	11	164	543	1256	951	232	181	243	345	141	300	40	4407	
1.00 - 1.49	.	.	79	277	430	164	79	91	119	108	192	11	1550	
1.50 - 1.99	.	.	.	6	40	11	17	23	23	17	91	6	234	
2.00 - 2.49	.	.	.	.	.	11	.	.	.	.	.	.	11	
2.50 - 2.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.00 - 3.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
3.50 - 3.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	.	.	0	
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	.	.	0	
5.00 - Greater	.	.	.	.	.	.	.	.	.	.	.	.	0	
Total	68	339	1007	1992	1625	576	492	912	1110	634	1007	238		

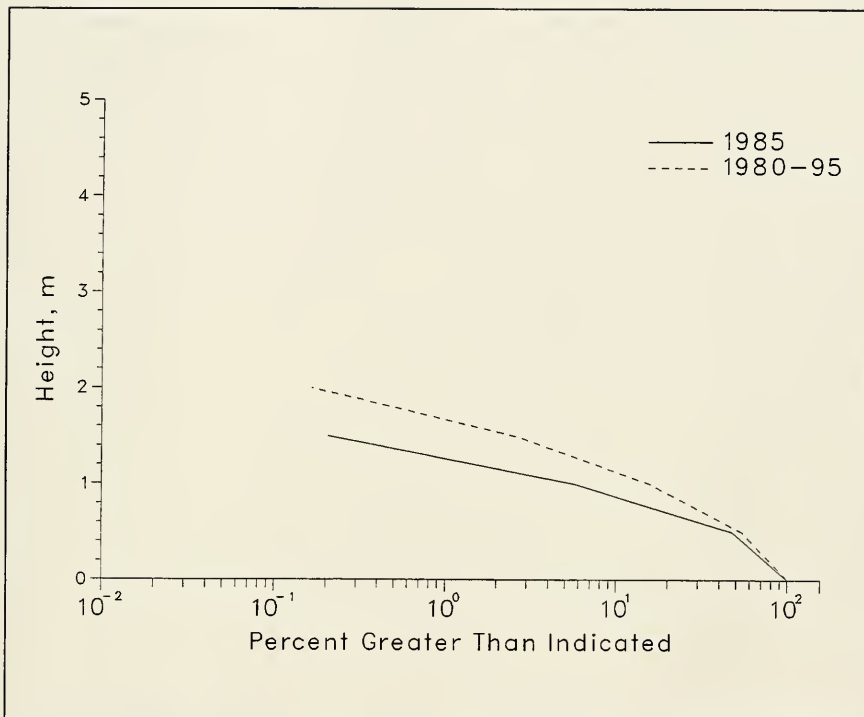


Figure E2. Annual cumulative wave height distributions for Gauge 641

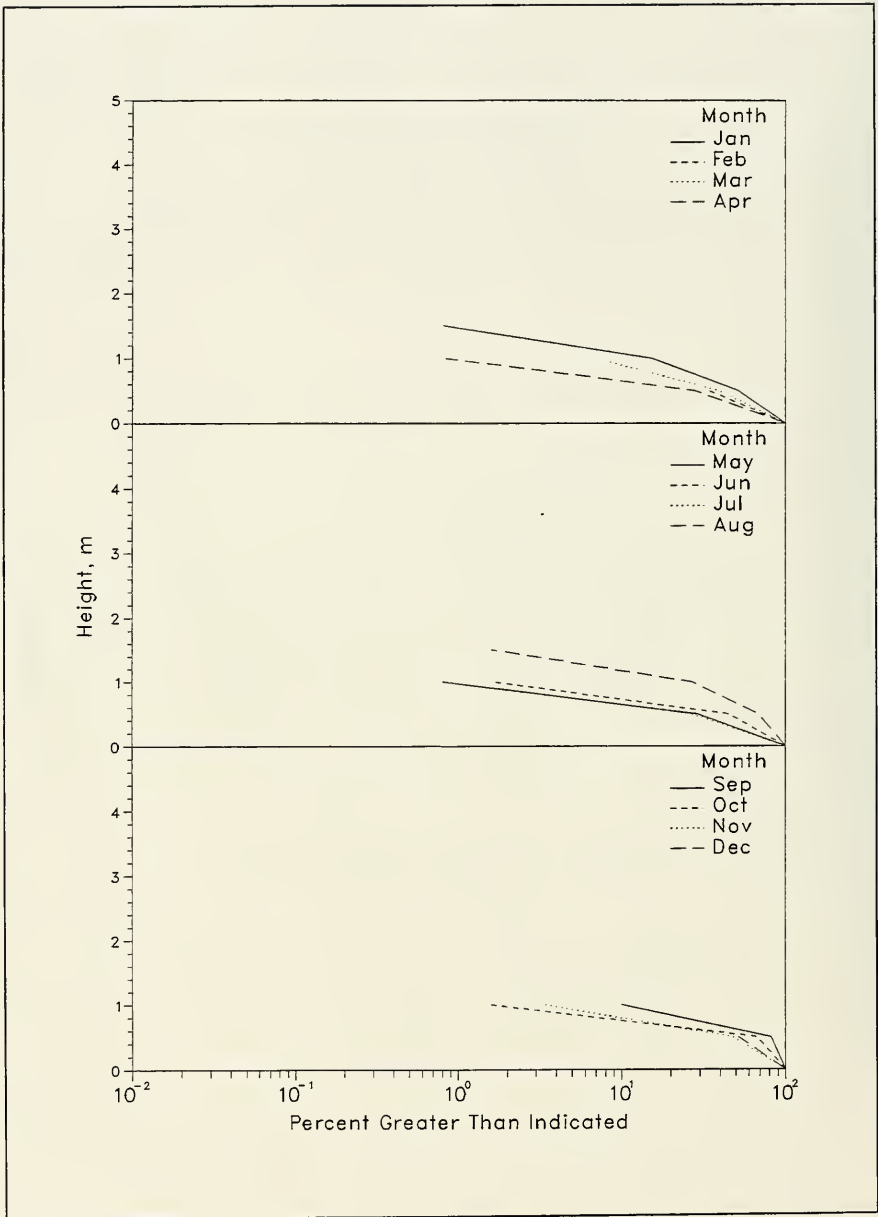


Figure E3. 1995 monthly wave height distributions for Gauge 641



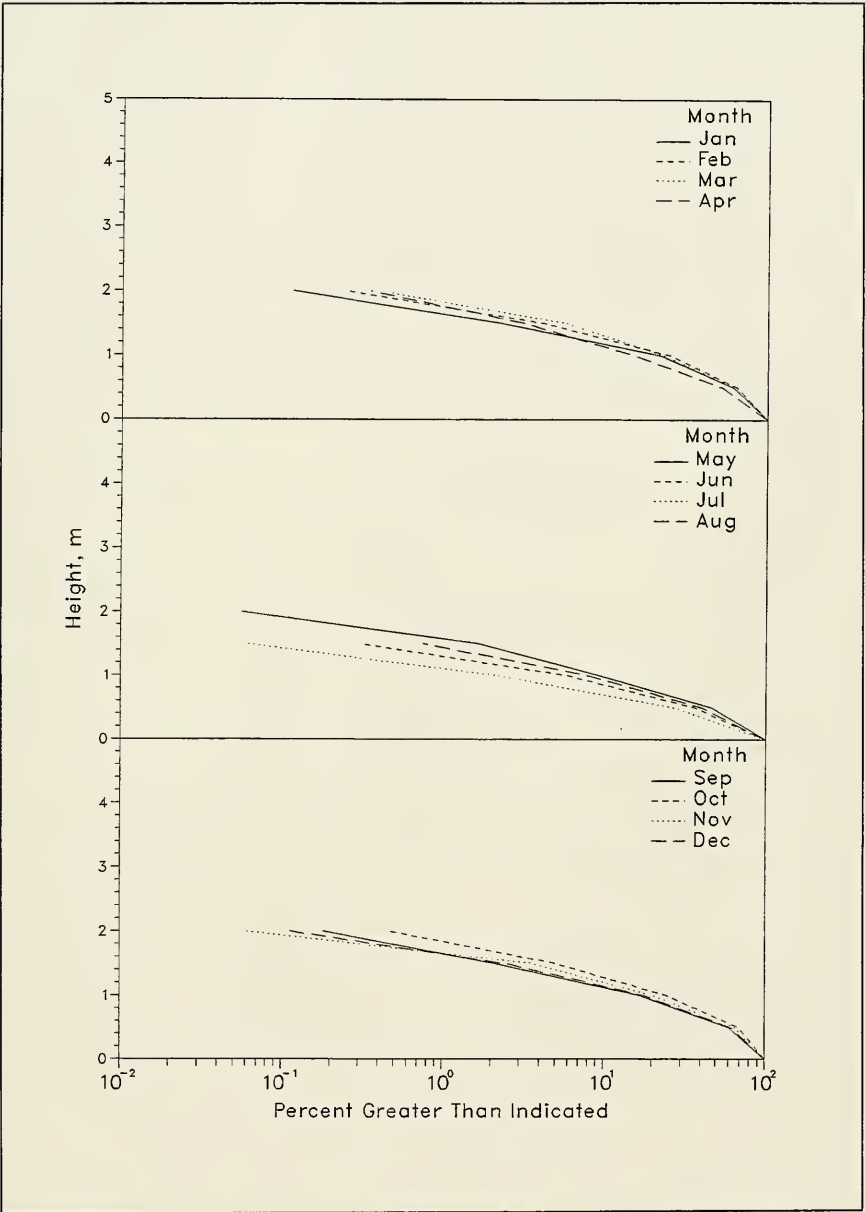


Figure E4. 1980-1995 monthly wave height distributions for Gauge 641

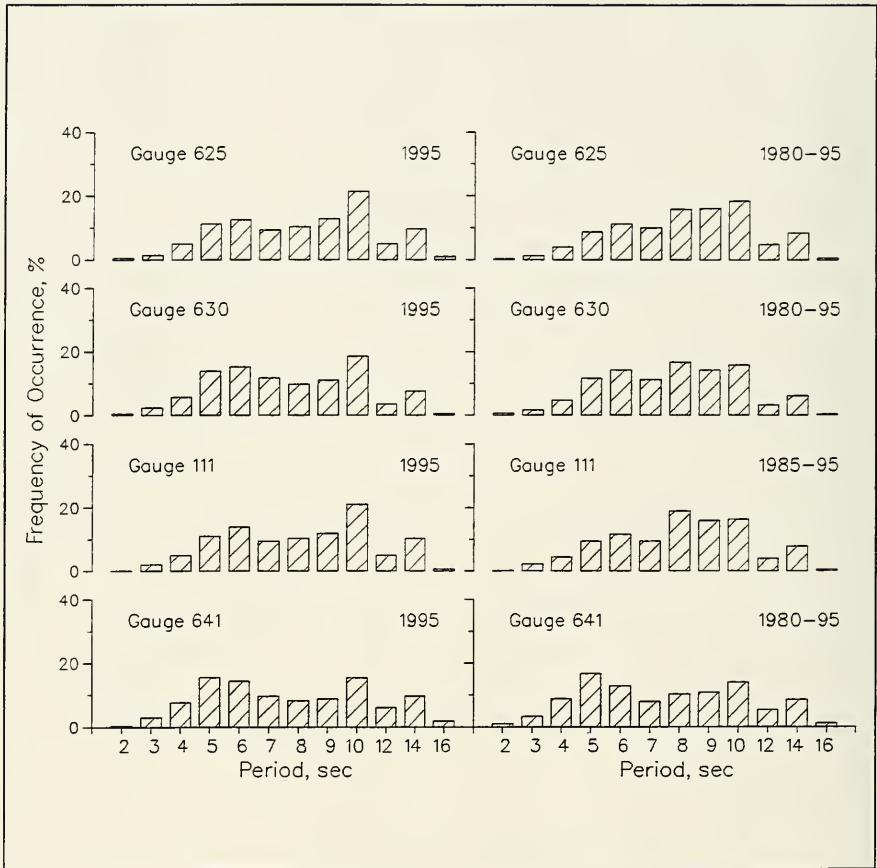


Figure E5. Annual wave period distributions for all gauges

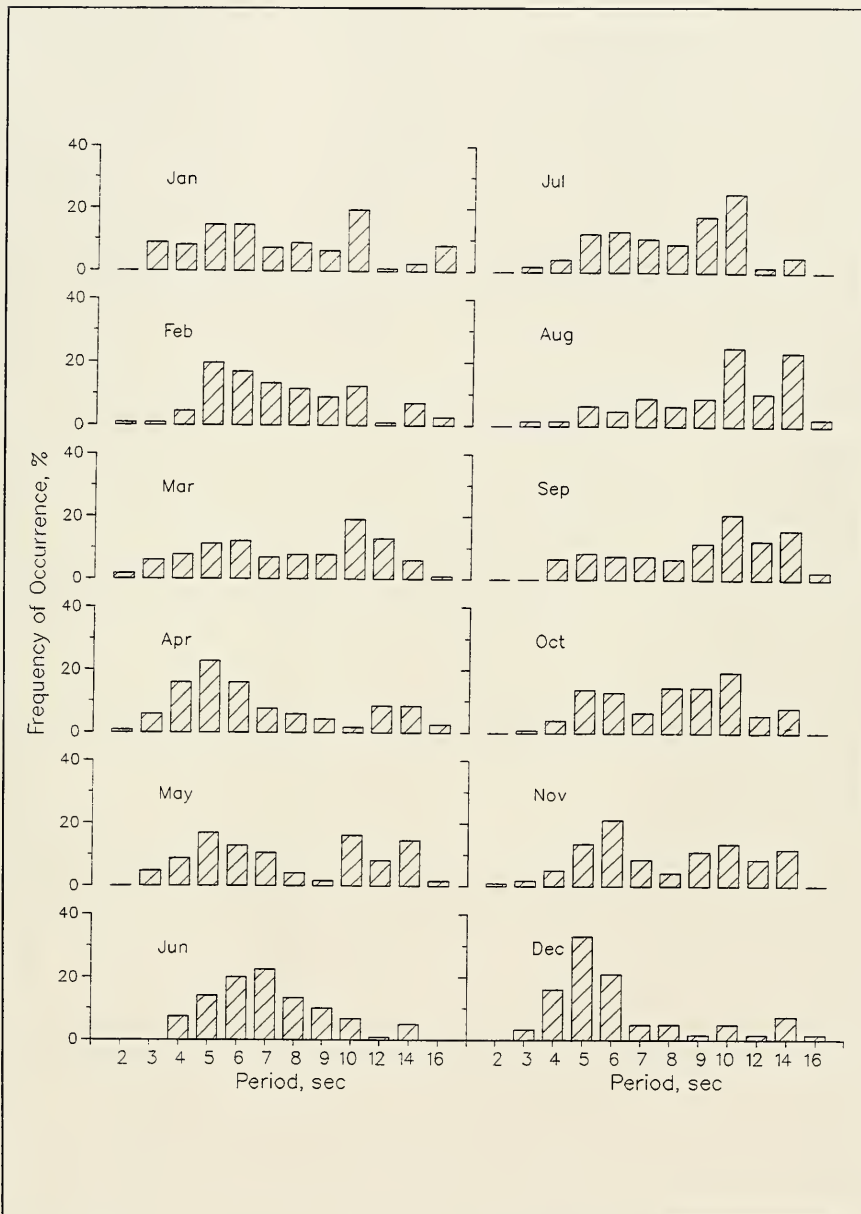


Figure E6. 1995 monthly wave period distributions for Gauge 641

