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TECHNICAL REPORT CERC-91-9

2

# ANNUAL DATA SUMMARY FOR 1989 CERC FIELD RESEARCH FACILITY

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Volume II

## APPENDIXES C THROUGH E

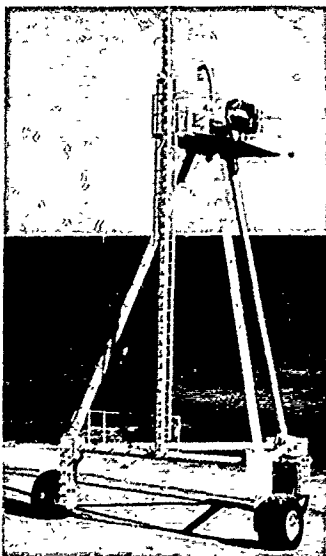
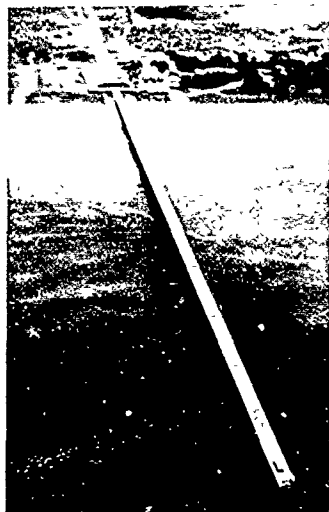
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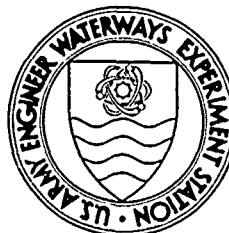
Coastal Engineering Research Center

DEPARTMENT OF THE ARMY

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## APPENDIX C: WAVE DATA FOR GAGE 111

1. Wave data summaries for Gage 111 are presented for 1989 and for 1985 through 1989 in the following forms:

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

2. Figure C1 displays the individual wave height and peak spectral wave period values along with the monthly mean values.

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

3. Annual and monthly joint distributions tables are presented in Tables C1 and C2, and data for 1985 through 1989 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 total 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

4. Annual and monthly wave height distributions for 1989 are plotted in cumulative form in Figures C2 and C3. Data for 1985 through 1989 are in Figure C4.

### Peak Spectral Wave Period Distributions

5. Annual and monthly peak wave period,  $T_p$ , distribution histograms for 1989 are presented in Figures C5 and C6. Data for 1985 through 1989 are in Figure C7.

### Persistence of Wave Heights

6. Table C5 shows the number of times in 1989 when the specified wave height was equaled or exceeded at least once during each day for the duration (consecutive days). Data for 1985 through 1989 are given in Table C6. An example is shown below:

| Height<br>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 3 times the height exceeded 1 m for shorter durations.

### Spectra

7. Monthly spectra for the offshore Waverider buoy (Gage 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-dimension surface drawing routine. Consequently, extremely high- and low-energy density values are modified to produce a smooth

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



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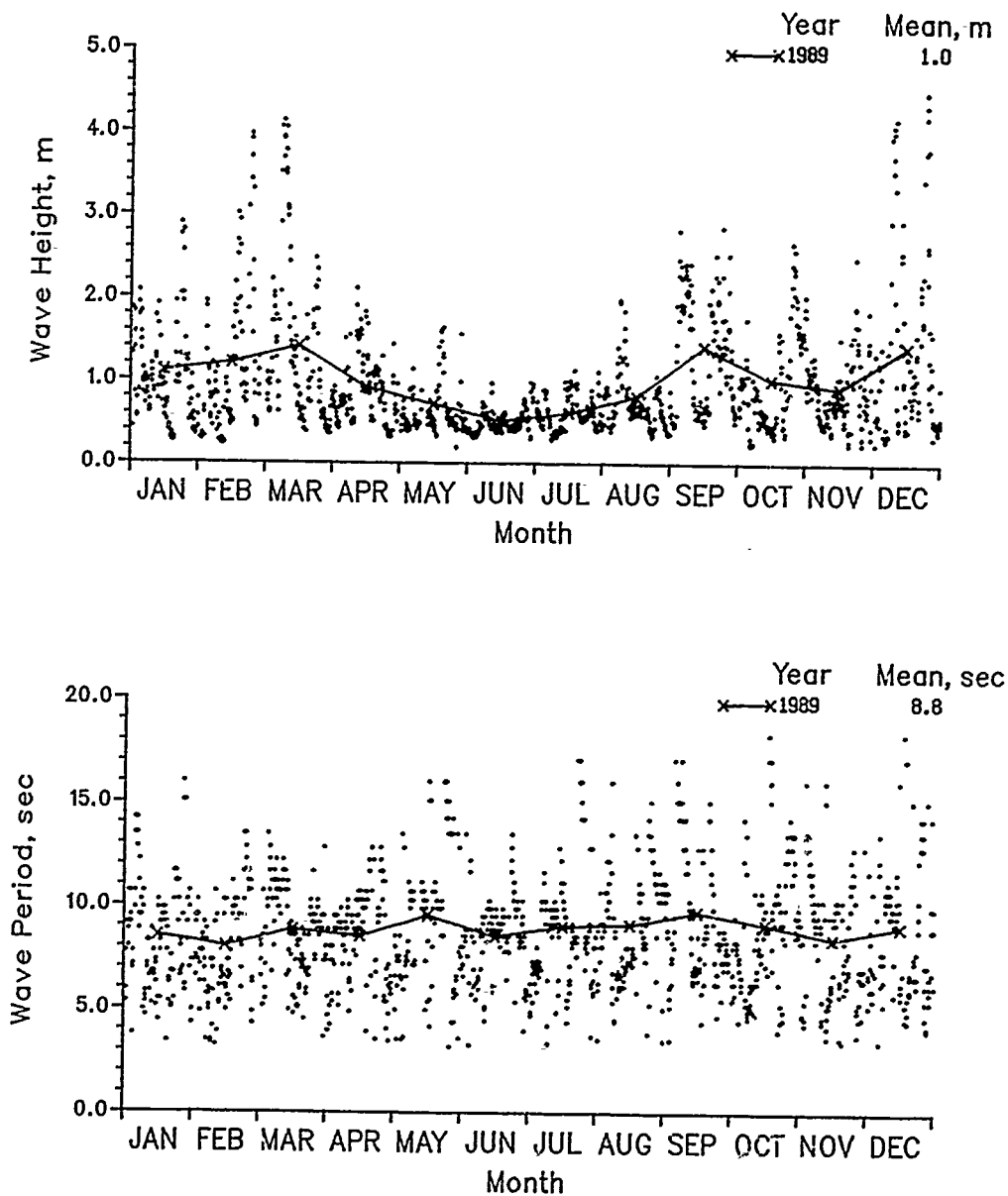


Figure C1. 1989 daily wave height and period values with monthly means for Gage 111

Table C1

Annual Joint Distribution of  $H_{mo}$  versus  $T_p$ 

| Annual 1989, Gage 111<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                              | Period, sec |             |             |             |             |             |             |             |               |               |               |                 |       |
|                                                                        | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer | Total |
| 0.00 - 0.49                                                            | .           | 64          | 28          | 85          | 183         | 212         | 550         | 593         | 480           | 127           | 198           | 14              | 2534  |
| 0.50 - 0.99                                                            | .           | 148         | 261         | 480         | 614         | 508         | 649         | 685         | 579           | 127           | 318           | 42              | 4411  |
| 1.00 - 1.49                                                            | .           | 7           | 134         | 247         | 282         | 71          | 134         | 155         | 254           | 56            | 78            | .               | 1418  |
| 1.50 - 1.99                                                            | .           | .           | 7           | 99          | 191         | 85          | 148         | 99          | 120           | 64            | 78            | 7               | 898   |
| 2.00 - 2.49                                                            | .           | .           | .           | .           | 64          | 49          | 35          | 49          | 14            | 49            | 78            | 14              | 352   |
| 2.50 - 2.99                                                            | .           | .           | .           | .           | 7           | 35          | 7           | 35          | 35            | 7             | 28            | .               | 154   |
| 3.00 - 3.49                                                            | .           | .           | .           | .           | .           | 7           | 14          | 14          | 28            | 7             | .             | .               | 70    |
| 3.50 - 3.99                                                            | .           | .           | .           | .           | .           | 7           | 7           | 7           | 56            | 14            | 7             | .               | 98    |
| 4.00 - 4.49                                                            | .           | .           | .           | .           | .           | .           | .           | 7           | 49            | .             | 7             | .               | 63    |
| 4.50 - 4.99                                                            | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                                         | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                  | 0           | 219         | 430         | 911         | 1341        | 974         | 1544        | 1644        | 1615          | 451           | 792           | 77              |       |

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

| January 1989, Gage 111<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                               | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                         | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
|                                                                         |             |             |             |             |             |             |             |             |               |               |               |                 |       |
| 0.00 - 0.49                                                             | .           | 83          | .           | .           | 83          | 165         | 165         | 909         | 248           | .             | .             | .               | 1653  |
| 0.50 - 0.99                                                             | .           | 83          | 248         | 496         | 579         | 331         | 248         | 909         | 579           | 165           | 413           | .               | 4051  |
| 1.00 - 1.49                                                             | .           | .           | 165         | 744         | 413         | 248         | 331         | 165         | 413           | 165           | .             | .               | 2644  |
| 1.50 - 1.99                                                             | .           | .           | .           | 83          | 331         | 165         | 248         | 83          | 83            | 83            | .             | .               | 1076  |
| 2.00 - 2.49                                                             | .           | .           | .           | .           | 83          | 83          | .           | .           | 83            | .             | .             | .               | 249   |
| 2.50 - 2.99                                                             | .           | .           | .           | .           | .           | .           | .           | .           | 331           | .             | .             | .               | 331   |
| 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           | 166         | 413         | 1323        | 1489        | 992         | 992         | 2066        | 1737          | 413           | 413           | 0               |       |

| February 1989, Gage 111                       |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
| Height, m                                     | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                               | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                   | .           | 190         | 95          | .           | 190         | 286         | 190         | 857         | 762           | .             | .             | .               | 2570  |
| 0.50 - 0.99                                   | .           | 286         | 286         | 476         | 762         | 476         | 286         | 286         | 476           | .             | .             | .               | 3334  |
| 1.00 - 1.49                                   | .           | .           | 190         | 286         | 286         | 190         | 95          | 286         | 190           | .             | .             | .               | 1523  |
| 1.50 - 1.99                                   | .           | .           | .           | 286         | 286         | 190         | .           | 190         | 190           | .             | .             | .               | 1142  |
| 2.00 - 2.49                                   | .           | .           | .           | .           | 95          | 95          | .           | .           | .             | .             | 190           | .               | 380   |
| 2.50 - 2.99                                   | .           | .           | .           | .           | 95          | 95          | .           | 190         | .             | .             | .             | .               | 380   |
| 3.00 - 3.49                                   | .           | .           | .           | .           | .           | .           | 190         | 95          | .             | 95            | .             | .               | 390   |
| 3.50 - 3.99                                   | .           | .           | .           | .           | .           | .           | .           | .           | 190           | 95            | .             | .               | 235   |
| 4.00 - 4.49                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                         | 0           | 476         | 571         | 1048        | 1714        | 1332        | 761         | 1904        | 1808          | 190           | 190           | 0               |       |

| March 1989, Gage 111                          |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
| Height, m                                     | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                               | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                   | .           | .           | .           | 81          | .           | .           | 732         | 163         | .             | .             | 81            | .               | 1057  |
| 0.50 - 0.99                                   | .           | 81          | 81          | 407         | 163         | 894         | 1057        | 650         | 488           | .             | .             | .               | 3821  |
| 1.00 - 1.49                                   | .           | .           | 163         | 244         | 244         | 81          | 81          | 163         | 650           | .             | 81            | .               | 1707  |
| 1.50 - 1.99                                   | .           | .           | .           | 163         | 407         | 163         | .           | 163         | 325           | 81            | 81            | .               | 1383  |
| 2.00 - 2.49                                   | .           | .           | .           | .           | 163         | .           | 244         | 244         | .             | .             | 81            | .               | 732   |
| 2.50 - 2.99                                   | .           | .           | .           | .           | .           | .           | .           | 163         | 81            | .             | .             | .               | 244   |
| 3.00 - 3.49                                   | .           | .           | .           | .           | .           | .           | .           | 81          | 244           | .             | .             | .               | 325   |
| 3.50 - 3.99                                   | .           | .           | .           | .           | .           | .           | .           | .           | 407           | .             | 81            | .               | 488   |
| 4.00 - 4.49                                   | .           | .           | .           | .           | .           | .           | .           | .           | 244           | .             | .             | .               | 244   |
| 4.50 - 4.99                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                         | 0           | 81          | 244         | 895         | 977         | 1138        | 2114        | 1627        | 2439          | 81            | 405           | 0               |       |

(Continued)

(Sheet 1 of 4)

Table C2 (Continued)

April 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | .           | 508         | .           | 169         | 254         | 339         | 593           | .             | 169           | .               | 2032  |
| 0.50 - 0.99    | .           | 254         | 254         | 254         | 424         | 424         | 678         | 1441        | 678           | .             | 424           | .               | 4831  |
| 1.00 - 1.49    | .           | 85          | 85          | 169         | 254         | 85          | 169         | 424         | 339           | .             | 254           | .               | 1864  |
| 1.50 - 1.99    | .           | .           | 85          | 169         | 85          | 254         | 339         | 85          | 169           | .             | .             | .               | 1186  |
| 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           | 339         | 424         | 1100        | 848         | 932         | 1440        | 2289        | 1779          | 0             | 847           | 0               |       |

May 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 180         | 90          | 90          | 450         | 450         | 541         | 180         | 811           | 901           | 991           | .               | 4684  |
| 0.50 - 0.99    | .           | 270         | 360         | 450         | 360         | 901         | 360         | 450         | 541           | 180           | 360           | .               | 4232  |
| 1.00 - 1.49    | .           | .           | .           | .           | 90          | .           | .           | 180         | 360           | .             | .             | .               | 630   |
| 1.50 - 1.99    | .           | .           | .           | 90          | .           | .           | .           | 90          | 270           | .             | .             | .               | 450   |
| 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           | 450         | 450         | 630         | 900         | 1351        | 901         | 900         | 1982          | 1081          | 1351          | 0               |       |

June 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 83          | .           | 83          | 500         | 500         | 2583        | 1583        | 417           | 167           | 167           | .               | 6093  |
| 0.50 - 0.99    | .           | 83          | 83          | 917         | 500         | 83          | 833         | 1000        | 333           | .             | 83            | .               | 3915  |
| 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           | 166         | 83          | 1000        | 1000        | 583         | 3416        | 2583        | 750           | 167           | 250           | 0               |       |

(Continued)

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Table C2 (Continued)

July 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 83          | 83          | .           | 333         | 167         | 833         | 1250        | 333           | .             | 250           | .               | 3332  |
| 0.50 - 0.99    | .           | 83          | 333         | 667         | 1083        | 583         | 1250        | 583         | 583           | 500           | 583           | 167             | 6415  |
| 1.00 - 1.49    | .           | .           | .           | 83          | 83          | .           | .           | .           | 83            | .             | .             | .               | 249   |
| 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           | 166         | 416         | 750         | 1499        | 750         | 2033        | 1833        | 999           | 500           | 833           | 167             |       |

August 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | .           | .           | 83          | 83          | 579         | 496         | 826           | 83            | .             | .               | 2150  |
| 0.50 - 0.99    | .           | 248         | 83          | 331         | 744         | 1322        | 1074        | 413         | 1240          | 413           | 826           | .               | 6694  |
| 1.00 - 1.49    | .           | .           | 83          | 83          | 331         | .           | .           | 83          | 83            | 83            | 83            | .               | 829   |
| 1.50 - 1.99    | .           | .           | .           | 165         | 165         | .           | .           | .           | .             | .             | .             | .               | 330   |
| 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           | 248         | 166         | 579         | 1323        | 1405        | 1653        | 992         | 2149          | 579           | 909           | 0               |       |

September 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | .           | .           | .           | 83          | 83          | .           | 167           | .             | 83            | .               | 416   |
| 0.50 - 0.99    | .           | 83          | .           | .           | 917         | 750         | 667         | 500         | 583           | .             | 167           | .               | 3657  |
| 1.00 - 1.49    | .           | .           | 167         | 167         | 250         | 83          | 417         | 250         | 250           | 83            | 167           | .               | 1834  |
| 1.50 - 1.99    | .           | .           | .           | 167         | 417         | .           | 583         | .           | 83            | 250           | 500           | 83              | 2083  |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 333         | 167         | 83          | .             | 500           | 417           | 167             | 1657  |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 167         | 83          | .           | .             | .             | 83            | .               | 333   |
| 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          | 167         | 334         | 1584        | 1416        | 2000        | 833         | 1083          | 833           | 1417          | 250             |       |

(Continued)

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Table C2 (Concluded)

October 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | .           | .           | .           | .           | 242         | 323         | 403         | 403         | 645           | 242           | 81            | 161             | 2500  |
| 0.50 - 0.99    | .           | 81          | 403         | 484         | 1048        | 81          | 565         | 403         | 242           | .             | 242           | 81              | 3630  |
| 1.00 - 1.49    | .           | .           | 323         | 323         | 81          | 161         | 161         | 81          | 242           | 81            | 161           | .               | 1614  |
| 1.50 - 1.99    | .           | .           | .           | .           | 81          | .           | 484         | 323         | 161           | 323           | 242           | .               | 1614  |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | .           | .           | 161         | 81            | 81            | 161           | .               | 484   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | 161           | .               | 161   |
| 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          | 726         | 807         | 1452        | 565         | 1613        | 1371        | 1371          | 727           | 1048          | 242             |       |

November 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | .           | 83          | .           | .           | 83          | 83          | 167         | 500         | 750           | .             | 333           | .               | 1999  |
| 0.50 - 0.99    | .           | 250         | 667         | 750         | 500         | 167         | 333         | 1000        | 833           | 83            | 333           | .               | 4916  |
| 1.00 - 1.49    | .           | .           | 333         | 333         | 583         | .           | 333         | 250         | 250           | 167           | 167           | .               | 2416  |
| 1.50 - 1.99    | .           | .           | .           | .           | 250         | 83          | 83          | 167         | .             | .             | .             | .               | 583   |
| 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           | 333         | 1000        | 1083        | 1499        | 333         | 916         | 1917        | 1833          | 250           | 833           | 0               |       |

December 1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | .           | 88          | 88          | 263         | 263         | 263         | .           | 439         | 263           | 175           | 263           | .               | 2105  |
| 0.50 - 0.99    | .           | .           | 351         | 526         | 263         | 88          | 351         | 526         | 351           | 175           | 351           | 263             | 3245  |
| 1.00 - 1.49    | .           | .           | 88          | 526         | 789         | .           | .           | .           | 175           | 83            | .             | .               | 1666  |
| 1.50 - 1.99    | .           | .           | .           | 88          | 263         | 175         | .           | 88          | 175           | .             | 88            | .               | 877   |
| 2.00 - 2.49    | .           | .           | .           | .           | 263         | 88          | .           | 88          | .             | .             | 88            | .               | 527   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 175         | .           | 88          | .             | 88            | 88            | .               | 439   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | 88          | .           | .           | 88            | .             | .             | .               | 176   |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | 88          | 88          | 88          | 88            | 88            | .             | .               | 450   |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | 88          | 351           | .             | 88            | .               | 527   |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total          | 0           | 88          | 527         | 1403        | 1841        | 965         | 439         | 1405        | 1491          | 614           | 956           | 263             |       |

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

| Annual 1985-1989, Gage 111<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                   | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                             | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                 | 9           | 72          | 38          | 70          | 128         | 224         | 688         | 446         | 389           | 163           | 261           | 6               | 2494  |
| 0.50 - 0.99                                                                 | 4           | 142         | 239         | 466         | 535         | 405         | 941         | 751         | 548           | 139           | 289           | 13              | 4472  |
| 1.00 - 1.49                                                                 | .           | 13          | 132         | 375         | 298         | 152         | 242         | 199         | 246           | 29            | 89            | .               | 1775  |
| 1.50 - 1.99                                                                 | .           | .           | 10          | 120         | 180         | 73          | 85          | 67          | 120           | 34            | 60            | 3               | 752   |
| 2.00 - 2.49                                                                 | .           | .           | .           | 6           | 44          | 40          | 40          | 40          | 54            | 23            | 34            | 3               | 284   |
| 2.50 - 2.99                                                                 | .           | .           | .           | .           | 4           | 12          | 7           | 13          | 37            | 9             | 21            | .               | 103   |
| 3.00 - 3.49                                                                 | .           | .           | .           | .           | 3           | 7           | 10          | 16          | 13            | 4             | 4             | .               | 57    |
| 3.50 - 3.99                                                                 | .           | .           | .           | .           | .           | 1           | 7           | 3           | 16            | 4             | 3             | .               | 34    |
| 4.00 - 4.49                                                                 | .           | .           | .           | .           | .           | .           | 1           | 3           | 12            | .             | 4             | .               | 20    |
| 4.50 - 4.99                                                                 | .           | .           | .           | .           | .           | .           | .           | .           | 3             | .             | .             | .               | 3     |
| 5.00 - Greater                                                              | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                       | 13          | 227         | 419         | 1037        | 1192        | 914         | 2021        | 1538        | 1438          | 405           | 765           | 25              |       |