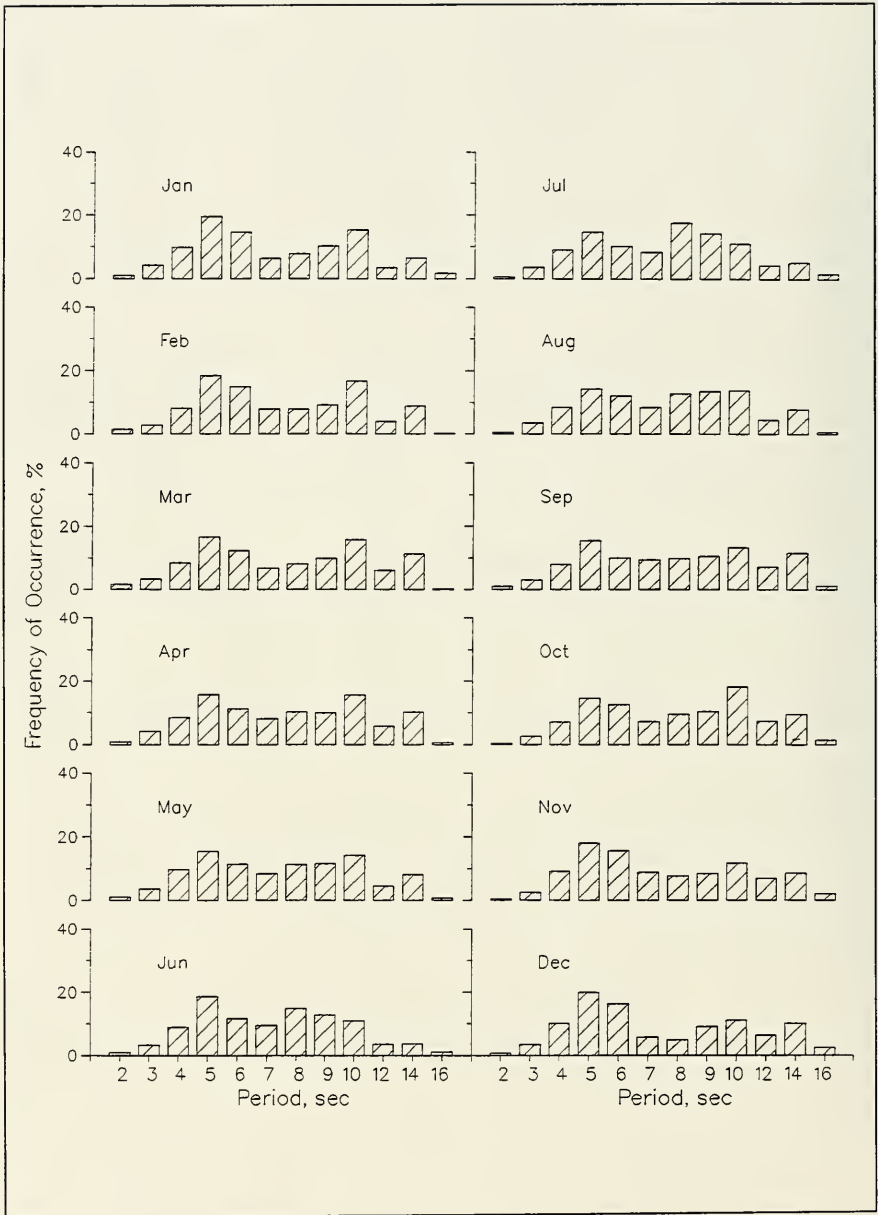


Figure E7. 1980-1995 monthly wave period distributions for Gauge 641

**Table E5**  
**1995 persistence of  $H_{mo}$  for Gauge 641**

Height (m)	Consecutive Day(s) or Longer																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+	
0.5	59	44	31	26	16	14	10	8	7				4		3				2	1
1.0	23	9	4	3				1												
1.5	3																			
2.0																				
2.5																				
3.0																				
3.5																				
4.0																				

**Table E6**  
**1980 through 1995 persistence of  $H_{mo}$  for Gauge 641**

Height (m)	Consecutive Day(s) or Longer																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19+	
0.5	45	36	29	24	18	14	11	10	9	7			6	5			4		3	2
1.0	40	24	14	8	5	3	2		1											
1.5	13	5	2		1															
2.0	2	1																		
2.5	1																			
3.0	1																			
3.5																				
4.0																				

\* 1980-1992 data from gauge 645

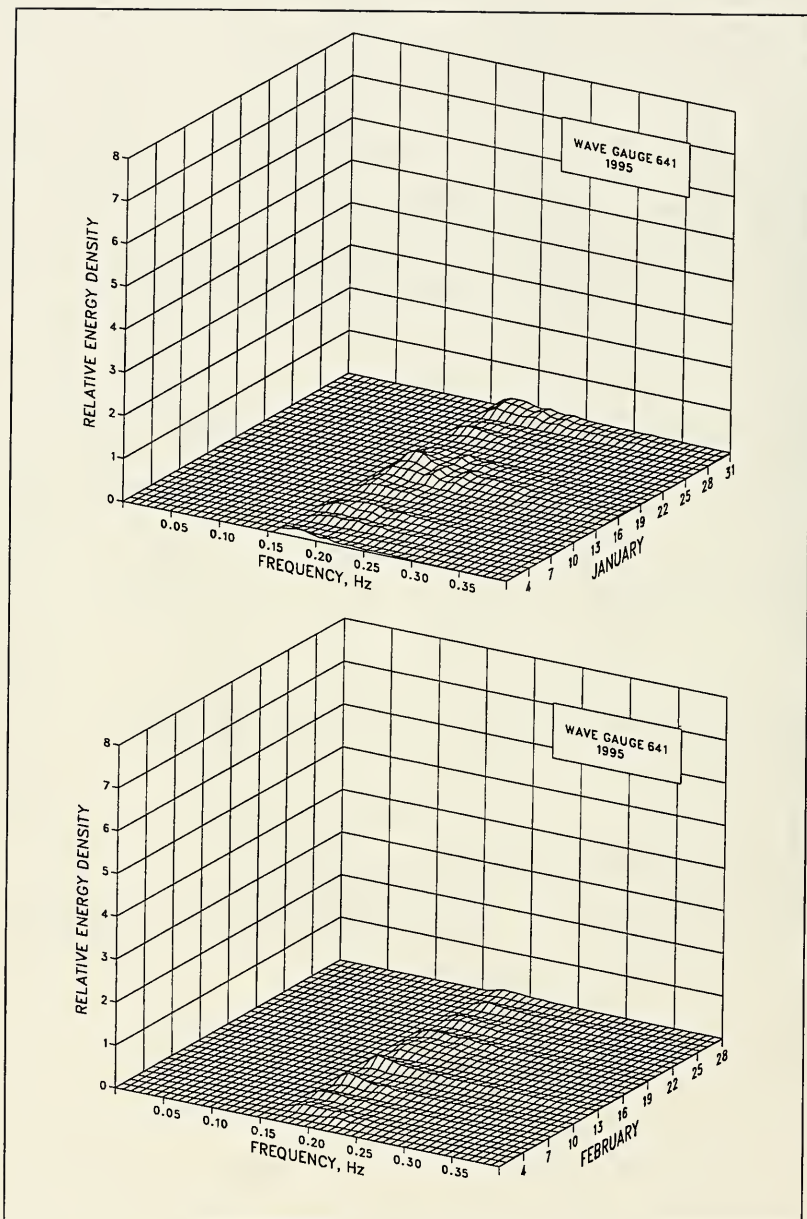


Figure E8. 1995 monthly spectra for Gauge 641 (Sheet 1 of 6)