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

| January 1985-1989, Gage 111<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                    | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                              | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                  | .           | 117         | 17          | 17          | 34          | 185         | 453         | 587         | 369           | 168           | 268           | 17              | 2232  |
| 0.50 - 0.99                                                                  | .           | 168         | 235         | 436         | 436         | 302         | 721         | 470         | 654           | 84            | 268           | .               | 3774  |
| 1.00 - 1.49                                                                  | .           | 17          | 218         | 654         | 436         | 185         | 252         | 268         | 268           | 34            | 50            | .               | 2382  |
| 1.50 - 1.99                                                                  | .           | .           | .           | 168         | 369         | 101         | 117         | 84          | 67            | 34            | 17            | .               | 957   |
| 2.00 - 2.49                                                                  | .           | .           | .           | .           | 134         | 117         | 84          | 17          | 50            | .             | 34            | .               | 436   |
| 2.50 - 2.99                                                                  | .           | .           | .           | .           | 17          | .           | 34          | .           | 134           | .             | .             | .               | 185   |
| 3.00 - 3.49                                                                  | .           | .           | .           | .           | .           | .           | .           | .           | 17            | .             | .             | .               | 17    |
| 3.50 - 3.99                                                                  | .           | .           | .           | .           | .           | .           | .           | .           | 17            | .             | .             | .               | 17    |
| 4.00 - 4.49                                                                  | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                                                  | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                                               | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                        | 0           | 302         | 470         | 1275        | 1426        | 890         | 1661        | 1426        | 1576          | 320           | 637           | 17              |       |

| February 1985-1989, Gage 111<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                     | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                               | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                   | .           | 56          | 56          | 19          | 93          | 75          | 168         | 355         | 280           | 37            | 168           | .               | 1307  |
| 0.50 - 0.99                                                                   | .           | 150         | 224         | 486         | 579         | 393         | 748         | 841         | 766           | 93            | 187           | 19              | 4486  |
| 1.00 - 1.49                                                                   | .           | .           | 150         | 636         | 467         | 206         | 262         | 374         | 355           | 19            | 187           | .               | 2656  |
| 1.50 - 1.99                                                                   | .           | .           | 19          | 168         | 299         | 112         | 56          | 93          | 168           | .             | 19            | .               | 934   |
| 2.00 - 2.49                                                                   | .           | .           | .           | 19          | 37          | 19          | 19          | 37          | 56            | .             | 37            | .               | 224   |
| 2.50 - 2.99                                                                   | .           | .           | .           | .           | 19          | 19          | .           | 56          | 19            | .             | 56            | .               | 169   |
| 3.00 - 3.49                                                                   | .           | .           | .           | .           | 19          | .           | 37          | 75          | .             | 19            | .             | .               | 150   |
| 3.50 - 3.99                                                                   | .           | .           | .           | .           | .           | .           | .           | 19          | 37            | 19            | .             | .               | 75    |
| 4.00 - 4.49                                                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                                                | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                         | 0           | 206         | 449         | 1328        | 1513        | 824         | 1290        | 1850        | 1681          | 187           | 654           | 19              |       |

| March 1985-1989, Gage 111<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|----------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                  | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                            | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                | 17          | .           | .           | 83          | 50          | 99          | 413         | 215         | 231           | 66            | 83            | .               | 1257  |
| 0.50 - 0.99                                                                | .           | 66          | 116         | 495         | 495         | 495         | 1073        | 1023        | 677           | 50            | 50            | .               | 4540  |
| 1.00 - 1.49                                                                | .           | 17          | 182         | 380         | 413         | 165         | 198         | 281         | 528           | .             | 33            | .               | 2197  |
| 1.50 - 1.99                                                                | .           | .           | 17          | 132         | 198         | 132         | 99          | 83          | 198           | 17            | 99            | .               | 975   |
| 2.00 - 2.49                                                                | .           | .           | .           | .           | 66          | 17          | 83          | 132         | 116           | .             | 99            | .               | 513   |
| 2.50 - 2.99                                                                | .           | .           | .           | .           | .           | .           | .           | 50          | 83            | 17            | 50            | .               | 200   |
| 3.00 - 3.49                                                                | .           | .           | .           | .           | .           | .           | .           | 17          | 66            | .             | .             | .               | 83    |
| 3.50 - 3.99                                                                | .           | .           | .           | .           | .           | .           | 17          | .           | 99            | 17            | 17            | .               | 150   |
| 4.00 - 4.49                                                                | .           | .           | .           | .           | .           | .           | .           | .           | 50            | .             | 33            | .               | 83    |
| 4.50 - 4.99                                                                | .           | .           | .           | .           | .           | .           | .           | .           | 17            | .             | .             | .               | 17    |
| 5.00 - Greater                                                             | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                      | 17          | 83          | 315         | 1090        | 1222        | 908         | 1883        | 1801        | 2065          | 167           | 464           | 0               |       |

(Continued)

(Sheet 1 of 4)

Table C4 (Continued)

April 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 17          |             |             | 104         | 17          | 69          | 485         | 347         | 433           | 277           | 295           | .               | 2044  |
| 0.50 - 0.99    | .           | 191         | 191         | 295         | 468         | 312         | 849         | 988         | 607           | 295           | 555           | 17              | 4768  |
| 1.00 - 1.49    | .           | 17          | 35          | 156         | 277         | 104         | 364         | 416         | 139           | .             | 121           | .               | 1629  |
| 1.50 - 1.99    | .           | .           | 35          | 121         | 121         | 87          | 121         | 69          | 295           | 35            | 104           | .               | 988   |
| 2.00 - 2.49    | .           | .           | .           | 17          | 35          | .           | .           | 87          | 87            | .             | 35            | .               | 261   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | .           | .           | .           | 52            | 52            | .             | .               | 104   |
| 3.00 - 3.49    | .           | .           | .           | .           | 17          | .           | 17          | 17          | 17            | 17            | 17            | .               | 102   |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | 17          | 17          | 17            | .             | 17            | .               | 51    |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | 17          | 17          | .             | .             | .             | .               | 34    |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | 17            | .             | .             | .               | 17    |
| 5.00 - Greater | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total          | 17          | 208         | 261         | 693         | 935         | 572         | 1870        | 1941        | 1664          | 676           | 1144          | 17              |       |

May 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 18          | 89          | 36          | 125         | 231         | 214         | 872         | 374         | 391           | 302           | 445           | .               | 3097  |
| 0.50 - 0.99    | .           | 125         | 214         | 285         | 534         | 552         | 1174        | 694         | 498           | 53            | 231           | .               | 4360  |
| 1.00 - 1.49    | .           | .           | 18          | 178         | 125         | 160         | 516         | 196         | 214           | .             | 107           | .               | 1514  |
| 1.50 - 1.99    | .           | .           | 18          | 71          | 36          | 18          | 107         | 89          | 160           | 53            | 89            | 18              | 659   |
| 2.00 - 2.49    | .           | .           | .           | .           | 18          | 18          | 18          | 18          | 18            | 71            | 36            | .               | 197   |
| 2.50 - 2.99    | .           | .           | .           | .           | 18          | .           | .           | .           | 36            | 18            | 53            | .               | 125   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | 18            | 36            | .               | 54    |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total          | 18          | 214         | 286         | 659         | 962         | 962         | 2687        | 1371        | 1317          | 515           | 997           | 18              |       |

June 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 34          | 239         | 51          | 102         | 392         | 563         | 1724        | 751         | 392           | 222           | 239           | .               | 4709  |
| 0.50 - 0.99    | 17          | 137         | 239         | 427         | 495         | 290         | 1280        | 956         | 205           | 154           | 34            | .               | 4234  |
| 1.00 - 1.49    | .           | 17          | 68          | 137         | 239         | 119         | 102         | 34          | 68            | .             | 17            | .               | 801   |
| 1.50 - 1.99    | .           | .           | 17          | 34          | 34          | 34          | 34          | 17          | 34            | .             | .             | .               | 204   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | .           | 34          | .           | 17            | .             | .             | .               | 51    |
| 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          | 51          | 393         | 375         | 700         | 1160        | 1006        | 3174        | 1758        | 716           | 376           | 290           | 0               |       |

(Continued)

(Sheet 2 of 4)

Table C4 (Continued)

July 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 17          | 69          | 104         | 35          | 260         | 608         | 1823        | 955         | 660           | 243           | 486           | 17              | 5277  |
| 0.50 - 0.99    | .           | 226         | 313         | 434         | 382         | 538         | 1337        | 469         | 226           | 139           | 226           | 35              | 4325  |
| 1.00 - 1.49    | .           | .           | 52          | 87          | 69          | 17          | 17          | 17          | 52            | .             | .             | .               | 311   |
| 1.50 - 1.99    | .           | .           | .           | .           | 17          | 17          | 35          | 17          | .             | .             | .             | .               | 86    |
| 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          | 17          | 295         | 469         | 556         | 728         | 1180        | 3212        | 1458        | 938           | 382           | 712           | 52              |       |

August 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 72          | 54          | 108         | 199         | 271         | 939         | 505         | 487           | 126           | 144           | .               | 2905  |
| 0.50 - 0.99    | .           | 235         | 126         | 848         | 830         | 415         | 1029        | 578         | 433           | 253           | 433           | .               | 5180  |
| 1.00 - 1.49    | .           | .           | 199         | 379         | 181         | 90          | 253         | 54          | 126           | 36            | 36            | .               | 1354  |
| 1.50 - 1.99    | .           | .           | .           | 144         | 72          | 36          | .           | 36          | 36            | 72            | .             | .               | 396   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 18          | .           | 36          | 72            | 18            | .             | .               | 144   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | .           | 18          | .           | .             | .             | .             | .               | 18    |
| 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           | 307         | 379         | 1479        | 1282        | 830         | 2239        | 1209        | 1154          | 505           | 613           | 0               |       |

September 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | 18          | 18          | 18          | 147         | 312         | 257         | 587           | 37            | 275           | .               | 1669  |
| 0.50 - 0.99    | .           | 73          | 128         | 312         | 624         | 440         | 881         | 1028        | 789           | 165           | 275           | .               | 4715  |
| 1.00 - 1.49    | .           | 18          | 73          | 275         | 257         | 294         | 440         | 239         | 275           | 110           | 128           | .               | 2109  |
| 1.50 - 1.99    | .           | .           | .           | 128         | 220         | 165         | 202         | 37          | 55            | 55            | 110           | 18              | 990   |
| 2.00 - 2.49    | .           | .           | .           | .           | 37          | 110         | 37          | 18          | .             | 110           | 92            | 37              | 441   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 37          | 18          | .           | .             | .             | 18            | .               | 73    |
| 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           | 91          | 219         | 733         | 1156        | 1193        | 1890        | 1579        | 1706          | 477           | 898           | 55              |       |

(Continued)

(Sheet 3 of 4)

Table C4 (Concluded)

October 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | 34          | 17          | 68          | 136         | 271         | 254         | 254           | 136           | 186           | 34              | 1390  |
| 0.50 - 0.99    | .           | 85          | 322         | 373         | 627         | 322         | 915         | 729         | 678           | 68            | 424           | 17              | 4560  |
| 1.00 - 1.49    | .           | 17          | 322         | 458         | 153         | 102         | 119         | 271         | 492           | 17            | 136           | .               | 2087  |
| 1.50 - 1.99    | .           | .           | 17          | 237         | 237         | 34          | 169         | 153         | 220           | 85            | 102           | .               | 1254  |
| 2.00 - 2.49    | .           | .           | .           | .           | 51          | 68          | 34          | 51          | 136           | 17            | 34            | .               | 391   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 34          | 17          | 17          | 68            | .             | 34            | .               | 170   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | 34          | 68          | 34          | .             | .             | .             | .               | 136   |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | 17          | .           | .             | .             | .             | .               | 17    |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total          | 0           | 102         | 695         | 1085        | 1136        | 730         | 1610        | 1509        | 1848          | 323           | 916           | 51              |       |

November 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 52          | 52          | 70          | 35          | 192         | 385         | 227         | 280           | 105           | 210           | .               | 1608  |
| 0.50 - 0.99    | 17          | 157         | 420         | 577         | 577         | 455         | 752         | 577         | 490           | 175           | 402           | .               | 4599  |
| 1.00 - 1.49    | .           | 17          | 227         | 629         | 472         | 280         | 297         | 105         | 157           | 87            | 157           | .               | 2428  |
| 1.50 - 1.99    | .           | .           | .           | 140         | 262         | 87          | 70          | 87          | 105           | .             | 35            | .               | 786   |
| 2.00 - 2.49    | .           | .           | .           | 35          | 35          | 87          | 157         | 52          | 70            | .             | .             | .               | 436   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 17          | .           | 17          | .             | .             | .             | .               | 34    |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | 17          | .           | 35          | 35            | .             | .             | .               | 87    |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | 17            | .             | .             | .               | 17    |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total          | 17          | 226         | 699         | 1451        | 1381        | 1135        | 1661        | 1100        | 1154          | 367           | 804           | 0               |       |

December 1985-1989, Gage 111  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 173         | 38          | 154         | 134         | 115         | 345         | 518         | 307           | 230           | 345           | .               | 2359  |
| 0.50 - 0.99    | 19          | 96          | 345         | 653         | 384         | 345         | 480         | 653         | 576           | 154           | 403           | 77              | 4185  |
| 1.00 - 1.49    | .           | 38          | 19          | 557         | 499         | 115         | 96          | 134         | 269           | 58            | 115           | .               | 1900  |
| 1.50 - 1.99    | .           | .           | .           | 96          | 307         | 58          | .           | 38          | 96            | 58            | 154           | .               | 807   |
| 2.00 - 2.49    | .           | .           | .           | .           | 115         | 19          | .           | 19          | 19            | 77            | 38            | .               | 287   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 38          | .           | 19          | 38            | 19            | 38            | .               | 152   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | 38          | .           | 19          | 19            | .             | .             | .               | 76    |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | 19          | 38          | 19          | 19            | 19            | .             | .               | 114   |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | 19          | 77            | .             | 19            | .               | 115   |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total          | 19          | 307         | 402         | 1460        | 1439        | 747         | 959         | 1438        | 1420          | 615           | 1112          | 77              |       |

(Sheet 4 of 4)

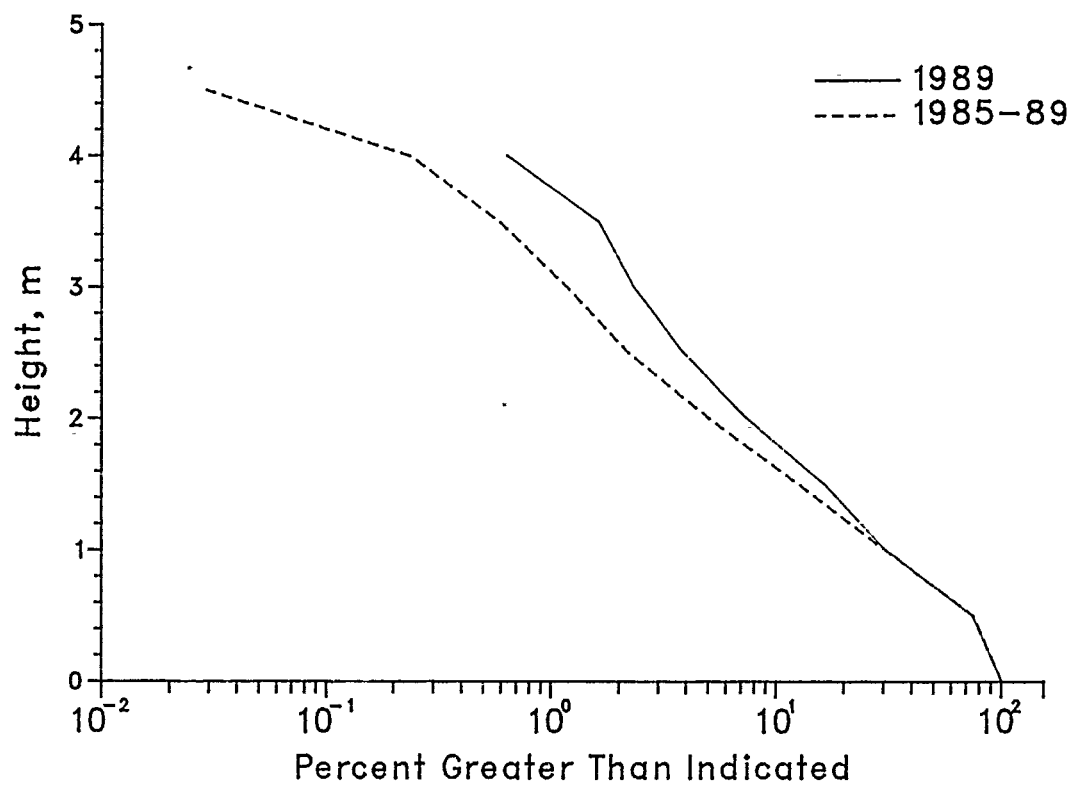


Figure C2. Annual cumulative wave height distributions  
for Gage 111

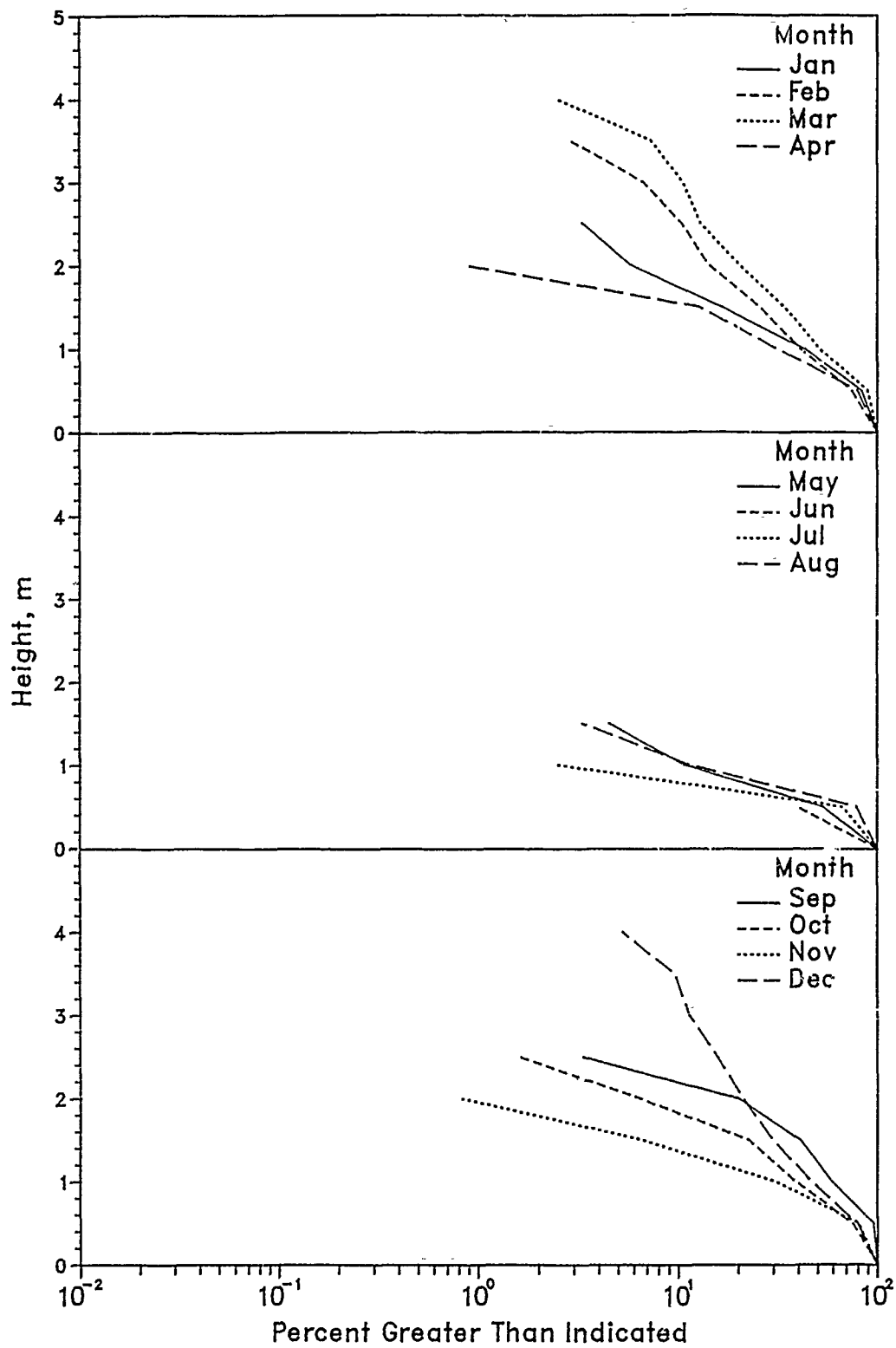


Figure C3. 1989 monthly wave height distributions  
for Gage 111

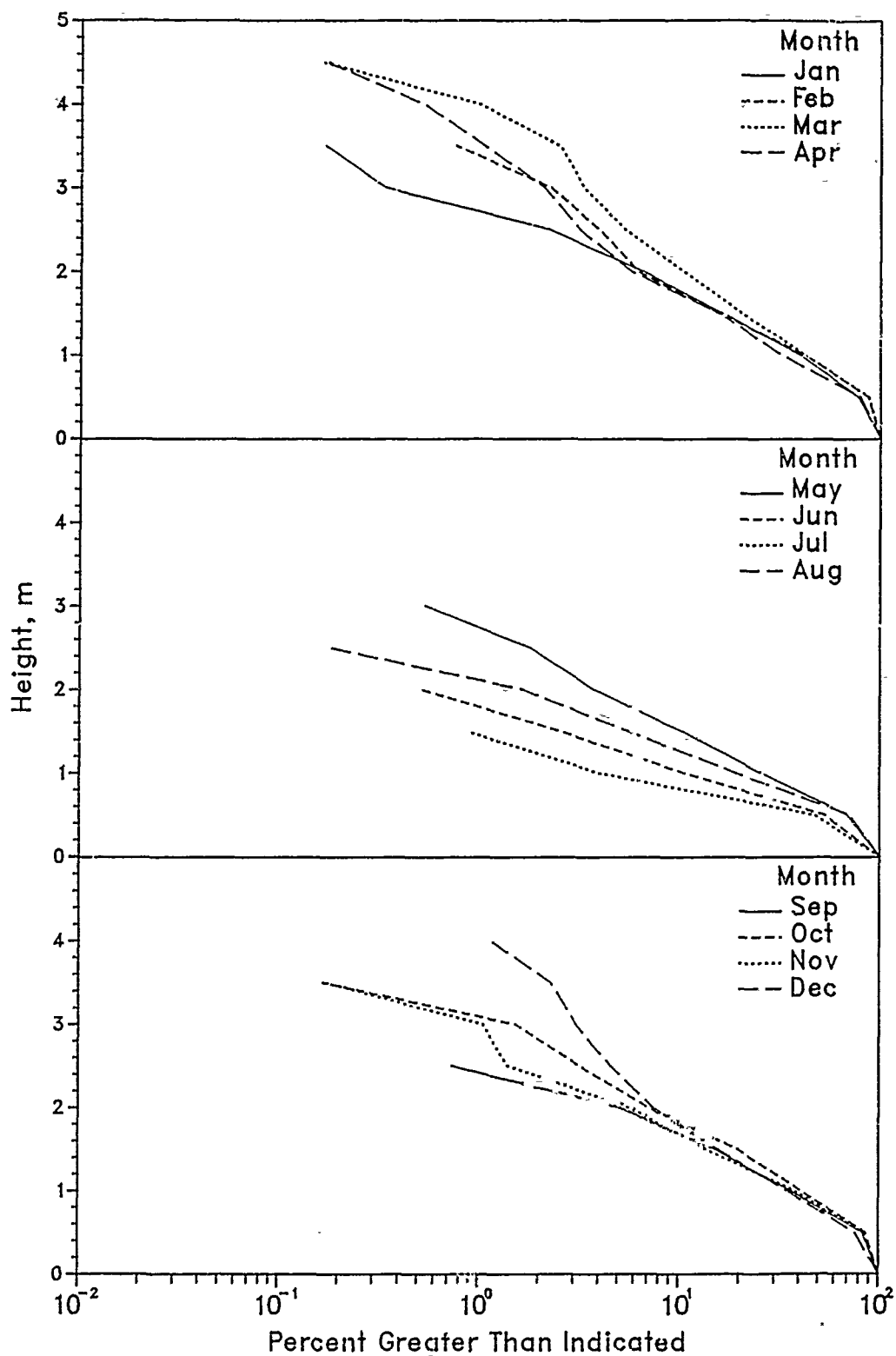


Figure C4. 1985-1989 monthly wave height distributions for Gage 111

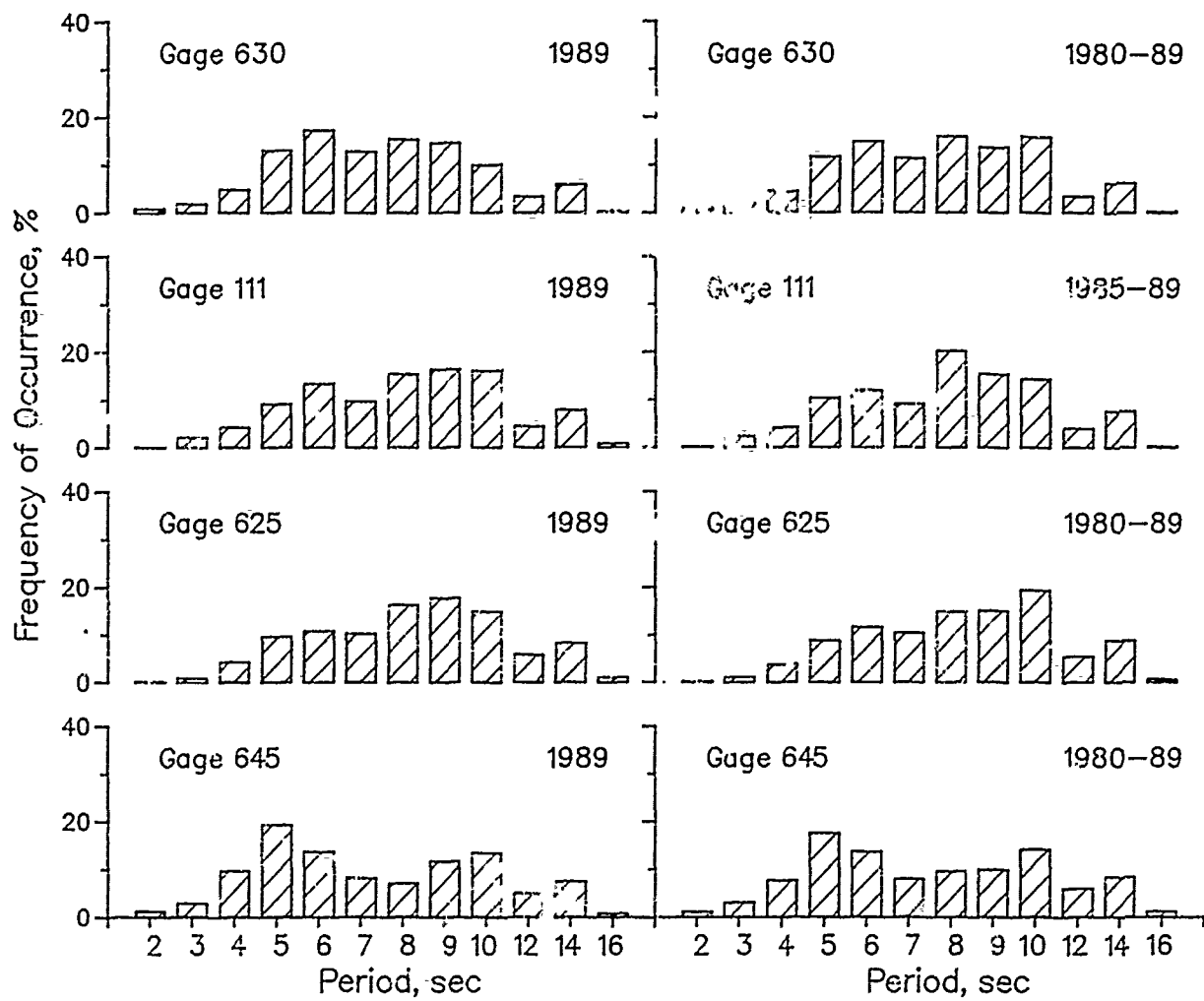


Figure C5. Annual wave period distributions for all gages

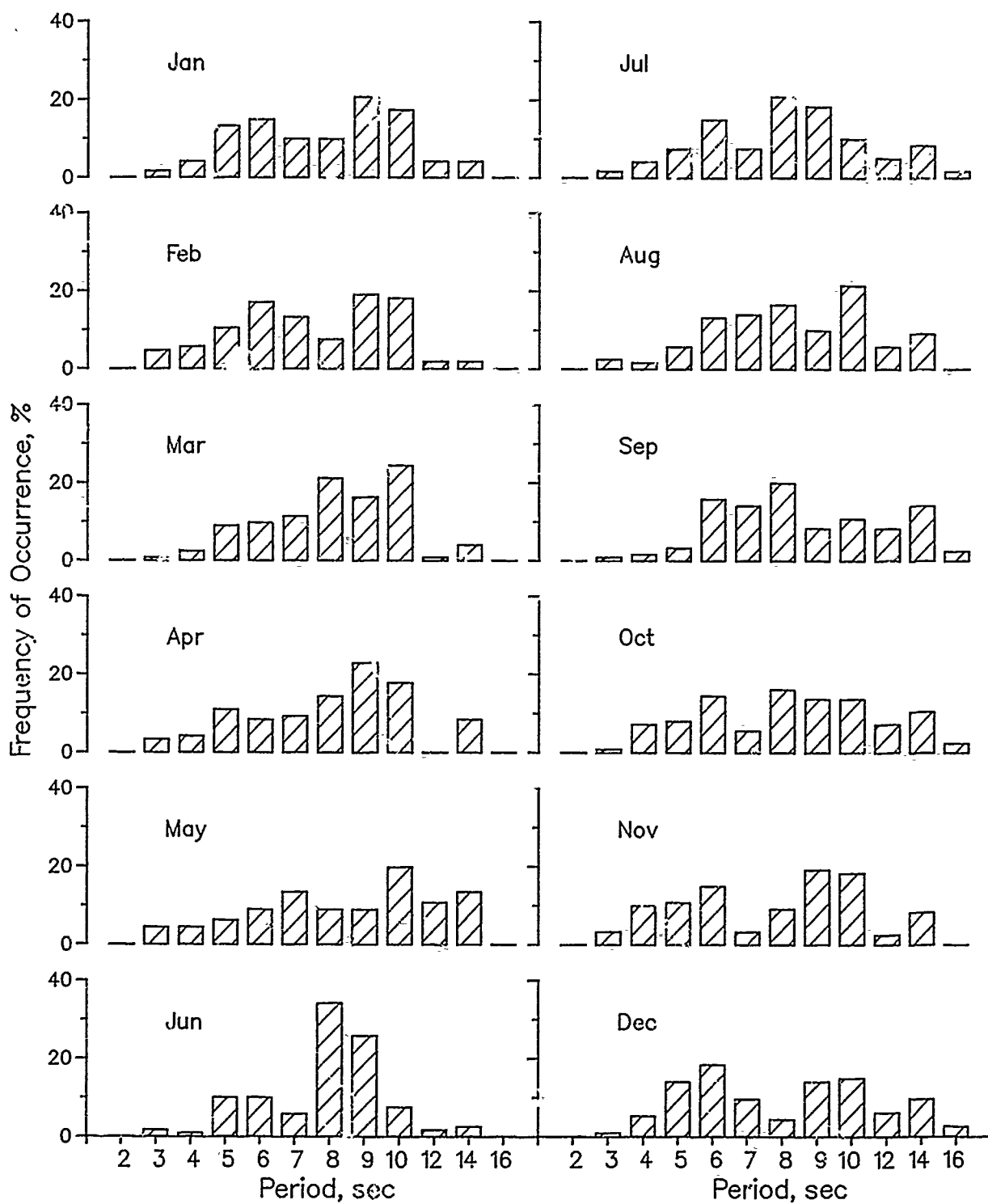


Figure C6. 1989 monthly wave period distributions for Gage 111

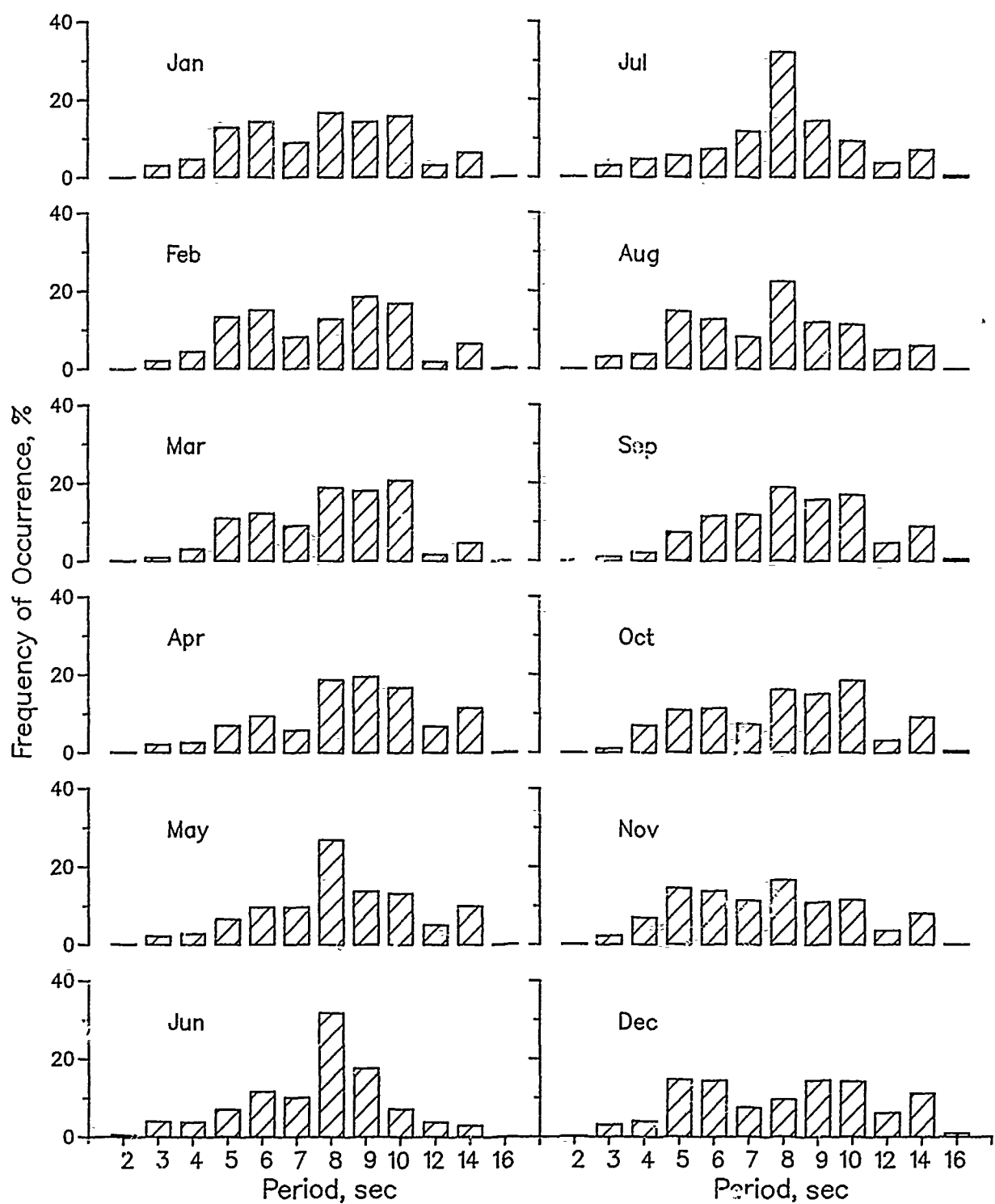


Figure C7. 1985-1989 monthly wave period distributions for Gage 111

Table C5  
1989 Persistence of  $H_{mo}$  for Gage 111

| Height<br>(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           | 30                           | 27 | 25 | 23 | 22 | 19 | 16 | 14 | 12 | 11 | 10 |    |    |    |    | 8  |    | 7  | 5   |
| 1.0           | 48                           | 28 | 19 | 14 | 13 | 8  | 6  |    | 5  |    | 4  | 2  | 1  |    |    |    |    |    |     |
| 1.5           | 35                           | 22 | 11 | 7  | 6  |    | 3  | 2  | 1  |    |    |    |    |    |    |    |    |    |     |
| 2.0           | 19                           | 11 | 6  | 3  | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 2.5           | 12                           | 7  |    | 4  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 3.0           | 5                            |    | 4  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 3.5           | 3                            | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 4.0           |                              |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |

Table C6  
1985 Through 1989 Persistence of  $H_{mo}$  for Gage 111

| Height<br>(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 | 23 | 21 | 18 | 17 | 15 | 14 | 13 | 12 | 10 | 9  | 8  |    | 7  | 6  |    |    | 5   |
| 1.0           | 49                           | 34 | 22 | 14 | 11 | 8  | 6  | 4  | 3  | 2  |    | 1  |    |    |    |    |    |    |     |
| 1.5           | 35                           | 19 | 8  | 4  | 2  |    |    | 1  |    |    |    |    |    |    |    |    |    |    |     |
| 2.0           | 16                           | 8  | 3  |    | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 2.5           | 8                            | 4  | 2  |    | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 3.0           | 5                            | 3  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 3.5           | 3                            | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 4.0           | 2                            |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |

\* Data from gage 640 from 1985 and 1986 as well as data from gage 141 for 1987 was used for comparison with gage 111.

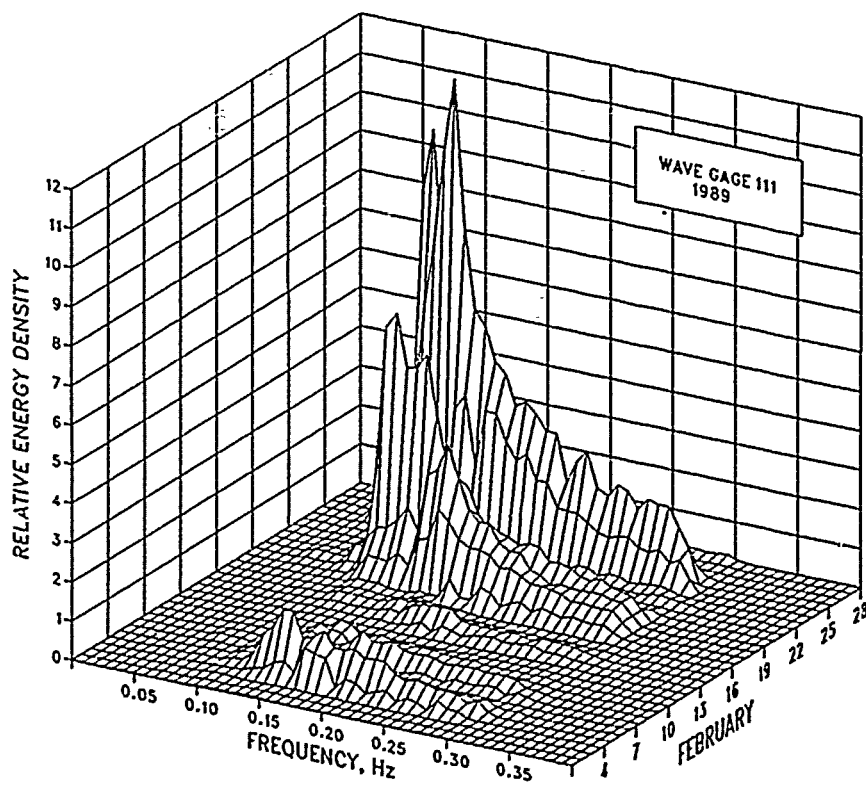
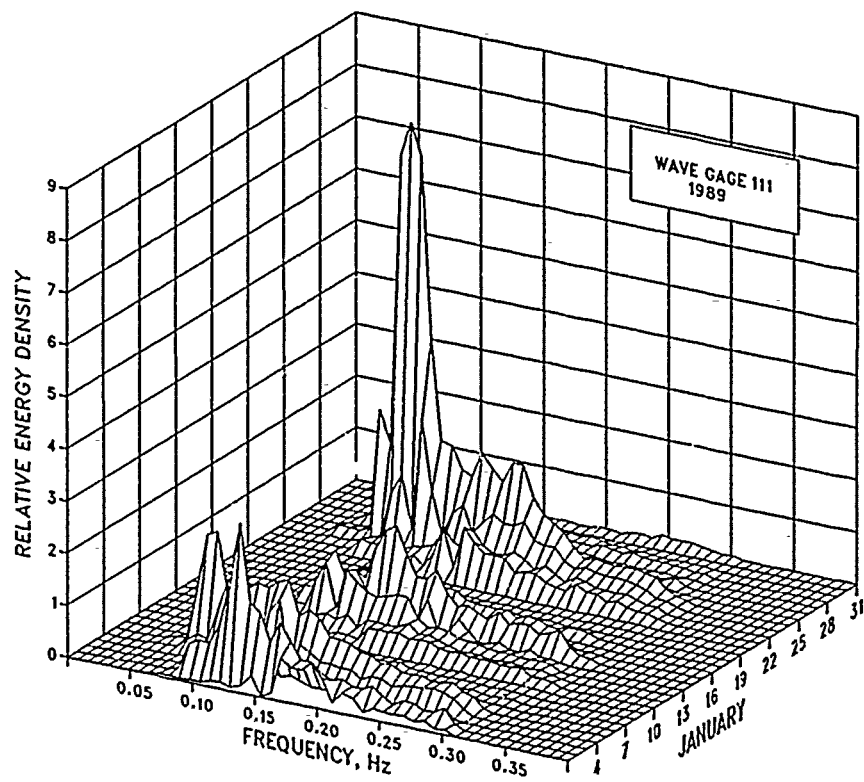


Figure C8. 1989 monthly spectra for Gage 111  
(Sheet 1 of 6)

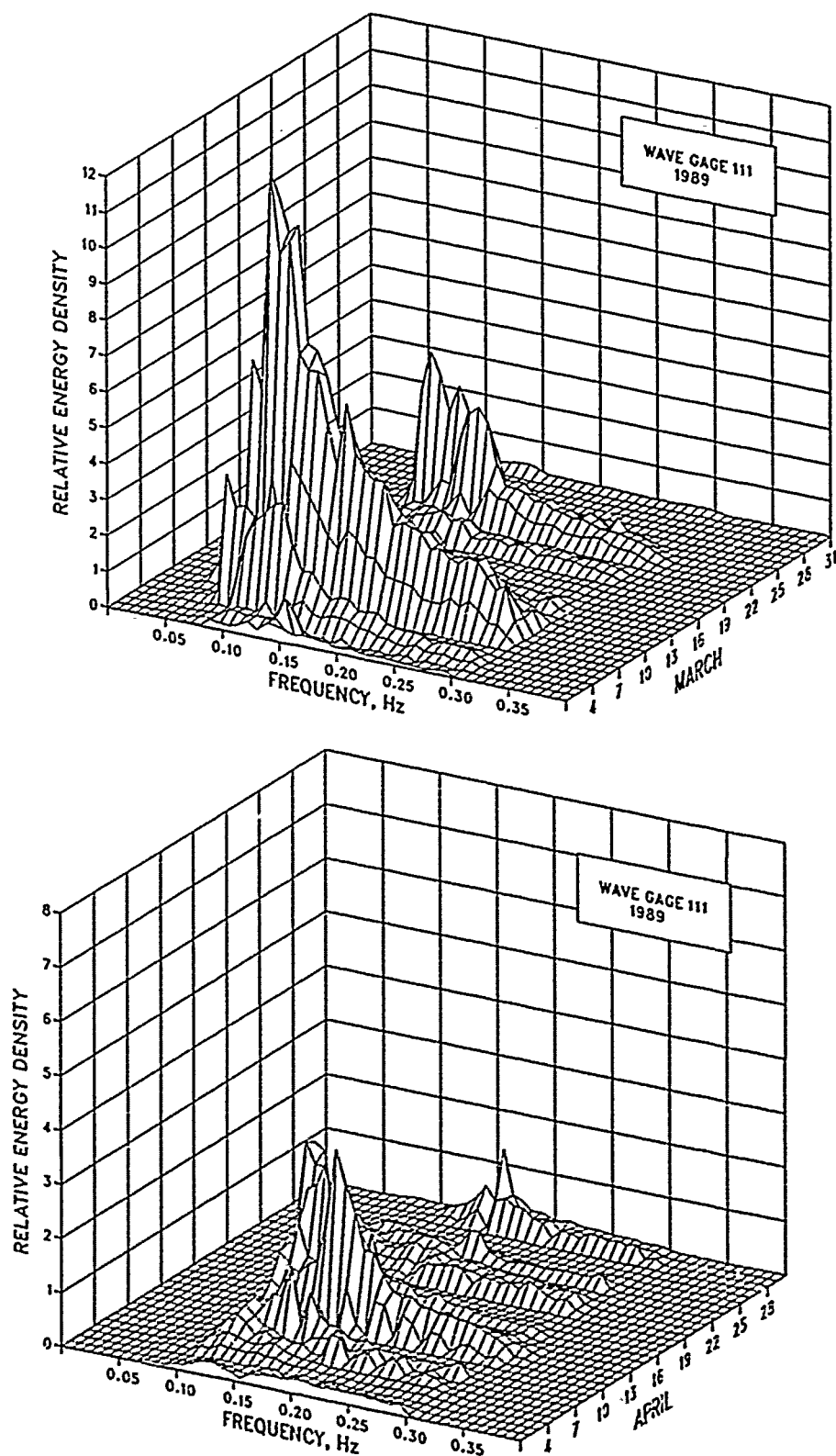


Figure C8. (Sheet 2 of 6)