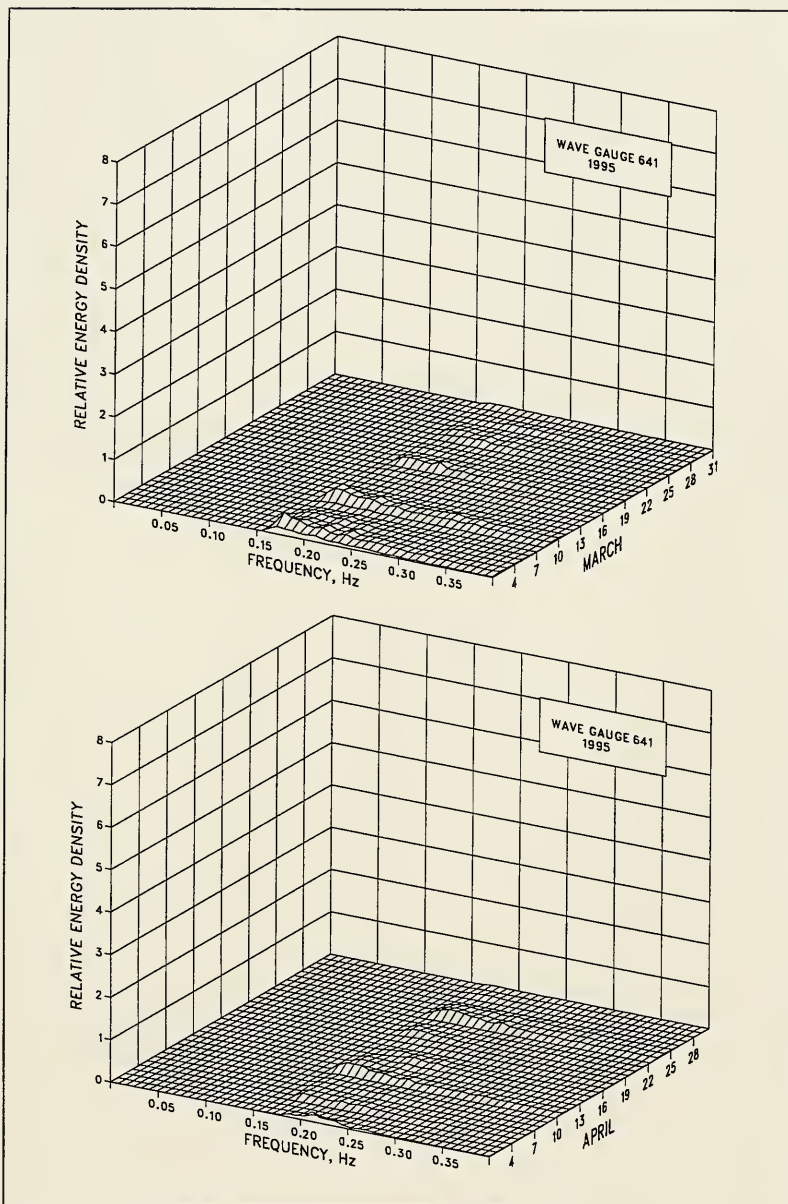


Figure E8. (Sheet 2 of 6)