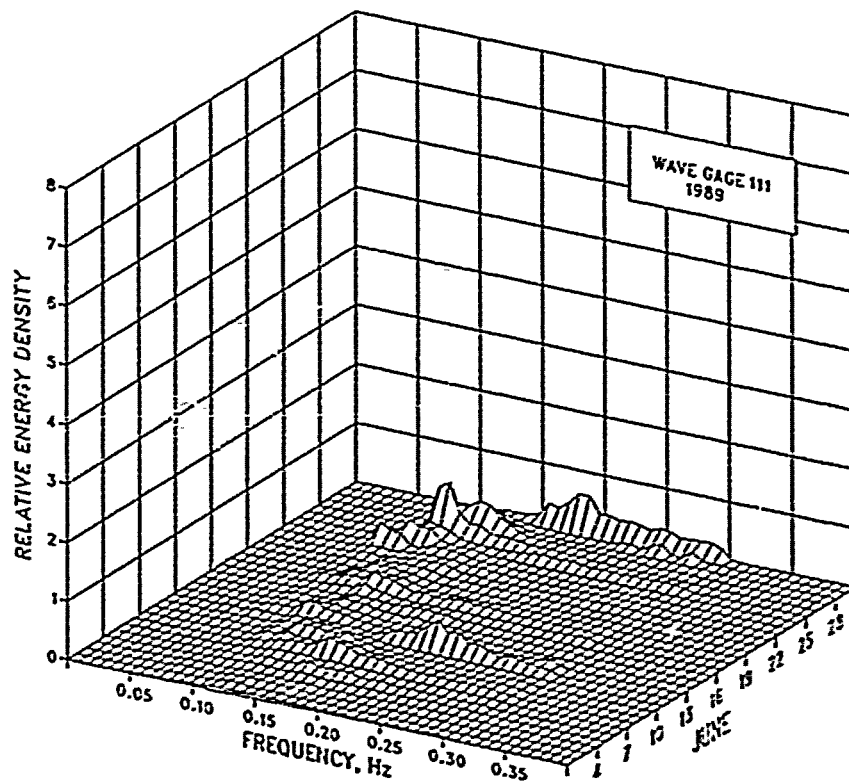
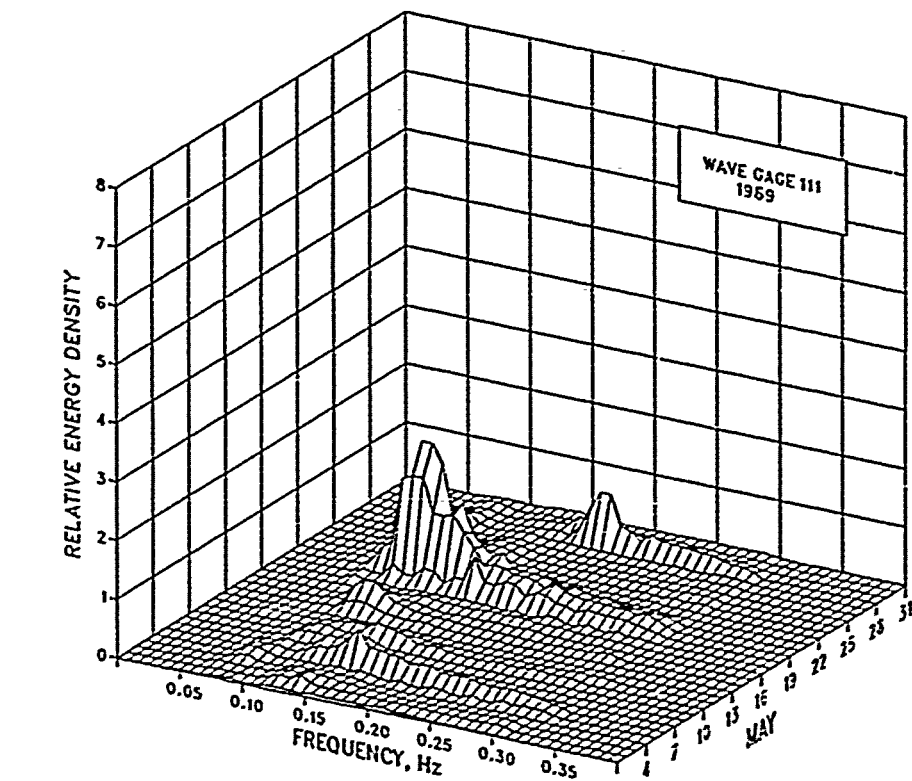


Figure C8. (Sheet 3 of 6)

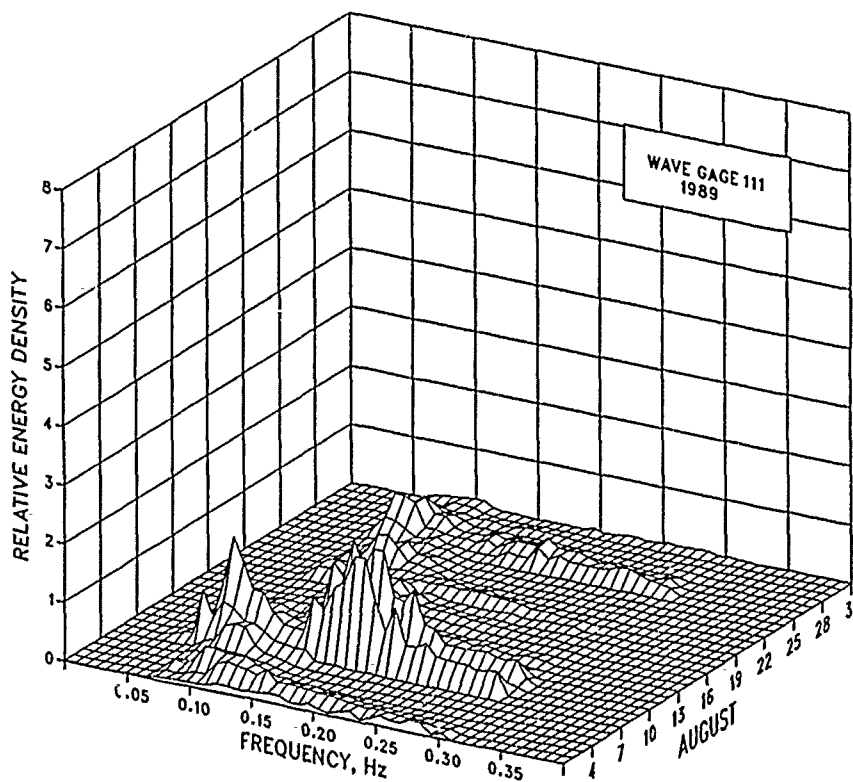
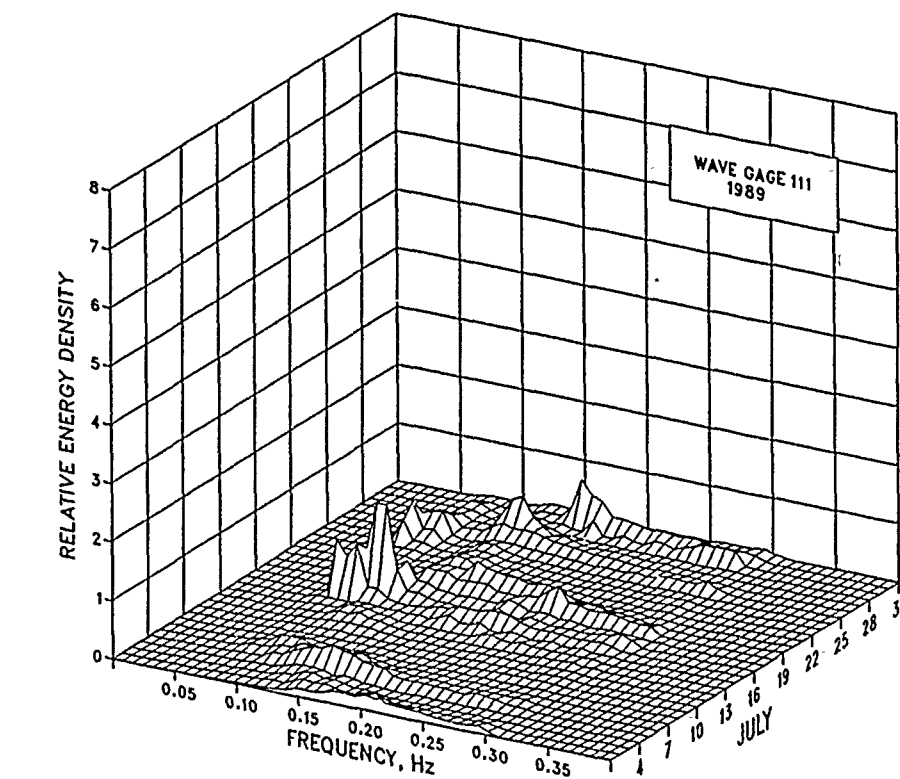


Figure C8. (Sheet 4 of 6)

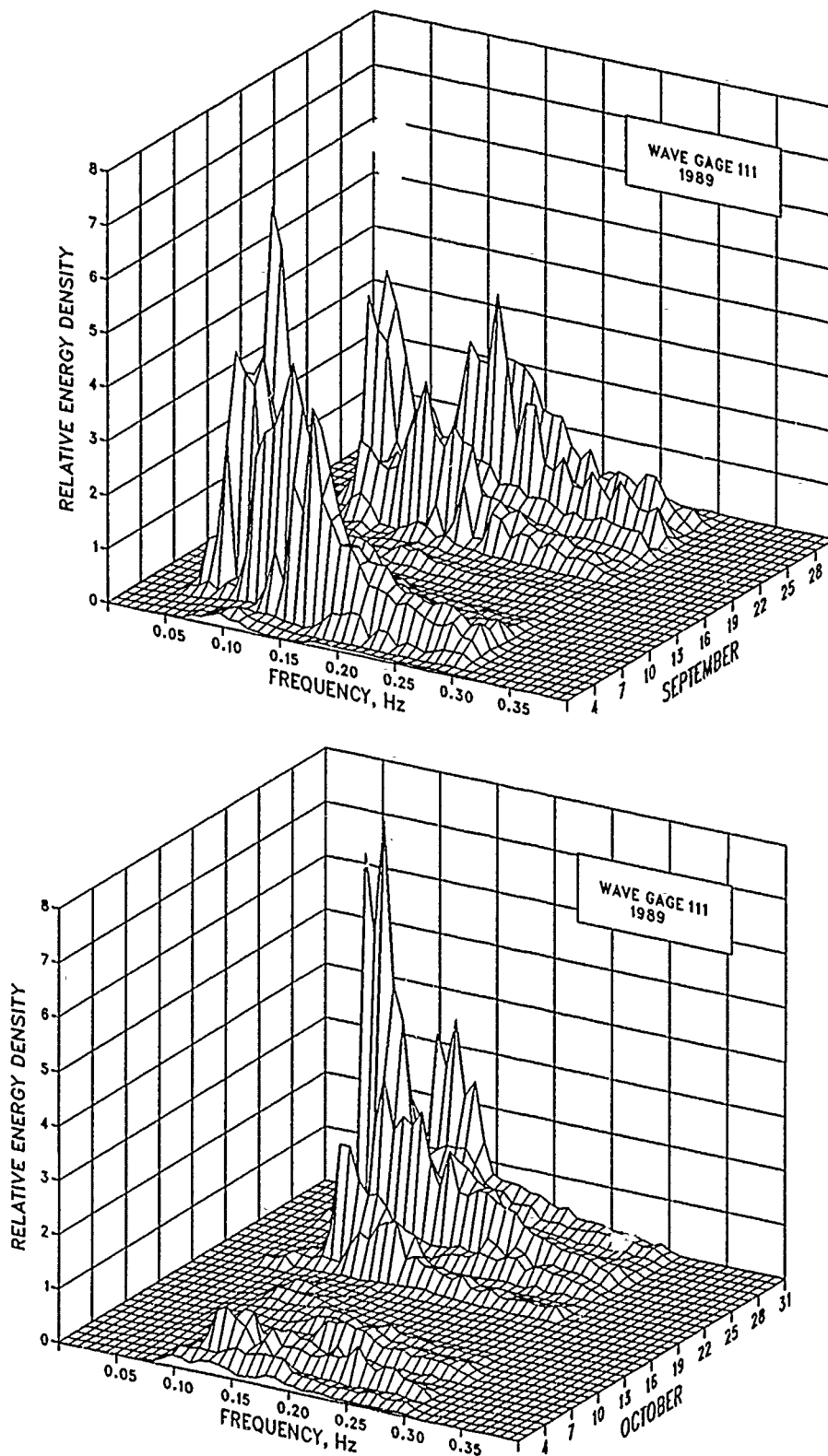


Figure C8. (Sheet 5 of 6)

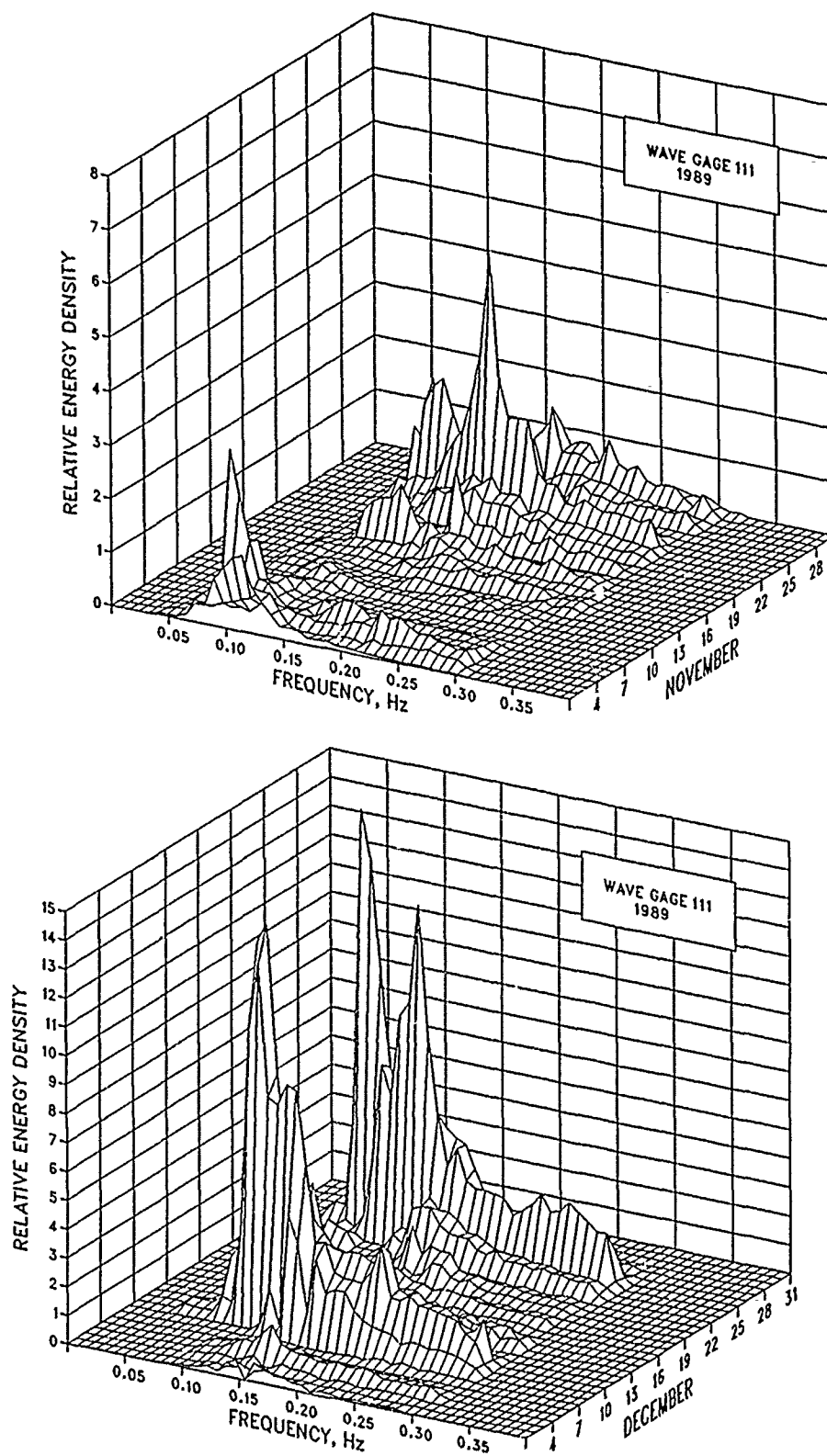


Figure C8. (Sheet 6 of 6)

Table C7  
Wave Statistics for Gage 111

| Month  | 1989   |      |         |      |      |        |      | 1980-1989 |        |      |          |      |      |        |      |        |
|--------|--------|------|---------|------|------|--------|------|-----------|--------|------|----------|------|------|--------|------|--------|
|        | Height |      |         |      | Date | Period |      |           | Height |      |          |      | Date | Period |      |        |
|        | Mean   | Std. | Extreme | Dev. |      | Mean   | Dev. | Number    | Mean   | Std. | Extreme  | Dev. |      | Mean   | Std. | Number |
|        |        | m    |         |      |      |        |      |           |        | m    |          |      |      |        | sec  |        |
| Jan    | 1.1    | 0.6  | 2.9     | 23   | 8.5  | 2.6    | 121  | 1.0       | 0.6    | 3.8  | 1987     | 8.5  | 2.7  | 596    |      |        |
| Feb    | 1.2    | 0.9  | 4.0     | 24   | 8.0  | 2.4    | 105  | 1.1       | 0.7    | 4.0  | 1989     | 8.5  | 2.6  | 535    |      |        |
| Mar    | 1.4    | 1.0  | 4.1     | 8    | 8.8  | 2.1    | 123  | 1.2       | 0.8    | 4.5  | 1987     | 8.7  | 2.3  | 606    |      |        |
| Apr    | 0.9    | 0.5  | 2.1     | 11   | 8.5  | 2.4    | 118  | 1.0       | 0.7    | 4.8  | 1988     | 9.4  | 2.8  | 577    |      |        |
| May    | 0.7    | 0.4  | 1.6     | 20   | 9.5  | 3.4    | 111  | 0.9       | 0.6    | 3.3  | 1986     | 9.1  | 2.8  | 562    |      |        |
| Jun    | 0.5    | 0.2  | 1.0     | 29   | 8.5  | 1.9    | 120  | 0.7       | 0.4    | 2.3  | 1986     | 8.3  | 2.3  | 586    |      |        |
| Jul    | 0.6    | 0.2  | 1.1     | 18   | 9.0  | 3.0    | 120  | 0.6       | 0.3    | 1.9  | 1986     | 8.7  | 2.6  | 576    |      |        |
| Aug    | 0.8    | 0.4  | 2.0     | 8    | 9.1  | 2.7    | 121  | 0.8       | 0.4    | 2.8  | 1985     | 8.4  | 2.7  | 554    |      |        |
| Sep    | 1.4    | 0.7  | 2.8     | 24   | 9.7  | 3.2    | 120  | 1.0       | 0.6    | 2.8  | 1989     | 9.1  | 2.8  | 545    |      |        |
| Oct    | 1.0    | 0.6  | 2.7     | 25   | 9.1  | 3.1    | 124  | 1.1       | 0.6    | 3.5  | 1987     | 8.8  | 2.8  | 590    |      |        |
| Nov    | 0.9    | 0.5  | 2.5     | 23   | 8.4  | 2.9    | 120  | 1.0       | 0.6    | 4.1  | 1985     | 8.3  | 2.8  | 572    |      |        |
| Dec    | 1.4    | 1.2  | 4.5     | 24   | 9.0  | 3.3    | 114  | 1.0       | 0.8    | 4.5  | 1989     | 8.9  | 3.3  | 521    |      |        |
| Annual | 1.0    | 0.7  | 4.5     | Dec  | 8.8  | 2.8    | 1417 | 0.9       | 0.6    | 4.8  | Apr 1982 | 8.7  | 2.7  | 6820   |      |        |

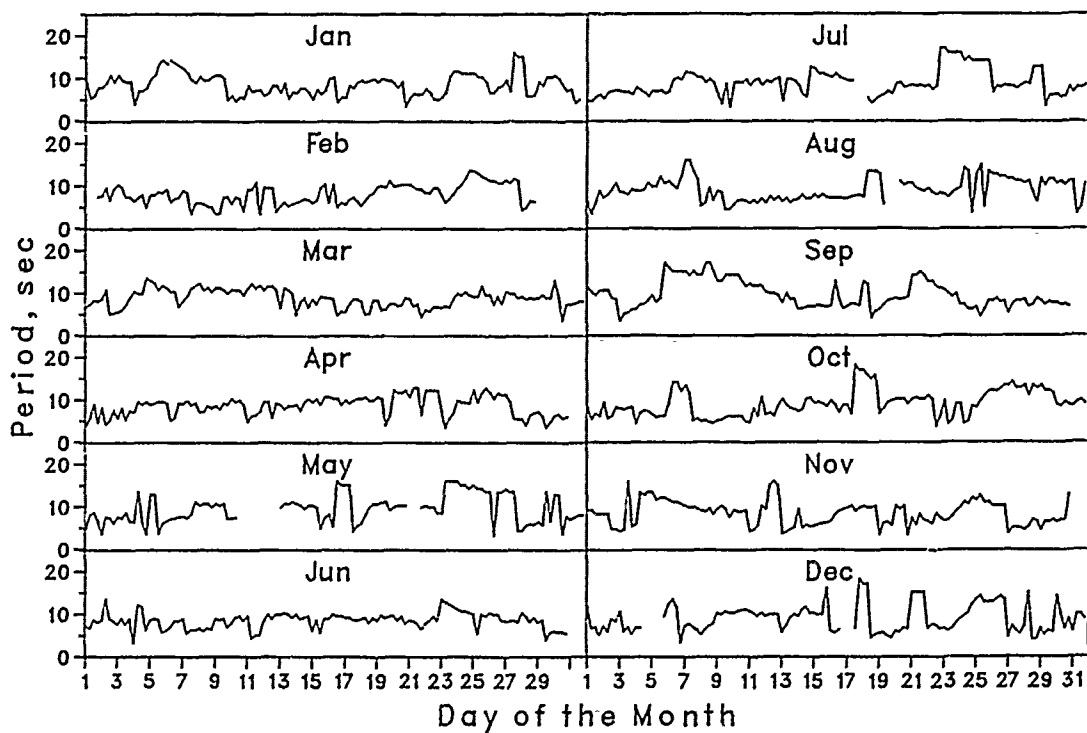
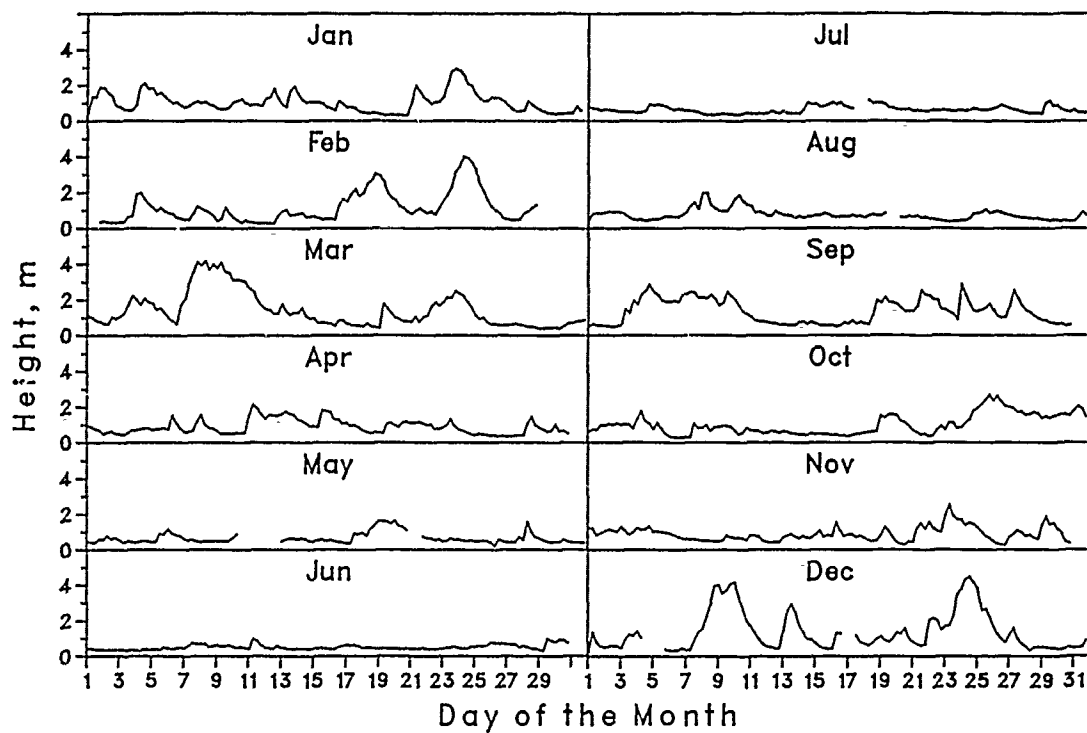


Figure C9. Time-histories of wave height and period for Garç 111

## APPENDIX D: WAVE DATA FOR GAGE 625

1. Wave data summaries for Gage 625 are presented for 1989 and for 1980 through 1989 in the following forms:

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

2. Figure D1 displays the individual wave height and peak spectral wave period values along with the monthly mean values.

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

3. Annual and monthly joint distributions tables are presented in Tables D1 and D2, and data for 1980 through 1989 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 total 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

4. Annual and monthly wave height distributions for 1989 are plotted in cumulative form in Figures D2 and D3. Data for 1980 through 1989 are in Figure D4.

### Peak Spectral Wave Period Distributions

5. Annual and monthly peak wave period,  $T_p$ , distribution histograms for 1989 are presented in Figures D5 and D6. Data for 1980 through 1989 are in Figure D7.

### Persistence of Wave Heights

6. Table D5 shows the number of times in 1989 when the specified wave height was equaled or exceeded at least once during each day for the duration (consecutive days). Data for 1980 through 1989 are given in Table D6. An example is shown below:

| Height<br>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 3 times the height exceeded 1 m for shorter durations.

### Spectra

7. Monthly spectra for the offshore Waverider buoy (Gage 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-dimension 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.

8. Monthly and annual wave statistics for Gage 625 for 1989 and for 1980 through 1989 are presented in Table D7.

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

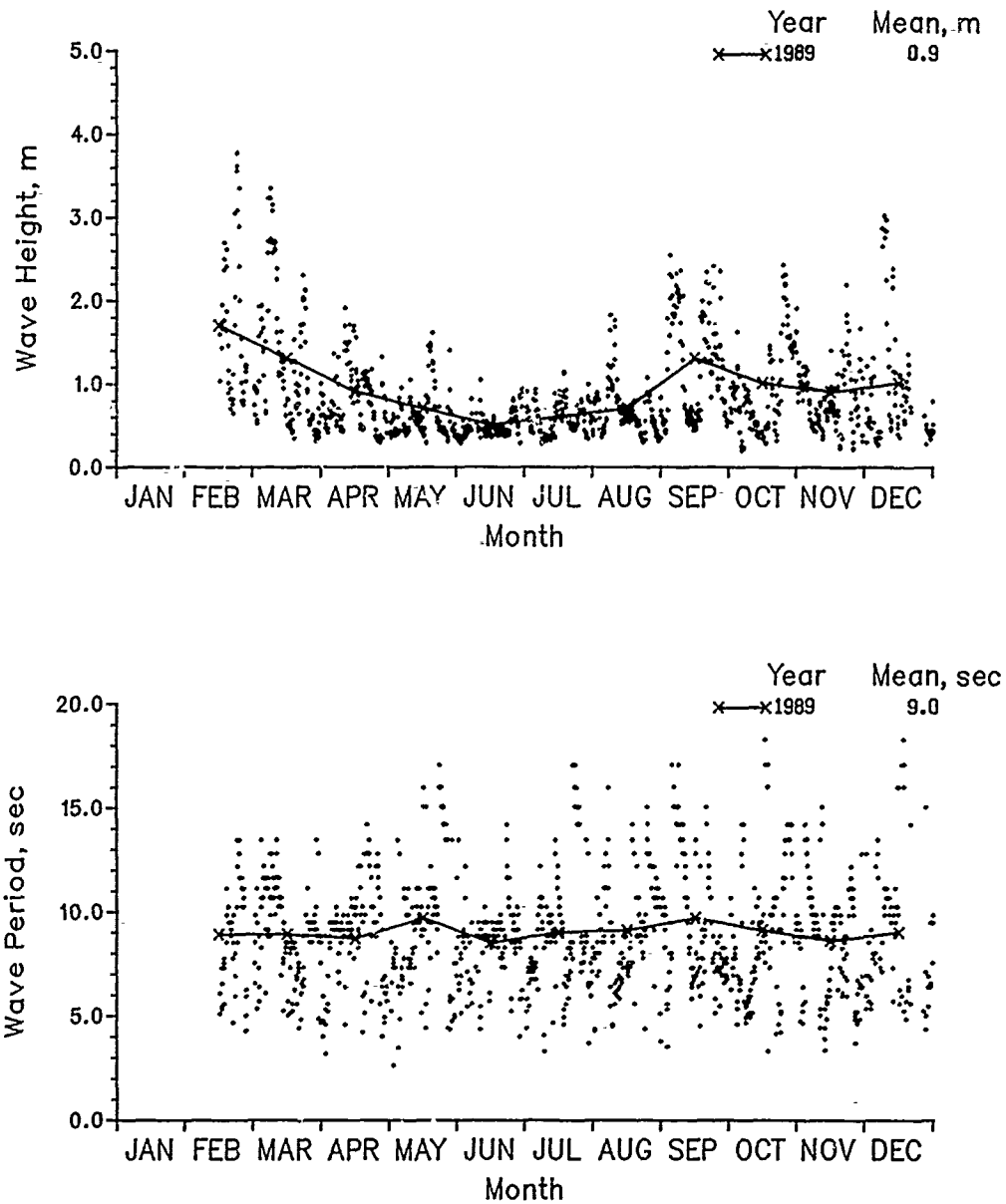


Figure D1. 1989 daily wave height and period values with monthly means for Gage 625

Table D1

Annual Joint Distribution of  $H_{mo}$  versus  $T_p$ 

| Annual 1983, Gage 625<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                              | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                        | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49                                                            | .           | 8           | 33          | 139         | 163         | 270         | 678         | 727         | 376           | 221           | 286           | 49              | 2950  |
| 0.50 - 0.99                                                            | 8           | 74          | 278         | 556         | 547         | 515         | 613         | 670         | 605           | 98            | 294           | 33              | 4291  |
| 1.00 - 1.49                                                            | .           | .           | 123         | 204         | 204         | 106         | 172         | 188         | 270           | 90            | 90            | .               | 1447  |
| 1.50 - 1.99                                                            | .           | .           | .           | 65          | 139         | 41          | 98          | 98          | 90            | 82            | 65            | 8               | 686   |
| 2.00 - 2.49                                                            | .           | .           | .           | .           | 25          | 74          | 41          | 41          | 33            | 82            | 57            | 8               | 361   |
| 2.50 - 2.99                                                            | .           | .           | .           | .           | .           | 16          | 16          | 33          | 74            | .             | 25            | .               | 164   |
| 3.00 - 3.49                                                            | .           | .           | .           | .           | .           | .           | 16          | 16          | 33            | 8             | 8             | .               | 81    |
| 3.50 - 3.99                                                            | .           | .           | .           | .           | .           | .           | .           | .           | 8             | 8             | 8             | .               | 24    |
| 4.00 - 4.49                                                            | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                                            | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                                         | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                  | 8           | 82          | 434         | 964         | 1078        | 1022        | 1634        | 1773        | 1469          | 589           | 833           | 98              |       |

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

| January 1989, Gage 625<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |                  |             |             |             |               |               |               |                 |       |
|-------------------------------------------------------------------------|-------------|-------------|-------------|-------------|------------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                               | Period, sec |             |             |             |                  |             |             |             |               |               |               |                 | Total |
|                                                                         | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9      | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                             | .           | .           | .           | .           | .                | .           | .           | .           | .             | .             | .             | .               | 0     |
| 0.50 - 0.99                                                             | .           | .           | .           | .           | .                | .           | .           | .           | .             | .             | .             | .               | 0     |
| 1.00 - 1.49                                                             | .           | .           | .           | .           | .                | .           | .           | .           | .             | .             | .             | .               | 0     |
| 1.50 - 1.99                                                             | .           | .           | .           | .           | .                | .           | .           | .           | .             | .             | .             | .               | 0     |
| 2.00 - 2.49                                                             | .           | .           | .           | .           | Gage Inoperative |             |             |             |               |               |               |                 | 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           | 0           | 0           | 0                | 0           | 0           | 0           | 0             | 0             | 0             | 0               | 0     |

| February 1989, Gage 625<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|--------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                          | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                              | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 0.50 - 0.99                                                              | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 2500  |
| 1.00 - 1.49                                                              | .           | .           | 417         | 833         | 208         | 208         | 417         | 833         | 1042          | .             | .             | .               | 2500  |
| 1.50 - 1.99                                                              | .           | .           | .           | 625         | 417         | 208         | .           | 208         | 625           | .             | .             | .               | 2083  |
| 2.00 - 2.49                                                              | .           | .           | .           | .           | 208         | 417         | 208         | .           | .             | .             | 208           | .               | 1041  |
| 2.50 - 2.99                                                              | .           | .           | .           | .           | .           | 208         | .           | 208         | .             | .             | 208           | .               | 624   |
| 3.00 - 3.49                                                              | .           | .           | .           | .           | .           | .           | 417         | .           | .             | 208           | .             | .               | 625   |
| 3.50 - 3.99                                                              | .           | .           | .           | .           | .           | .           | .           | .           | 208           | 208           | 208           | .               | 624   |
| 4.00 - 4.49                                                              | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                                              | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                                           | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                    | 0           | 0           | 417         | 1458        | 833         | 1041        | 1042        | 1249        | 2917          | 416           | 624           | 0               | 0     |

| March 1989, Gage 625<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                             | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                       | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                           | .           | .           | .           | 81          | .           | .           | 569         | 407         | 81            | 81            | .             | .               | 1300  |
| 0.50 - 0.99                                                           | .           | .           | 244         | 569         | 244         | 488         | 894         | 894         | 407           | .             | .             | .               | 3740  |
| 1.00 - 1.49                                                           | .           | .           | 81          | 163         | 244         | 163         | 244         | 81          | 813           | .             | .             | .               | 1789  |
| 1.50 - 1.99                                                           | .           | .           | .           | .           | 488         | 81          | 244         | 81          | 325           | 81            | 81            | .               | 1381  |
| 2.00 - 2.49                                                           | .           | .           | .           | .           | 81          | 81          | 81          | 163         | .             | 81            | 81            | .               | 558   |
| 2.50 - 2.99                                                           | .           | .           | .           | .           | .           | .           | 81          | 163         | 407           | .             | 163           | .               | 814   |
| 3.00 - 3.49                                                           | .           | .           | .           | .           | .           | .           | .           | 81          | 244           | .             | 81            | .               | 406   |
| 3.50 - 3.99                                                           | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49                                                           | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                                           | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                                        | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total                                                                 | 0           | 0           | 325         | 813         | 1057        | 813         | 2113        | 1870        | 2277          | 243           | 487           | 0               | 0     |

(Continued)

(Sheet 1 of 4)

Table D2 (Continued)

April 1989, Gage 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    | .           | .    | .    | 508  | .    | .    | 339  | 932  | 339   | .     | 339   | .      | 2457  |
| 0.50 - 0.99    | .           | 85   | 508  | 169  | 678  | 85   | 593  | 1186 | 678   | 85    | 424   | .      | 4491  |
| 1.00 - 1.49    | .           | .    | 254  | 254  | 254  | .    | 85   | 932  | 254   | 85    | 254   | .      | 2372  |
| 1.50 - 1.99    | .           | .    | .    | .    | 169  | 85   | 169  | 85   | 169   | .     | .     | .      | 677   |
| 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           | 85   | 762  | 931  | 1101 | 170  | 1186 | 3135 | 1440  | 170   | 1017  | 0      |       |

May 1989, Gage 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    | .           | .    | 161  | 242  | 161  | 645  | 484  | 565  | 484   | 968   | 1048  | 81     | 4839  |
| 0.50 - 0.99    | 81          | 81   | 323  | 403  | 565  | 645  | 403  | 726  | 726   | .     | 161   | .      | 4114  |
| 1.00 - 1.49    | .           | .    | .    | 81   | .    | 161  | .    | 161  | 484   | .     | 81    | .      | 968   |
| 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          | 81          | 81   | 484  | 726  | 726  | 1451 | 887  | 1533 | 1694  | 968   | 1290  | 81     |       |

June 1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |      |      |      |      |      |      |      |       |       |       |        | Total |
|----------------|-------------|------|------|------|------|------|------|------|-------|-------|-------|--------|-------|
|                | 2.0-        | 3.0- | 4.0- | 5.0- | 5.0- | 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    | .           | .    | .    | 265  | 531  | 619  | 2655 | 1770 | 531   | 265   | 177   | .      | 6813  |
| 0.50 - 0.99    | .           | .    | 177  | 708  | 265  | 88   | 885  | 796  | 177   | .     | .     | .      | 3096  |
| 1.00 - 1.49    | .           | .    | 88   | .    | .    | .    | .    | .    | .     | .     | .     | .      | 88    |
| 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    | 265  | 973  | 796  | 707  | 3540 | 2566 | 708   | 265   | 177   | 0      |       |

(Continued)

(Sheet 2 of 4)

Table D2 (Continued)

July 1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 81          | 81          | .           | 81          | 569         | 1301        | 813         | 407           | 163           | 244           | 163             | 3903  |
| 0.50 - 0.99    | .           | 81          | 244         | 732         | 976         | 976         | 732         | 569         | 488           | 488           | 569           | 81              | 5936  |
| 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           | 162         | 406         | 732         | 1138        | 1545        | 2033        | 1382        | 895           | 651           | 813           | 244             | 0     |

August 1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | .           | .           | 83          | 83          | 826         | 661         | 826           | .             | 83            | .               | 2562  |
| 0.50 - 0.99    | .           | 83          | 331         | 331         | 661         | 1405        | 909         | 331         | 909           | 331           | 1074          | .               | 6365  |
| 1.00 - 1.49    | .           | .           | 83          | .           | 331         | .           | .           | 83          | .             | 165           | 83            | .               | 745   |
| 1.50 - 1.99    | .           | .           | .           | 165         | 165         | .           | .           | .           | .             | .             | .             | .               | 330   |
| 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           | 83          | 414         | 496         | 1240        | 1488        | 1735        | 1075        | 1735          | 496           | 1240          | 0               | 0     |

September 1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | .           | .           | 250         | 167         | .           | 167         | 83            | 83            | .             | .               | 750   |
| 0.50 - 0.99    | .           | 83          | .           | 83          | 750         | 667         | 667         | 333         | 583           | .             | 417           | .               | 3593  |
| 1.00 - 1.49    | .           | .           | 83          | 417         | .           | 417         | 333         | 167         | 250           | 167           | 167           | .               | 2001  |
| 1.50 - 1.99    | .           | .           | .           | 83          | 250         | 167         | 250         | 250         | 83            | 167           | 583           | 83              | 1916  |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 417         | 250         | .           | .             | 583           | 333           | 83              | 1666  |
| 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           | 83          | 83          | 583         | 1250        | 1835        | 1500        | 1000        | 999           | 1000          | 1500          | 166             | 0     |

(Continued)

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Table D2 (Concluded)

October 1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | .           | 81          | 81          | 242         | 565         | 645         | 403           | 242           | 242           | 242             | 2743  |
| 0.50 - 0.99    | .           | 81          | 403         | 968         | 645         | 484         | 242         | 403         | 484           | .             | 81            | .               | 3791  |
| 1.00 - 1.49    | .           | .           | 161         | 242         | 81          | 161         | 323         | 323         | 81            | 161           | 161           | .               | 1694  |
| 1.50 - 1.99    | .           | .           | .           | 81          | 81          | .           | 242         | 242         | .             | 565           | .             | .               | 1211  |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | .           | .           | 81          | 242           | 161           | 81            | .               | 565   |
| 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          | 564         | 1372        | 888         | 887         | 1372        | 1694        | 1210          | 1129          | 565           | 242             |       |

November 1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | .           | .           | 83          | 167         | 167         | 917         | 500           | 250           | 167           | .               | 2251  |
| 0.50 - 0.99    | .           | 250         | 417         | 917         | 667         | 83          | 500         | 917         | 833           | 167           | 167           | .               | 4751  |
| 1.00 - 1.49    | .           | .           | 250         | 250         | 500         | 83          | 583         | 167         | 250           | 333           | 167           | .               | 2583  |
| 1.50 - 1.99    | .           | .           | .           | 83          | 83          | .           | 83          | 83          | .             | .             | .             | .               | 332   |
| 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           | 250         | 667         | 1250        | 1416        | 333         | 1333        | 2084        | 1583          | 583           | 501           | 0               |       |

December 1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | 111         | 333         | 556         | 333         | 111         | 778         | 222           | 222           | 667           | .               | 3333  |
| 0.50 - 0.99    | .           | .           | 222         | 1000        | 111         | 222         | 333         | 444         | 556           | 111           | 111           | 333             | 3443  |
| 1.00 - 1.49    | .           | .           | .           | 444         | 667         | 111         | 222         | .           | 222           | .             | .             | .               | 1666  |
| 1.50 - 1.99    | .           | .           | .           | .           | .           | .           | .           | 111         | 111           | .             | .             | .               | 222   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 111         | .           | 222         | 111           | .             | .             | .               | 444   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 111         | 111         | .           | 444           | .             | .             | .               | 666   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | .           | .           | 111         | 111           | .             | .             | .               | 222   |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| Total          | 0           | 0           | 333         | 1777        | 1334        | 883         | 777         | 1665        | 1777          | 333           | 778           | 333             |       |

(Sheet 4 of 4)

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

| Annual 1980-1989, Gage 625<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                   | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                             | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                 | 8           | 21          | 39          | 62          | 113         | 221         | 499         | 450         | 397           | 194           | 255           | 19              | 2278  |
| 0.50 - 0.99                                                                 | 5           | 81          | 244         | 440         | 479         | 435         | 686         | 725         | 871           | 180           | 299           | 32              | 4477  |
| 1.00 - 1.49                                                                 | .           | 5           | 91          | 307         | 351         | 223         | 191         | 190         | 372           | 52            | 145           | 2               | 1929  |
| 1.50 - 1.99                                                                 | .           | .           | 3           | 68          | 179         | 104         | 63          | 68          | 146           | 49            | 81            | 6               | 767   |
| 2.00 - 2.49                                                                 | .           | .           | .           | 2           | 37          | 45          | 24          | 39          | 79            | 45            | 51            | 2               | 324   |
| 2.50 - 2.99                                                                 | .           | .           | .           | .           | 4           | 15          | 22          | 25          | 45            | 18            | 35            | 2               | 166   |
| 3.00 - 3.49                                                                 | .           | .           | .           | .           | .           | .           | 5           | 7           | 18            | 7             | 12            | .               | 49    |
| 3.50 - 3.99                                                                 | .           | .           | .           | .           | .           | .           | .           | .           | 3             | 2             | 3             | .               | 8     |
| 4.00 - 4.49                                                                 | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                                                 | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                                              | 13          | 107         | 377         | 879         | 1163        | 1043        | 1490        | 1504        | 1931          | 547           | 881           | 63              | 0     |

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

| January 1980-1989, Gage 625                   |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
| Height, m                                     | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                               | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                   | 11          | 32          | 63          | 53          | 105         | 158         | 285         | 295         | 337           | 169           | 148           | 11              | 1667  |
| 0.50 - 0.99                                   | .           | 169         | 253         | 390         | 443         | 295         | 485         | 379         | 885           | 158           | 295           | 11              | 3763  |
| 1.00 - 1.49                                   | .           | .           | 95          | 580         | 632         | 242         | 221         | 211         | 485           | .             | 95            | .               | 2561  |
| 1.50 - 1.99                                   | .           | .           | .           | 105         | 274         | 253         | 84          | 126         | 190           | 42            | 42            | .               | 1116  |
| 2.00 - 2.49                                   | .           | .           | .           | .           | 84          | 179         | 11          | 42          | 179           | 53            | 95            | .               | 643   |
| 2.50 - 2.99                                   | .           | .           | .           | .           | 11          | 21          | 32          | 32          | 63            | 32            | 32            | .               | 223   |
| 3.00 - 3.49                                   | .           | .           | .           | .           | .           | .           | .           | 11          | 11            | .             | .             | .               | 22    |
| 3.50 - 3.99                                   | .           | .           | .           | .           | .           | .           | .           | .           | 11            | .             | .             | .               | 11    |
| 4.00 - 4.49                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater                                | 11          | 201         | 411         | 1128        | 1549        | 1148        | 1118        | 1096        | 2161          | 454           | 707           | 22              | 0     |

| February 1980-1989, Gage 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                                   | .           | 10   | 31   | 21   | 41   | 51   | 164  | 144  | 236   | 92    | 154   | .      | 944   |
| 0.50 - 0.99                                   | 10          | 62   | 133  | 390  | 338  | 349  | 636  | 677  | 1179  | 82    | 308   | 10     | 4174  |
| 1.00 - 1.49                                   | .           | .    | 123  | 421  | 441  | 267  | 215  | 256  | 687   | 72    | 215   | .      | 2697  |
| 1.50 - 1.99                                   | .           | .    | .    | 154  | 287  | 133  | 72   | 133  | 277   | 92    | 103   | .      | 1251  |
| 2.00 - 2.49                                   | .           | .    | .    | .    | 31   | 62   | 51   | 72   | 82    | 72    | 123   | .      | 493   |
| 2.50 - 2.99                                   | .           | .    | .    | .    | .    | 21   | 21   | 41   | 82    | 21    | 113   | .      | 299   |
| 3.00 - 3.49                                   | .           | .    | .    | .    | .    | .    | 31   | 10   | 41    | 10    | 10    | .      | 102   |
| 3.50 - 3.99                                   | .           | .    | .    | .    | .    | .    | .    | .    | 10    | 10    | 21    | .      | 41    |
| 4.00 - 4.49                                   | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 4.50 - 4.99                                   | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 5.00 - Greater                                | 10          | 72   | 287  | 986  | 1138 | 883  | 1190 | 1333 | 2594  | 451   | 1047  | 10     | 0     |

| March 1980-1989, Gage 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                                   | 9           | .    | .    | 71   | 44   | 71   | 285  | 222  | 231   | 107   | 125   | .      | 1165  |
| 0.50 - 0.99                                   | 9           | 44   | 222  | 516  | 463  | 498  | 756  | 658  | 863   | 116   | 285   | .      | 4430  |
| 1.00 - 1.49                                   | .           | 9    | 125  | 285  | 320  | 311  | 178  | 231  | 658   | 36    | 329   | .      | 2482  |
| 1.50 - 1.99                                   | .           | .    | .    | 71   | 196  | 80   | 98   | 80   | 240   | 71    | 160   | 9      | 1005  |
| 2.00 - 2.49                                   | .           | .    | .    | 9    | 62   | 36   | 36   | 36   | 151   | 80    | 71    | .      | 481   |
| 2.50 - 2.99                                   | .           | .    | .    | .    | .    | 9    | 36   | 18   | 107   | 44    | 62    | .      | 276   |
| 3.00 - 3.49                                   | .           | .    | .    | .    | .    | .    | 18   | 18   | 62    | 18    | 44    | .      | 160   |
| 3.50 - 3.99                                   | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 4.00 - 4.49                                   | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 4.50 - 4.99                                   | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 5.00 - Greater                                | 18          | 53   | 347  | 952  | 1085 | 1005 | 1407 | 1263 | 2312  | 472   | 1076  | 9      | 0     |