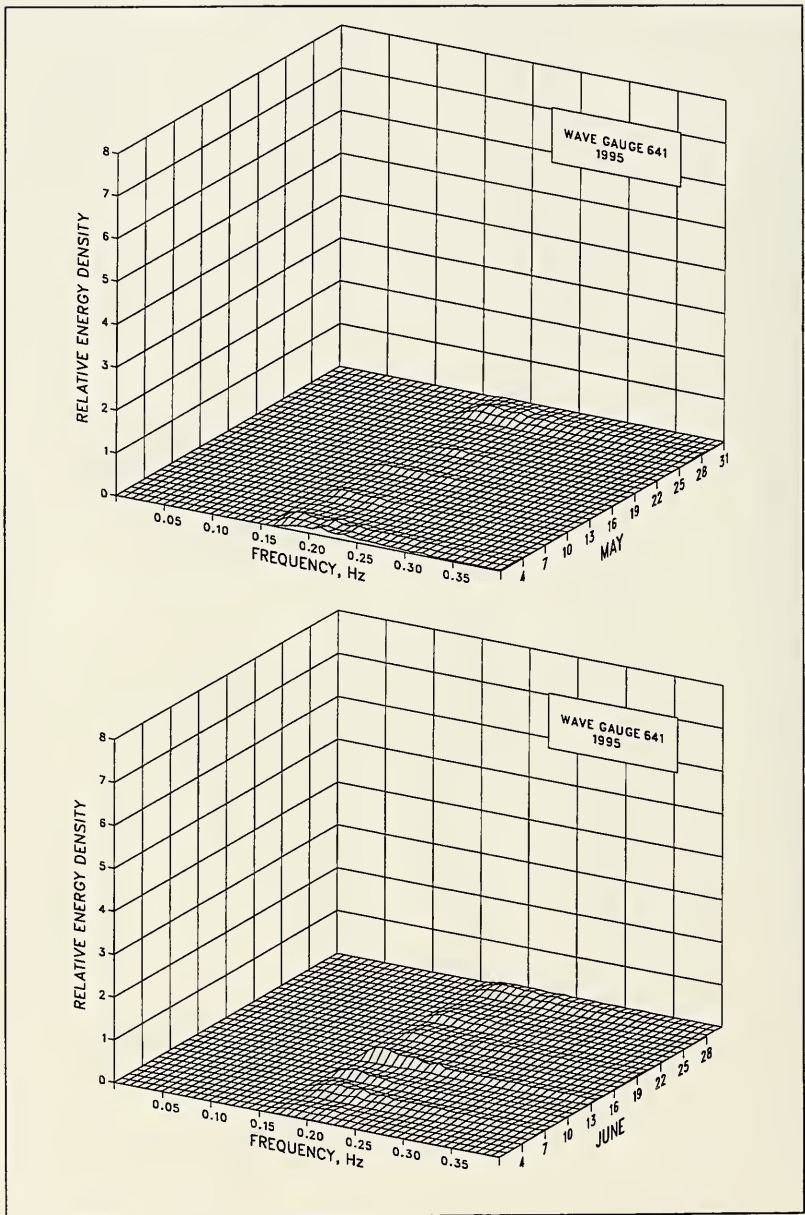


Figure E8. (Sheet 3 of 6)



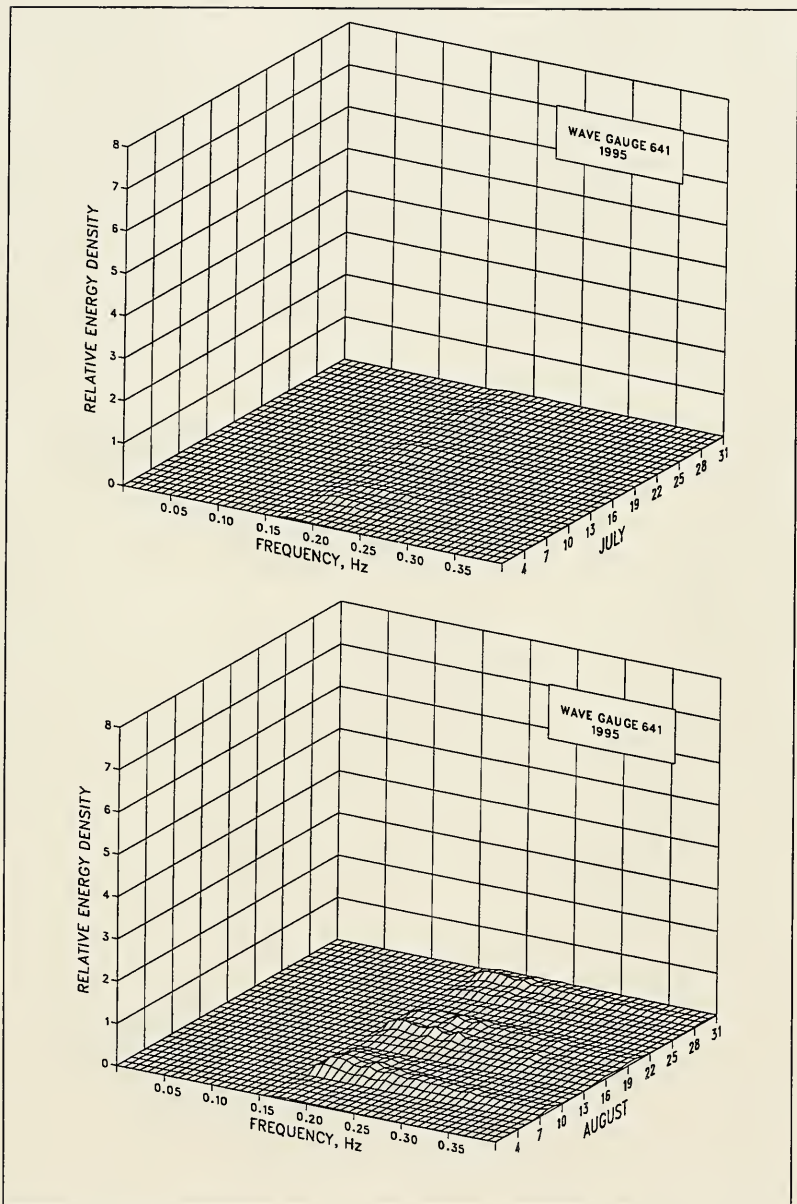


Figure E8. (Sheet 4 of 6)