(Continued)

(Sheet 1 of 4)

Table D4 (Continued)

April 1980-1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 19          | 10          | 10          | 76          | 57          | 67          | 400         | 400         | 353           | 181           | 353           |                 | 1926  |
| 0.50 - 0.99    | .           | 57          | 200         | 219         | 324         | 372         | 696         | 915         | 1306          | 248           | 543           | 19              | 4899  |
| 1.00 - 1.49    | .           | .           | 95          | 172         | 267         | 248         | 219         | 315         | 410           | 48            | 191           | .               | 1965  |
| 1.50 - 1.99    | .           | .           | 10          | 29          | 124         | 57          | 76          | 124         | 229           | 19            | 95            | .               | 763   |
| 2.00 - 2.49    | .           | .           | .           | 10          | 19          | .           | 29          | 29          | 86            | 19            | 10            | .               | 202   |
| 2.50 - 2.99    | .           | .           | .           | .           | 10          | 19          | 29          | 19          | 57            | 38            | 10            | .               | 182   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | .           | .           | 10          | 38            | .             | 19            | .               | 67    |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | 19          | 67          | 315         | 506         | 801         | 763         | 1449        | 1812        | 2479          | 553           | 1221          | 19              | 0     |

May 1980-1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 9           | 26          | 44          | 61          | 193         | 280         | 640         | 526         | 421           | 193           | 324           | 9               | 2726  |
| 0.50 - 0.99    | 9           | 131         | 237         | 403         | 587         | 526         | 1096        | 1052        | 780           | 70            | 219           | 9               | 5119  |
| 1.00 - 1.49    | .           | .           | 26          | 140         | 149         | 210         | 351         | 210         | 307           | 18            | 105           | .               | 1516  |
| 1.50 - 1.99    | .           | .           | .           | 53          | 61          | 18          | 61          | 53          | 79            | 18            | 79            | .               | 422   |
| 2.00 - 2.49    | .           | .           | .           | .           | 26          | 26          | .           | 9           | .             | 44            | 26            | 9               | 140   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | .           | .           | .           | 26            | 26            | 18            | .               | 70    |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | 9             | .               | 9     |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | 18          | 157         | 307         | 657         | 1016        | 1060        | 2148        | 1850        | 1613          | 369           | 780           | 27              | 0     |

June 1980-1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 41          | 73          | 93          | 114         | 332         | 519         | 1286        | 757         | 477           | 145           | 176           | 21              | 4034  |
| 0.50 - 0.99    | 10          | 166         | 280         | 467         | 322         | 488         | 1131        | 1100        | 633           | 114           | 41            | 21              | 4773  |
| 1.00 - 1.49    | .           | .           | 52          | 124         | 176         | 135         | 135         | 114         | 187           | .             | 10            | 10              | 943   |
| 1.50 - 1.99    | .           | .           | .           | 41          | 41          | 31          | .           | .           | 73            | .             | 21            | .               | 207   |
| 2.00 - 2.49    | .           | .           | .           | .           | 10          | 10          | 10          | 10          | 10            | .             | .             | .               | 50    |
| 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 | 51          | 239         | 425         | 746         | 881         | 1183        | 2562        | 1981        | 1380          | 259           | 248           | 52              | 0     |

(Continued)

(Sheet 2 of 4)

Table D4 (Continued)

July 1980-1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | .           | 56          | 112         | 78          | 179         | 592         | 1306        | 1083        | 804           | 324           | 413           | 56              | 5003  |
| 0.50 - 0.99    | .           | 100         | 324         | 391         | 636         | 603         | 759         | 703         | 379           | 290           | 167           | 89              | 4441  |
| 1.00 - 1.49    | .           | .           | 56          | 145         | 145         | 56          | 33          | 33          | .             | .             | 11            | .               | 479   |
| 1.50 - 1.99    | .           | .           | .           | .           | 22          | 22          | 22          | .           | .             | .             | .             | .               | 66    |
| 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           | 156         | 492         | 614         | 982         | 1273        | 2120        | 1819        | 1183          | 614           | 591           | 145             | 0     |

August 1980-1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | .           | 21          | 21          | 52          | 197         | 466         | 818         | 839         | 652           | 311           | 207           | 10              | 3594  |
| 0.50 - 0.99    | 21          | 93          | 238         | 621         | 663         | 704         | 859         | 714         | 569           | 217           | 300           | 31              | 5030  |
| 1.00 - 1.49    | .           | .           | 62          | 228         | 228         | 135         | 114         | 52          | 62            | 21            | 10            | .               | 912   |
| 1.50 - 1.99    | .           | .           | .           | 52          | 114         | 41          | 10          | 10          | 41            | 10            | 31            | .               | 309   |
| 2.00 - 2.49    | .           | .           | .           | .           | 10          | 10          | .           | .           | 31            | .             | 52            | .               | 103   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | .           | 10          | 10          | 10            | .             | .             | .               | 30    |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | .           | .           | 10          | 10            | .             | .             | .               | 20    |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | 21          | 114         | 321         | 953         | 1212        | 1356        | 1811        | 1635        | 1375          | 559           | 600           | 41              | 0     |

September 1980-1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | .           | .           | 11          | 22          | 77          | 133         | 155         | 387         | 442           | 232           | 221           | 65              | 1746  |
| 0.50 - 0.99    | .           | 33          | 221         | 310         | 531         | 420         | 420         | 708         | 1051          | 177           | 398           | .               | 4269  |
| 1.00 - 1.49    | .           | .           | 44          | 321         | 409         | 332         | 254         | 288         | 509           | 144           | 199           | .               | 2500  |
| 1.50 - 1.99    | .           | .           | .           | 100         | 232         | 166         | 100         | 111         | 100           | 66            | 111           | 11              | 997   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 77          | 44          | 22          | 11            | 100           | 77            | 11              | 342   |
| 2.50 - 2.99    | .           | .           | .           | .           | .           | 11          | 11          | 33          | 44            | .             | 33            | .               | 132   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | .           | .           | .           | 11            | .             | .             | .               | 11    |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | 0           | 33          | 276         | 753         | 1249        | 1139        | 984         | 1549        | 2168          | 719           | 1039          | 88              | 0     |

(Continued)

(Sheet 3 of 4)

Table D4 (Concluded)

October 1980-1989, Gage 625  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
|                |             |             |             |             |             |             |             |             |               |               |               |                 |       |
| 0.00 - 0.49    | 9           | .           | 17          | 51          | 17          | 137         | 291         | 274         | 317           | 111           | 257           | 43              | 1524  |
| 0.50 - 0.99    | .           | 60          | 197         | 359         | 402         | 317         | 470         | 624         | 1078          | 171           | 274           | 43              | 3995  |
| 1.00 - 1.49    | .           | 9           | 145         | 419         | 342         | 188         | 111         | 257         | 470           | 86            | 222           | 17              | 2266  |
| 1.50 - 1.99    | .           | .           | 26          | 103         | 265         | 77          | 68          | 86          | 240           | 128           | 145           | 26              | 1164  |
| 2.00 - 2.49    | .           | .           | .           | .           | 86          | 68          | 60          | 128         | 163           | 77            | 51            | 9               | 642   |
| 2.50 - 2.99    | .           | .           | .           | .           | 17          | 51          | 60          | 51          | 26            | 17            | 68            | 17              | 307   |
| 3.00 - 3.49    | .           | .           | .           | .           | .           | .           | 9           | .           | .             | 34            | 34            | .               | 77    |
| 3.50 - 3.99    | .           | .           | .           | .           | .           | .           | .           | .           | 17            | 9             | .             | .               | 26    |
| 4.00 - 4.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 4.50 - 4.99    | .           | .           | .           | .           | .           | .           | .           | .           | .             | .             | .             | .               | 0     |
| 5.00 - Greater | 9           | 69          | 385         | 932         | 1129        | 838         | 1069        | 1420        | 2311          | 633           | 1051          | 155             | 0     |

November 1980-1989, Gage 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    | .           | 9    | 47   | 74   | 47   | 140  | 251  | 242  | 242   | 205   | 326   | .      | 1583  |
| 0.50 - 0.99    | .           | 47   | 372  | 512  | 624  | 410  | 549  | 540  | 698   | 279   | 363   | 28     | 4422  |
| 1.00 - 1.49    | .           | 37   | 158  | 400  | 577  | 298  | 279  | 158  | 270   | 140   | 130   | 9      | 2456  |
| 1.50 - 1.99    | .           | .    | .    | 56   | 251  | 205  | 130  | 47   | 112   | 93    | 65    | 19     | 978   |
| 2.00 - 2.49    | .           | .    | .    | .    | 56   | 28   | 28   | 9    | 74    | 56    | 65    | .      | 316   |
| 2.50 - 2.99    | .           | .    | .    | .    | .    | 9    | 28   | 37   | 19    | 28    | 37    | .      | 158   |
| 3.00 - 3.49    | .           | .    | .    | .    | .    | .    | .    | 9    | 28    | 9     | 19    | .      | 65    |
| 3.50 - 3.99    | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | 19    | .      | 19    |
| 4.00 - 4.49    | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 4.50 - 4.99    | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 5.00 - Greater | 0           | 93   | 577  | 1042 | 1555 | 1090 | 1265 | 1042 | 1443  | 810   | 1024  | 56     | 0     |

December 1980-1989, Gage 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   | 32   | 64   | 95   | 106  | 233  | 361  | 339   | 308   | 361   | 21     | 1941  |
| 0.50 - 0.99    | .           | 21   | 265  | 721  | 424  | 255  | 329  | 594  | 965   | 265   | 392   | 138    | 4369  |
| 1.00 - 1.49    | .           | .    | 95   | 456  | 541  | 233  | 148  | 117  | 350   | 53    | 170   | .      | 2163  |
| 1.50 - 1.99    | .           | .    | .    | 53   | 265  | 191  | 21   | 42   | 138   | 21    | 85    | .      | 816   |
| 2.00 - 2.49    | .           | .    | .    | .    | 42   | 53   | 11   | 95   | 138   | 32    | 42    | .      | 413   |
| 2.50 - 2.99    | .           | .    | .    | .    | 11   | 32   | 32   | 53   | 106   | .     | 32    | .      | 266   |
| 3.00 - 3.49    | .           | .    | .    | .    | .    | .    | .    | 21   | 11    | .     | .     | .      | 32    |
| 3.50 - 3.99    | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 4.00 - 4.49    | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 4.50 - 4.99    | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
| 5.00 - Greater | .           | .    | .    | .    | .    | .    | .    | .    | .     | .     | .     | .      | 0     |
|                | 0           | 42   | 392  | 1294 | 1378 | 870  | 774  | 1283 | 2047  | 679   | 1082  | 159    |       |

(Sheet 4 of 4)

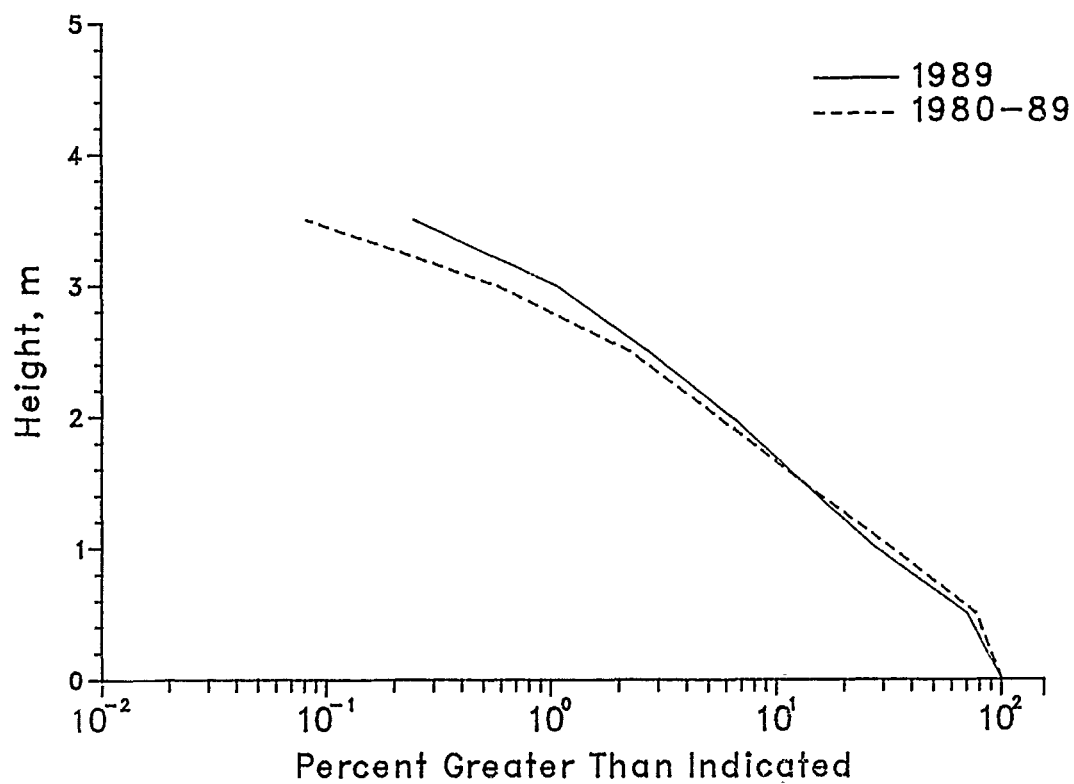


Figure D2. Annual cumulative wave height distributions  
for Gage 625

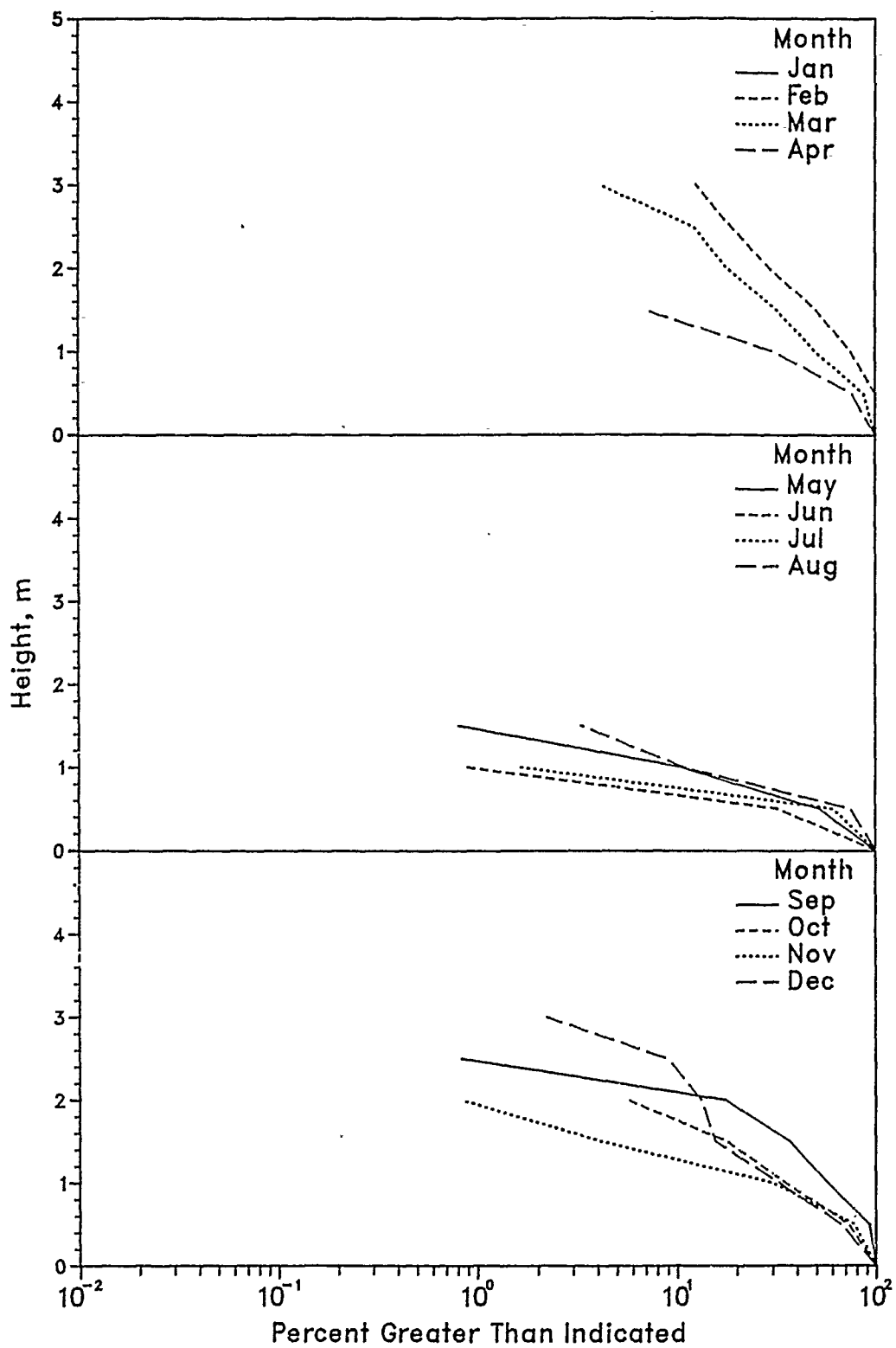


Figure D3. 1989 monthly wave height distributions  
for Gage 625

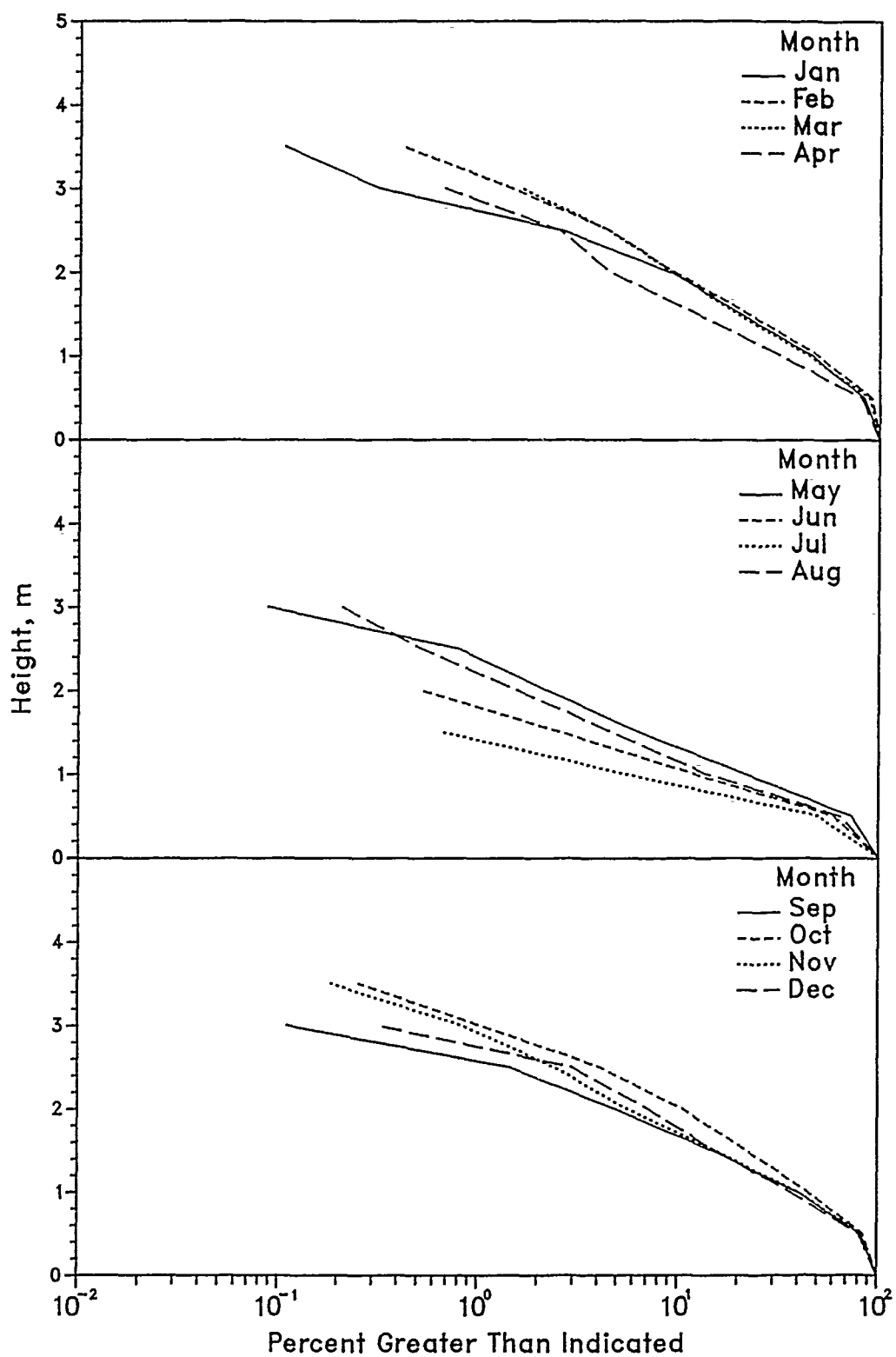


Figure D4. 1980-1989 monthly wave height distributions for Gage 625

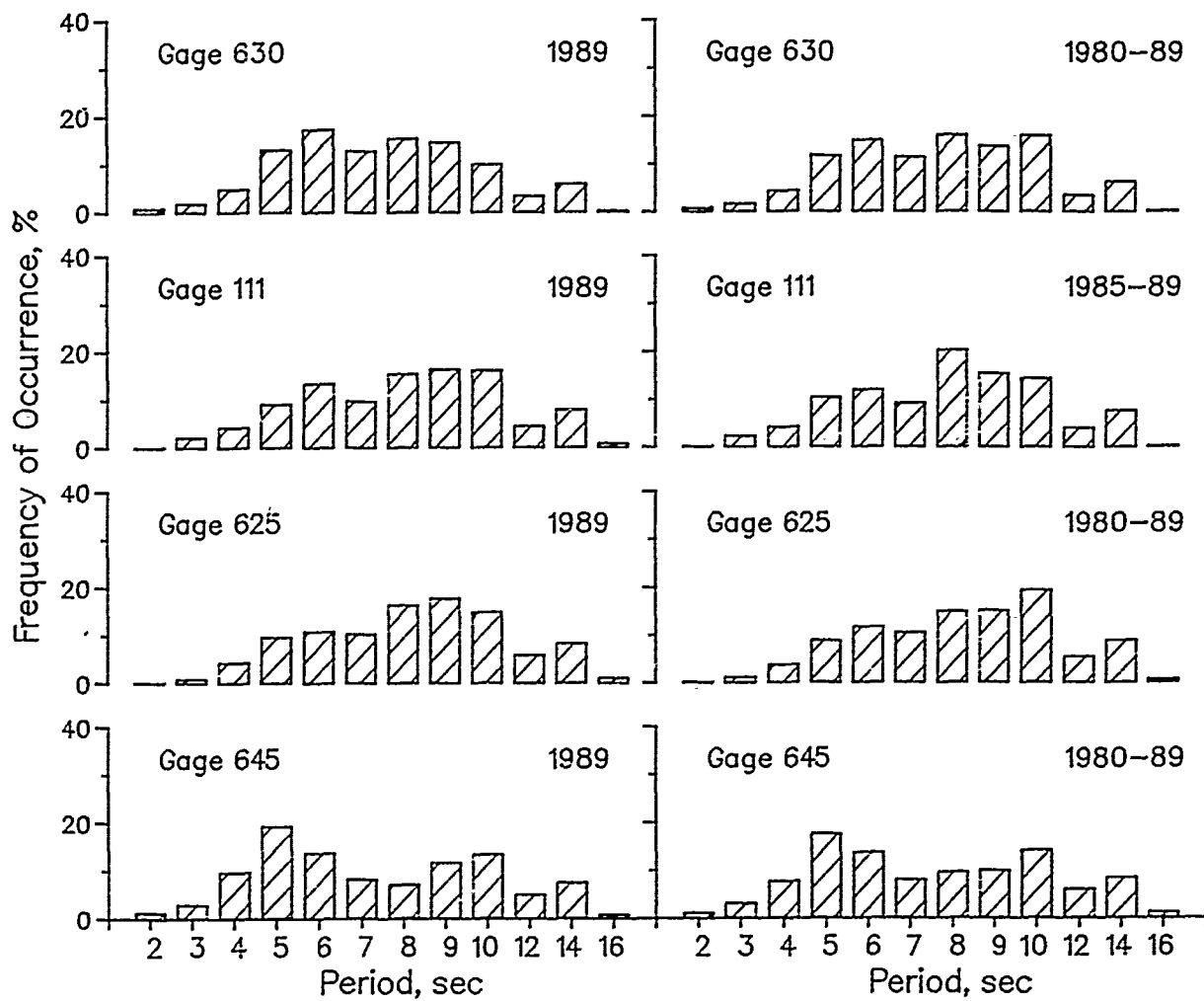


Figure D5. Annual wave period distributions for all gages

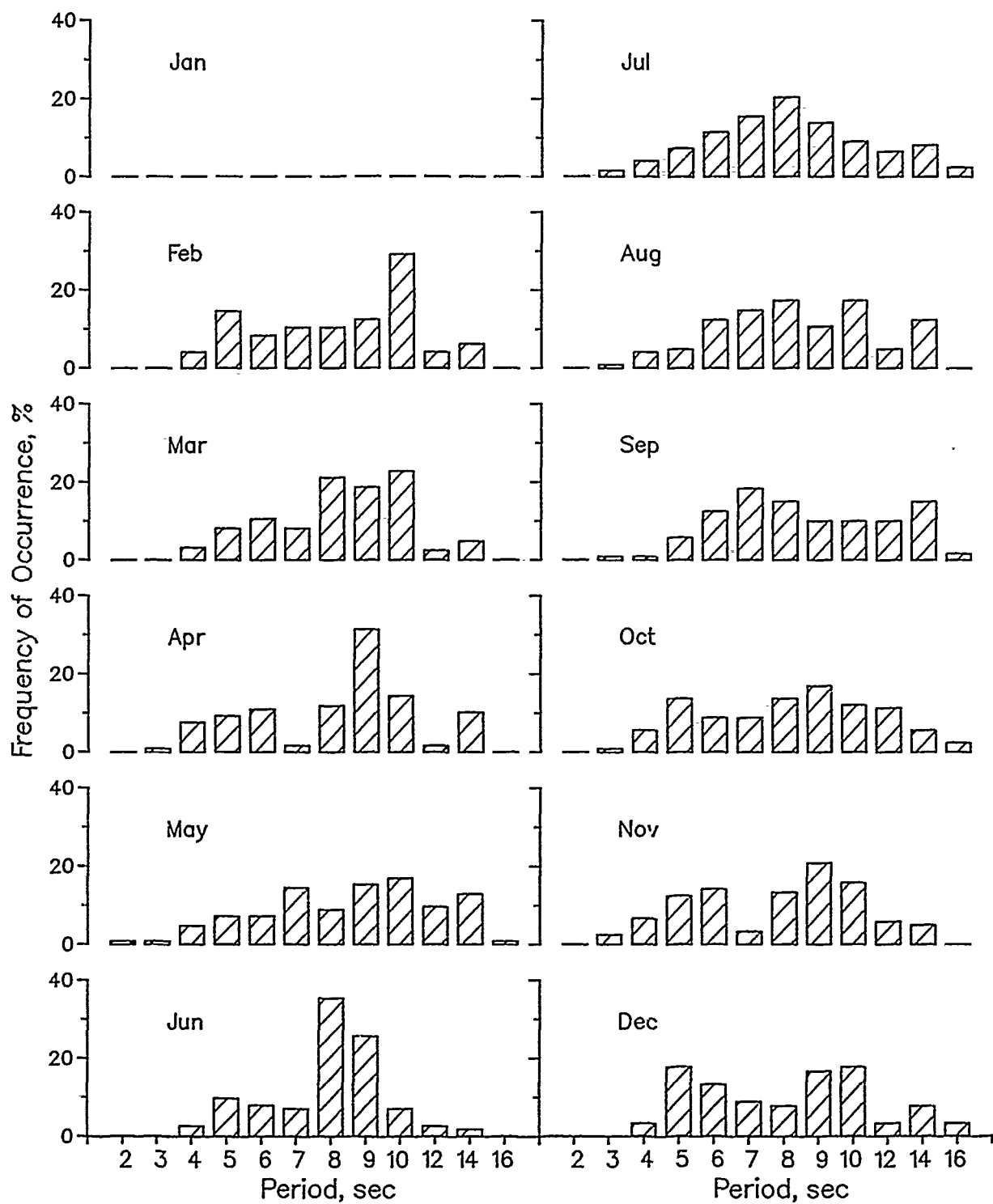


Figure D6. 1989 monthly wave period distributions for Gage 625

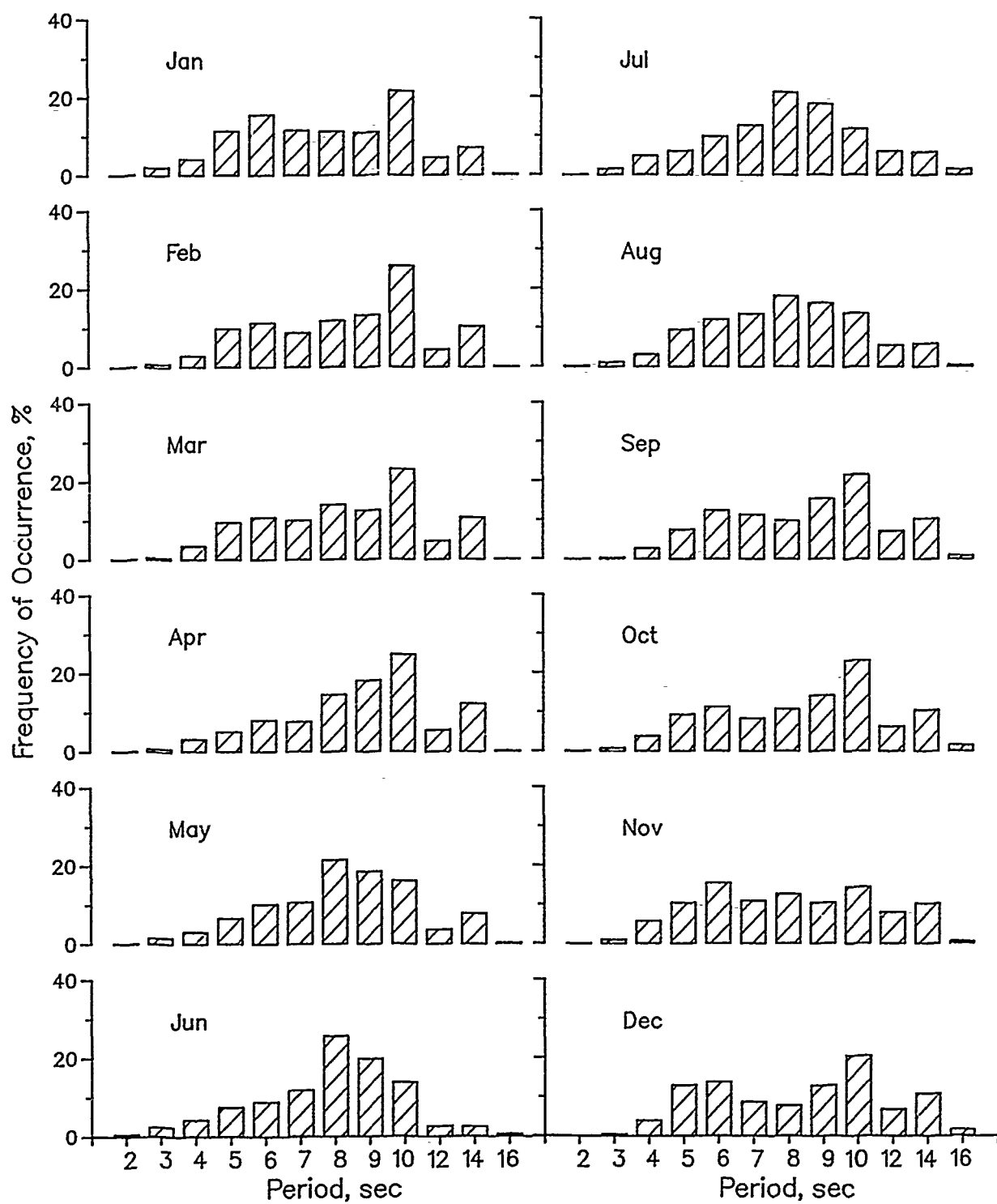


Figure D7. 1980-1989 monthly wave period distributions for Gage 625

Table D5  
1989 Persistence of  $H_{mo}$  for Gage 625

| Height<br>(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 | 21 | 18 | 15 | 13 | 10 |   |    |    | 9  | 8  |    | 7  | 6  |    | 5  | 4   |
| 1.0           | 35                           | 20 | 15 | 12 |    | 9  | 5  |    |   | 4  | 3  | 2  |    | 1  |    |    |    |    |     |
| 1.5           | 23                           | 13 | 8  | 6  |    | 4  |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 2.0           | 13                           | 9  | 4  | 2  | 1  |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 2.5           | 5                            | 4  | 3  | 1  |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 3.0           | 3                            | 3  | 2  |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 3.5           | 1                            |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |

Table D6  
1980 Through 1989 Persistence of  $H_{mo}$  for Gage 625

| Height<br>(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           | 28                           | 25 | 21 | 19 | 16 | 14 | 12 | 11 | 10 |    | 9  | 8  |    | 7  | 6  | 5  |    | 4  | 3   |
| 1.0           | 44                           | 31 | 21 | 15 | 10 | 7  | 5  | 4  | 3  | 2  |    |    | 1  |    |    |    |    |    |     |
| 1.5           | 29                           | 16 | 9  | 5  | 3  | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |     |
| 2.0           | 15                           | 8  | 4  | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 2.5           | 8                            | 4  | 2  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 3.0           | 3                            | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 3.5           | 1                            |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| 4.0           |                              |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |

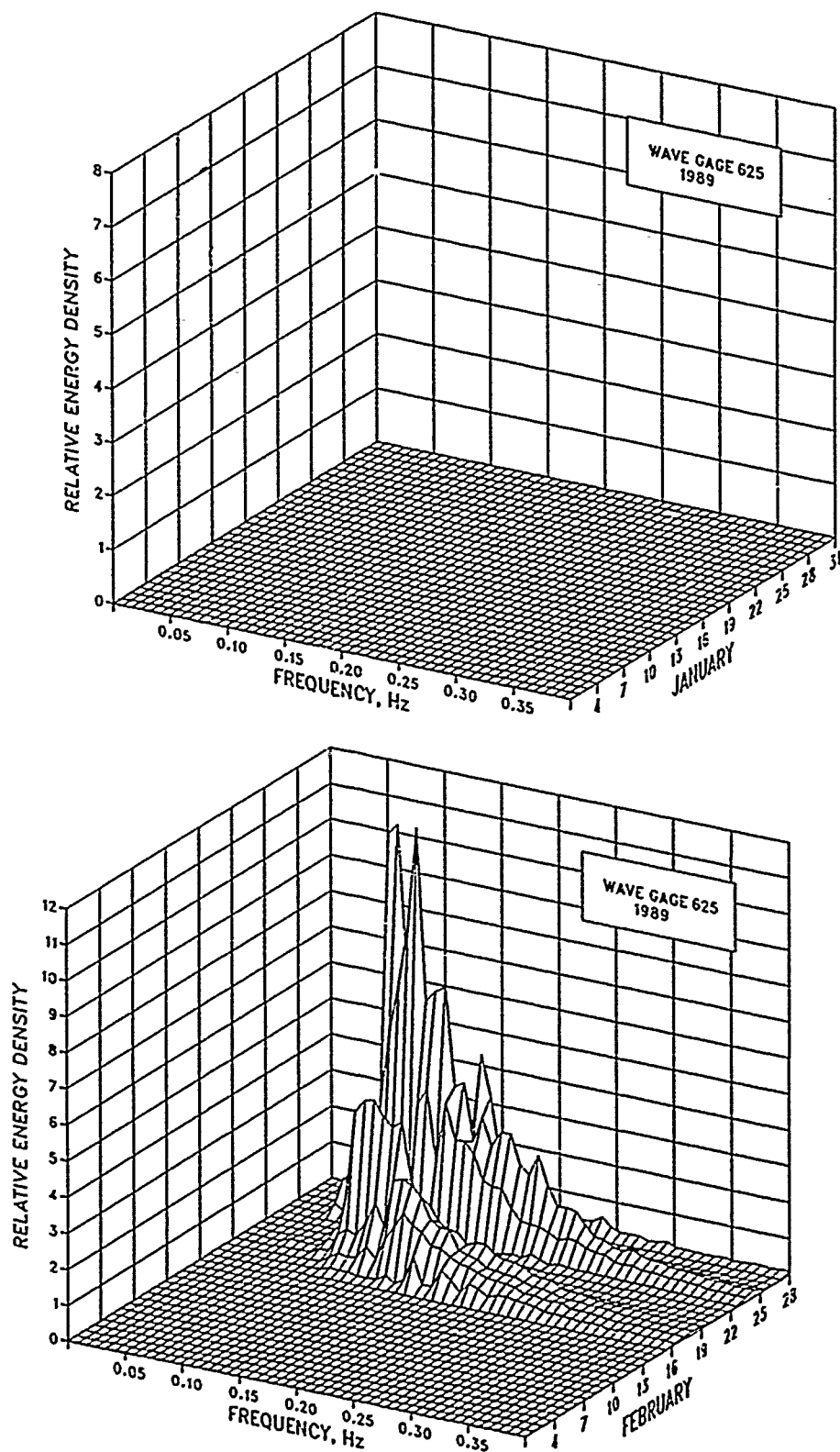


Figure D8. 1989 monthly spectra for Gage 625  
(Sheet 1 of 6)

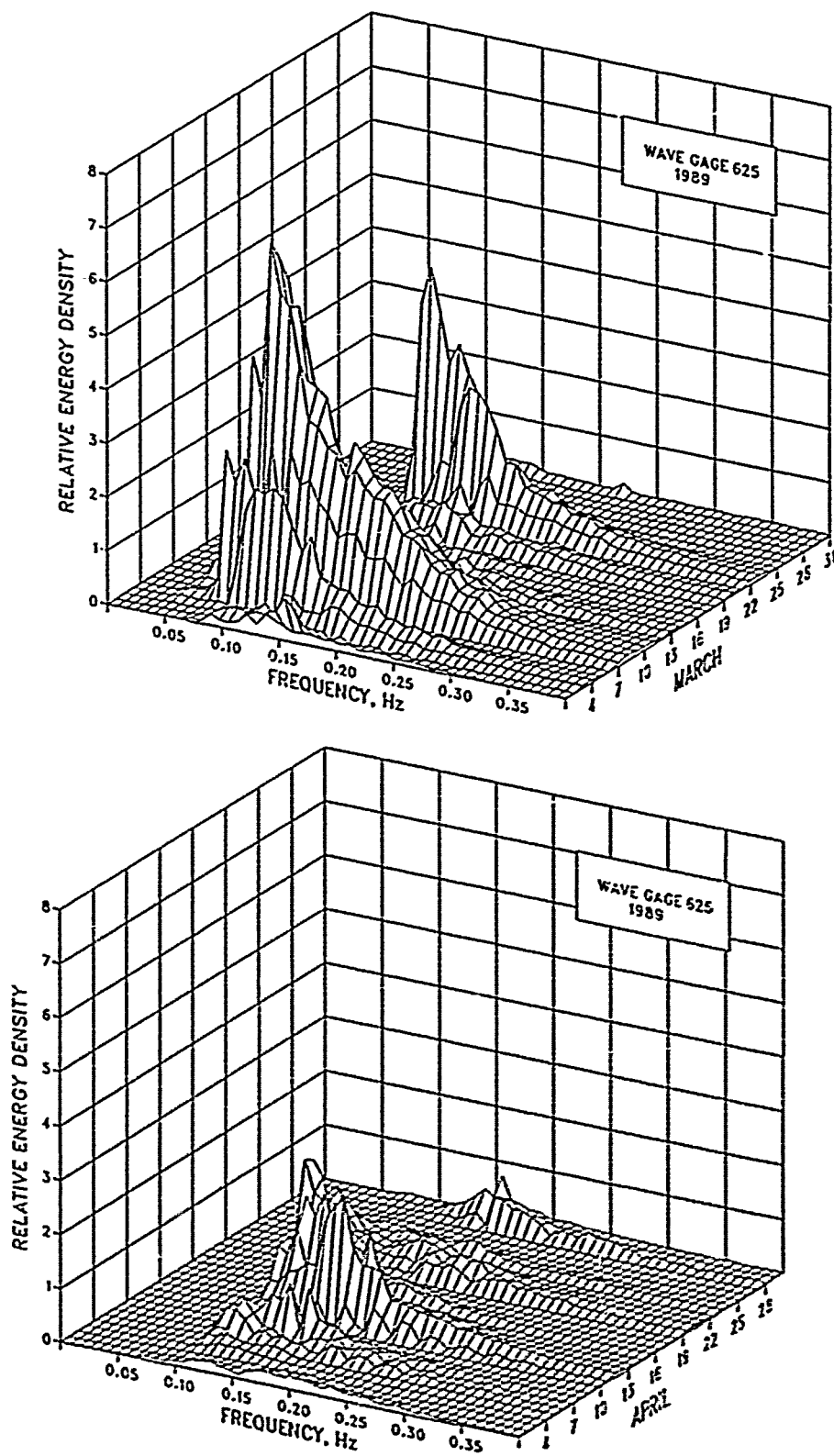


Figure D8. (Sheet 2 of 6)

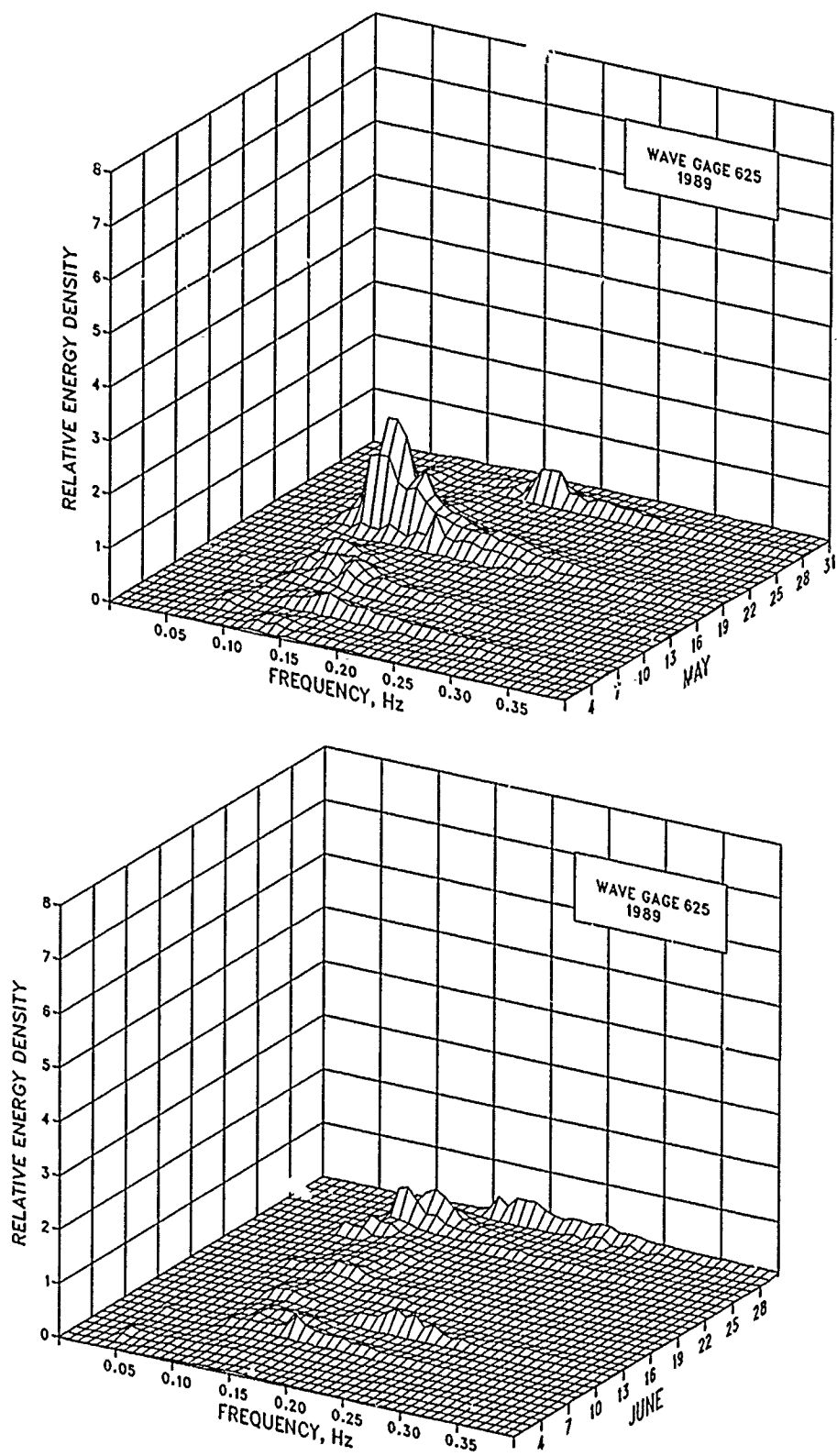


Figure D8. (Sheet 3 of 6)