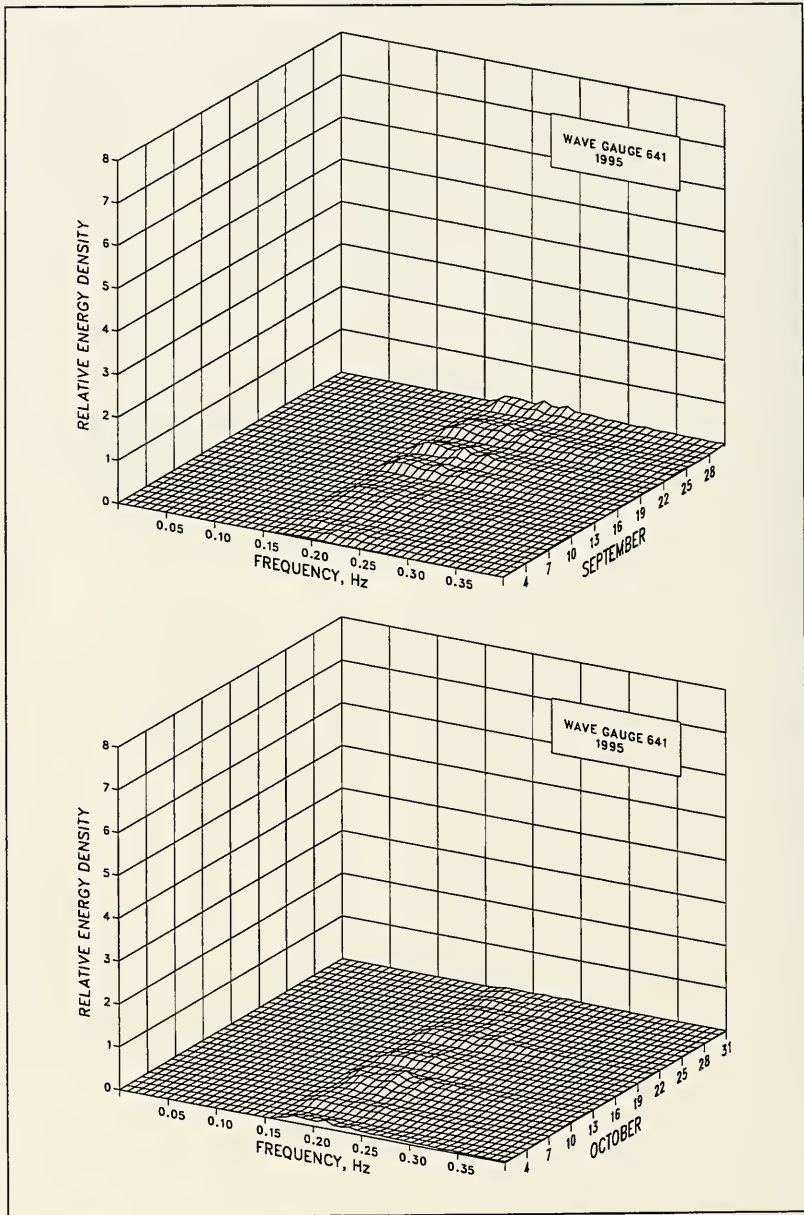


Figure E8. (Sheet 5 of 6)

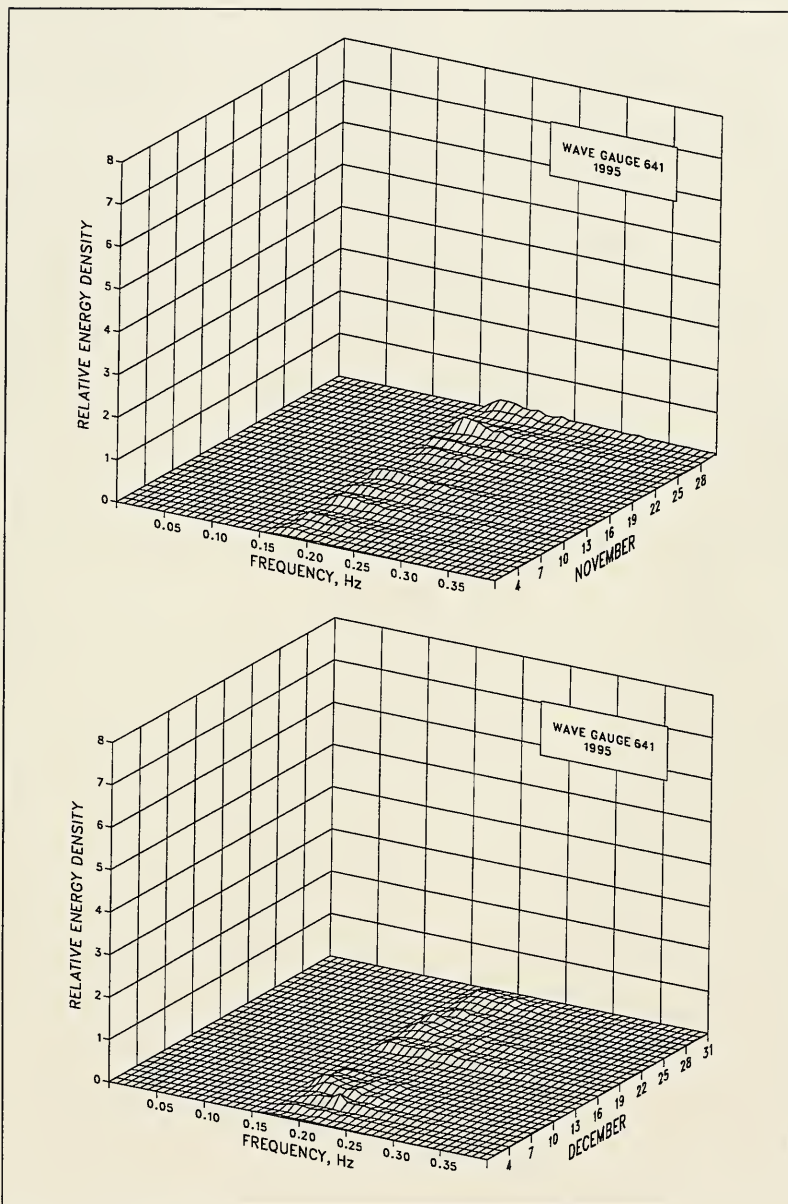


Figure E8. (Sheet 6 of 6)

**Table E7**  
**Wave statistics for Gauge 641**

Month	1995							1980-1995						
	Height			Date	Period			Height			Date	Period		
	Mean	Std.	Extreme		Mean	Std.	Number	Mean	Std.	Extreme		Mean	Std.	Number
m	m	m	sec	sec	Obs.	m	m	m	sec	sec	Obs.			
Jan	0.7	0.4	1.5	15	8.3	3.8	123	0.7	0.4	2.0	1980	7.9	3.3	1762
Feb	0.5	0.3	1.0	12	8.2	3.0	112	0.8	0.4	2.2	1992	8.1	3.0	1672
Mar	0.6	0.3	1.4	2	8.8	3.4	116	0.8	0.4	2.3	1980	8.3	3.3	1844
Apr	0.5	0.2	1.0	10	7.7	3.8	119	0.7	0.4	2.3	1987	8.4	3.3	1742
May	0.5	0.2	1.0	2	8.7	3.5	124	0.6	0.4	2.0	1987	8.1	3.2	1800
Jun	0.5	0.2	1.0	13	7.6	2.1	120	0.5	0.3	1.7	1990	7.8	2.9	1647
Jul	0.5	0.2	0.8	18	8.6	2.4	123	0.5	0.2	1.6	1990	8.1	3.0	1684
Aug	0.8	0.4	1.7	17	10.7	3.3	124	0.6	0.3	1.7	1995	8.2	3.1	1722
Sep	0.7	0.3	1.5	9	10.2	3.6	120	0.7	0.4	2.1	1985	8.6	3.4	1647
Oct	0.6	0.2	1.0	11	8.8	2.7	124	0.8	0.4	2.2	1982	8.7	3.3	1689
Nov	0.5	0.3	1.1	14	8.7	3.2	118	0.7	0.4	2.0	1981	8.3	3.5	1656
Dec	0.6	0.3	1.0	7	6.9	2.9	124	0.7	0.4	2.2	1989	8.2	3.6	1767
Annual	0.6	0.3	1.7	Aug	8.6	3.3	1447	0.7	0.4	2.3	Apr 1987	8.2	3.3	20632

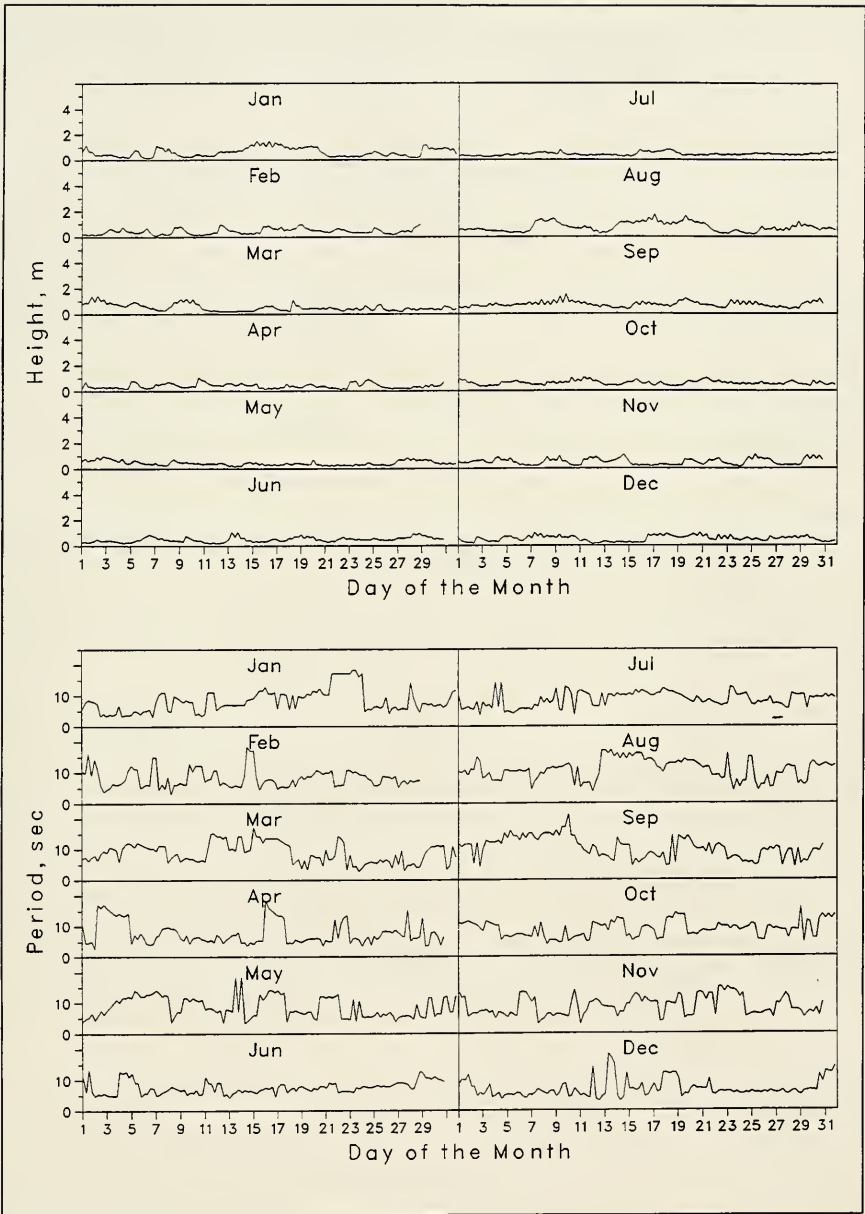


Figure E9. Time-histories of wave height and period for Gauge 641



# REPORT DOCUMENTATION PAGE

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<b>13. ABSTRACT (Maximum 200 words)</b>  This report provides basic data and summaries for measurements made during 1995 at the U.S. Army Engineer Waterways Experiment Station (WES), Coastal and Hydraulics Laboratory's (CHL's) Field Research Facility (FRF) in Duck, NC. The report includes comparisons of the present year's data with cumulative statistics from 1980 to the present.  Summarizes in this report are meteorological and oceanographic data, monthly bathymetric survey results, samples of biannual aerial photography, and descriptions of 10 storms that occurred during the year. The year was highlighted by Hurricane Felix, which impacted the North Carolina coast on 15-18 August.  This report is the 17th in a series of annual summaries of data at the FRF that began with Miscellaneous Report CERC-82-16, which summarizes data collected during 1977-1979. These reports are available from the WES Technical Report Distribution Section of the Information Technology Laboratory, Vicksburg, MS.			
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