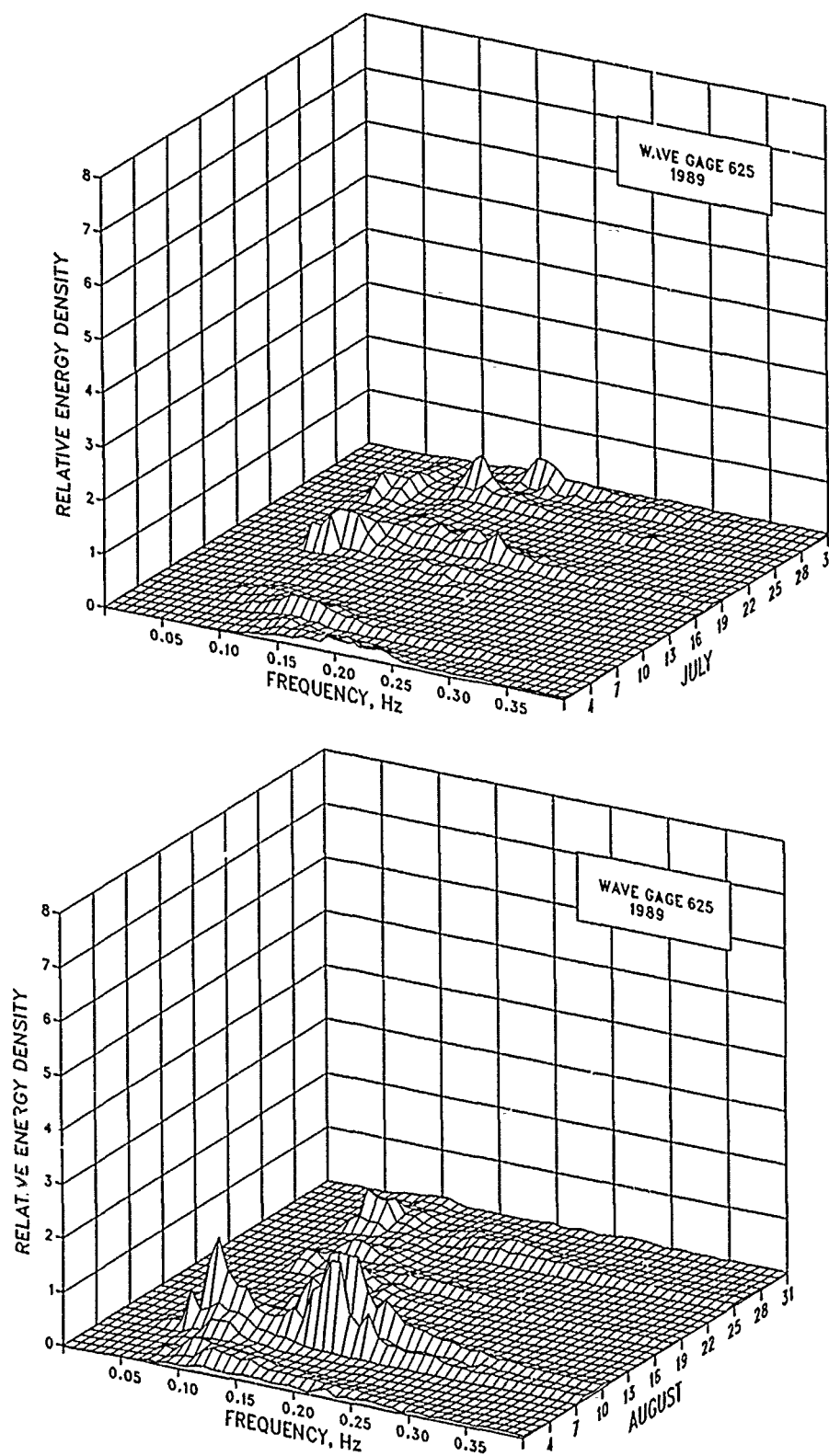


Figure D8. (Sheet 4 of 6)

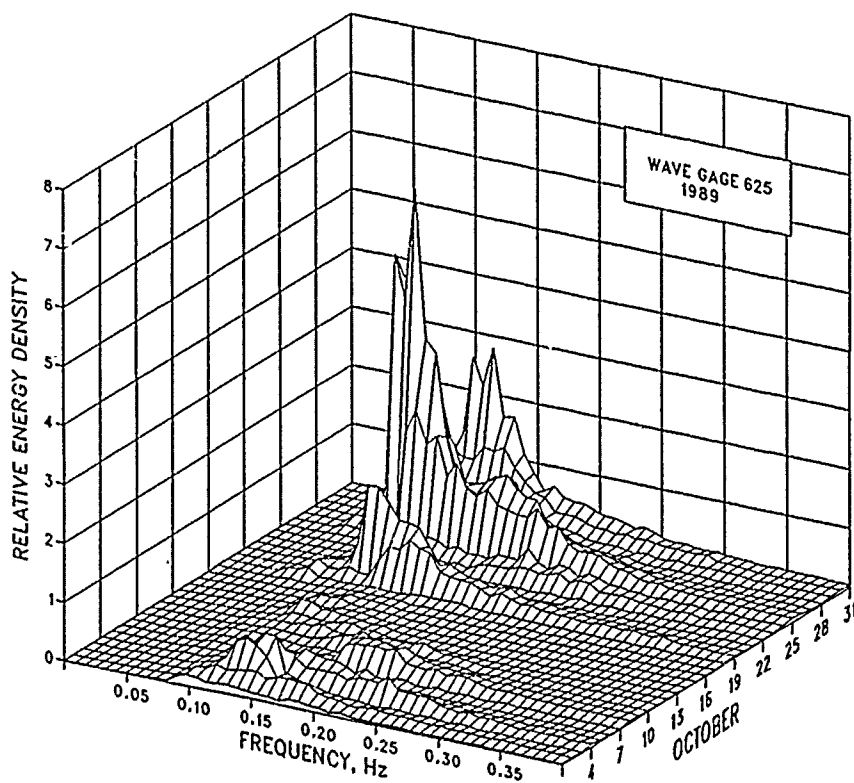
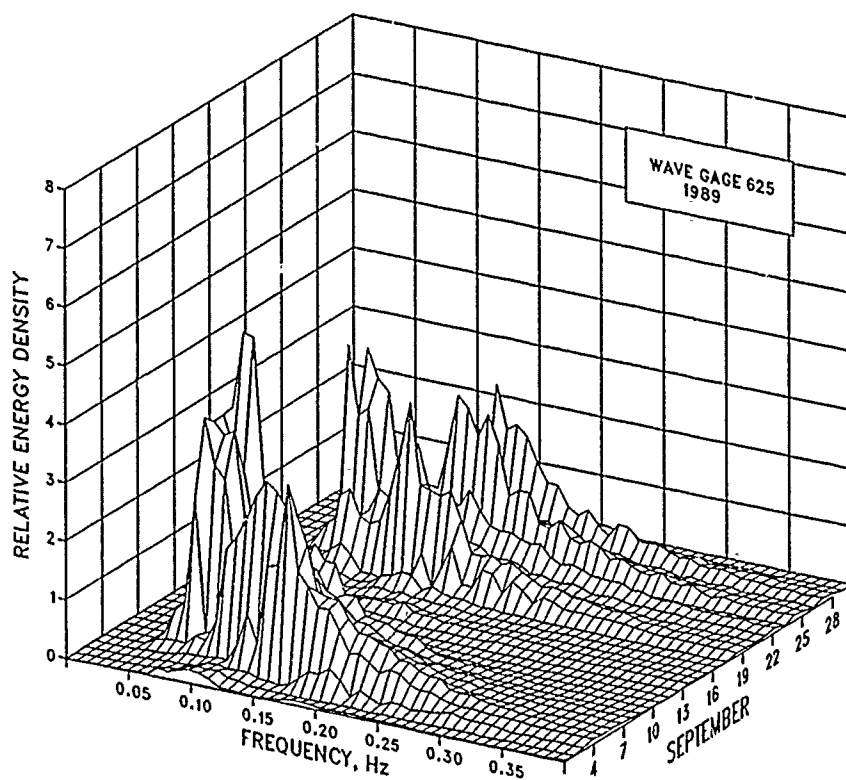


Figure D8. (Sheet 5 of 6)

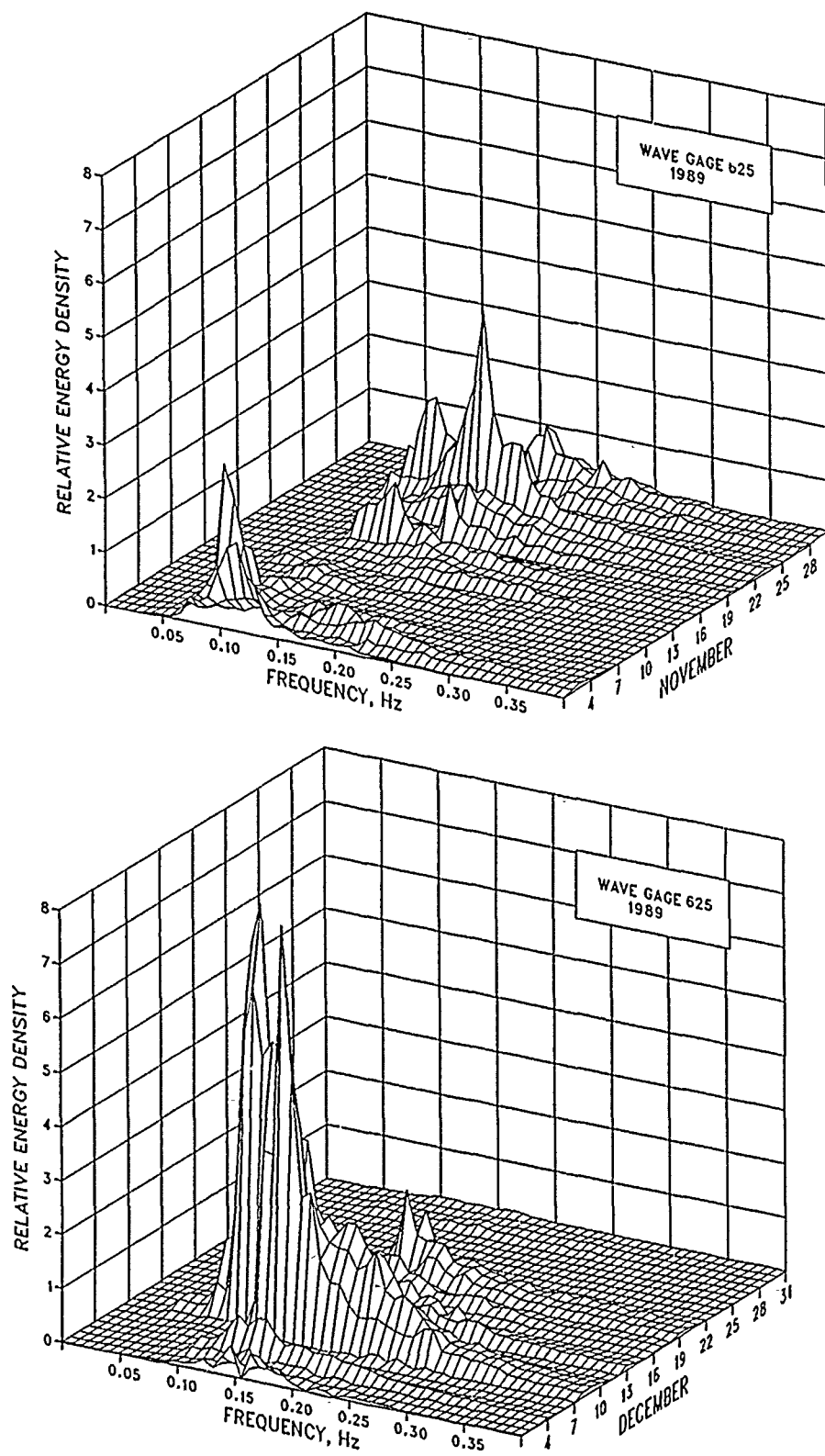


Figure D8. (Sheet 6 of 6)

Table D7  
Wave Statistics for Gage 625

| Month  | 1989   |      |         |      |        |      |        | 1980-1989 |      |         |          |        |      |        |
|--------|--------|------|---------|------|--------|------|--------|-----------|------|---------|----------|--------|------|--------|
|        | Height |      |         |      | Period |      |        | Height    |      |         |          | Period |      |        |
|        | Std.   |      |         | Date | Std.   |      | Number | Std.      |      |         | Date     | Std.   |      | Number |
|        | Mean   | Dev. | Extreme |      | Mean   | Dev. |        | Mean      | Dev. | Extreme |          | Mean   | Dev. |        |
|        | m      | m    | m       |      | sec    | sec  |        | m         | m    | m       |          | sec    | sec  |        |
| Jan    |        |      |         |      |        |      | 0      | 1.1       | 0.6  | 3.5     | 1988     | 8.5    | 2.7  | 949    |
| Feb    | 1.7    | 0.9  | 3.8     | 24   | 8.9    | 2.5  | 48     | 1.1       | 0.7  | 3.8     | 1989     | 9.0    | 2.7  | 975    |
| Mar    | 1.3    | 0.8  | 3.3     | 8    | 8.9    | 2.2  | 123    | 1.1       | 0.7  | 3.4     | 1983     | 9.0    | 2.6  | 1124   |
| Apr    | 0.9    | 0.4  | 1.9     | 11   | 8.7    | 2.5  | 118    | 0.9       | 0.6  | 3.4     | 1988     | 9.4    | 2.6  | 1049   |
| May    | 0.7    | 0.3  | 1.6     | 20   | 9.7    | 3.3  | 124    | 0.8       | 0.5  | 3.0     | 1986     | 8.7    | 2.6  | 1141   |
| Jun    | 0.5    | 0.2  | 1.0     | 11   | 8.5    | 1.9  | 113    | 0.7       | 0.4  | 2.3     | 1983     | 8.2    | 2.3  | 964    |
| Jul    | 0.6    | 0.2  | 1.1     | 18   | 9.0    | 3.1  | 123    | 0.6       | 0.3  | 1.8     | 1985     | 8.7    | 2.8  | 896    |
| Aug    | 0.7    | 0.4  | 1.8     | 8    | 9.1    | 2.6  | 121    | 0.7       | 0.4  | 3.1     | 1981     | 8.5    | 2.6  | 966    |
| Sep    | 1.3    | 0.7  | 2.5     | 4    | 9.7    | 3.2  | 120    | 1.0       | 0.6  | 3.0     | 1983     | 9.2    | 2.8  | 904    |
| Oct    | 1.0    | 0.6  | 2.4     | 25   | 9.1    | 3.2  | 124    | 1.1       | 0.7  | 3.5     | 1980     | 9.2    | 2.9  | 1169   |
| Nov    | 0.9    | 0.4  | 2.2     | 23   | 8.6    | 2.7  | 120    | 1.0       | 0.6  | 3.5     | 1981     | 8.7    | 3.0  | 1074   |
| Dec    | 1.0    | 0.8  | 3.0     | 9    | 9.0    | 3.2  | 90     | 1.0       | 0.6  | 3.1     | 1986     | 9.0    | 3.1  | 943    |
| Annual | 0.9    | 0.6  | 3.8     | Feb  | 9.0    | 2.8  | 1224   | 0.9       | 0.6  | 3.8     | Feb 1989 | 8.9    | 2.8  | 12154  |

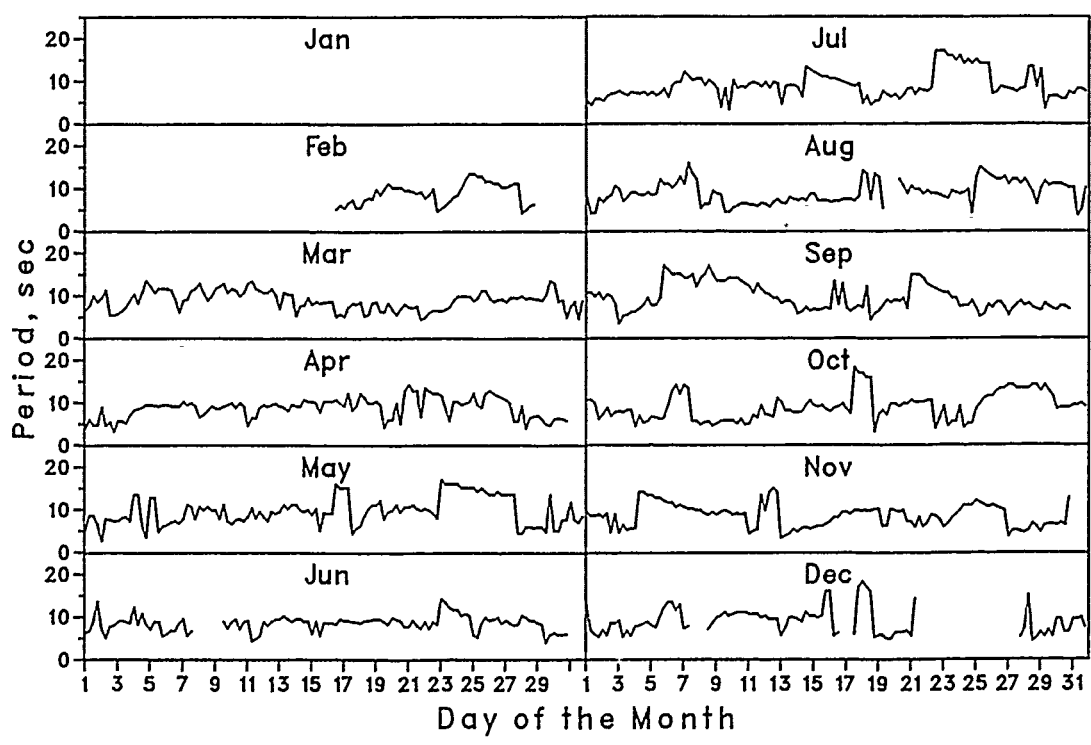
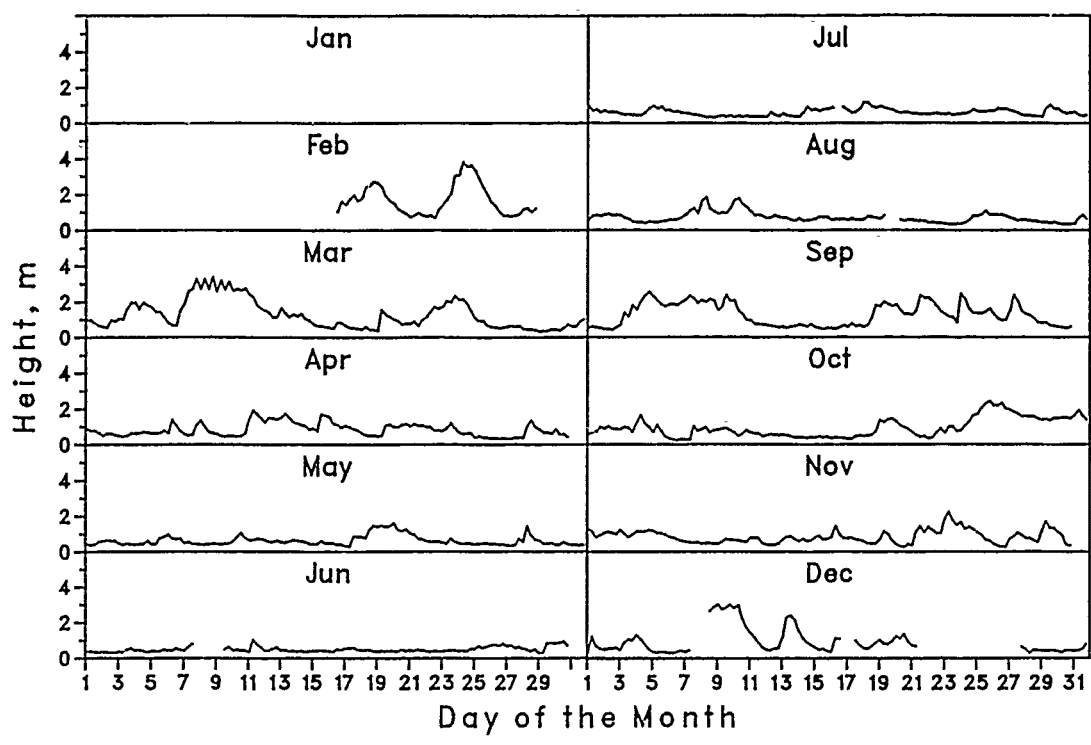


Figure D9. Time-histories of wave height and period for Gage 625

## APPENDIX E: WAVE DATA FOR GAGE 645

1. Wave data summaries for Gage 645 are presented for 1989 and for 1980 through 1989 in the following forms:

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

2. Figure E1 displays the individual wave height and peak spectral wave period values along with the monthly mean values.

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

3. Annual and monthly joint distributions tables are presented in Tables E1 and E2, and data for 1980 through 1989 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 total 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

4. Annual and monthly wave height distributions for 1989 are plotted in cumulative form in Figures E2 and E3. Data for 1980 through 1989 are in Figure E4.

### Peak Spectral Wave Period Distributions

5. Annual and monthly peak wave period,  $T_p$ , distribution histograms for 1989 are presented in Figures E5 and E6. Data for 1980 through 1989 are in Figure E7.

### Persistence of Wave Heights

6. Table E5 shows the number of times in 1989 when the specified wave height was equaled or exceeded at least once during each day for the duration (consecutive days). Data for 1980 through 1989 are given in Table E6. An example is shown below:

| Height<br>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  | 6  | 5  | 4  | 3  | 2  | 1  |    |    |     |
| 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 3 times the height exceeded 1 m for shorter durations.

### Spectra

7. Monthly spectra for the offshore Waverider buoy (Gage 645) 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-dimension 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.

8. Monthly and annual wave statistics for Gage 645 for 1989 and for 1980 through 1989 are presented in Table E7.

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

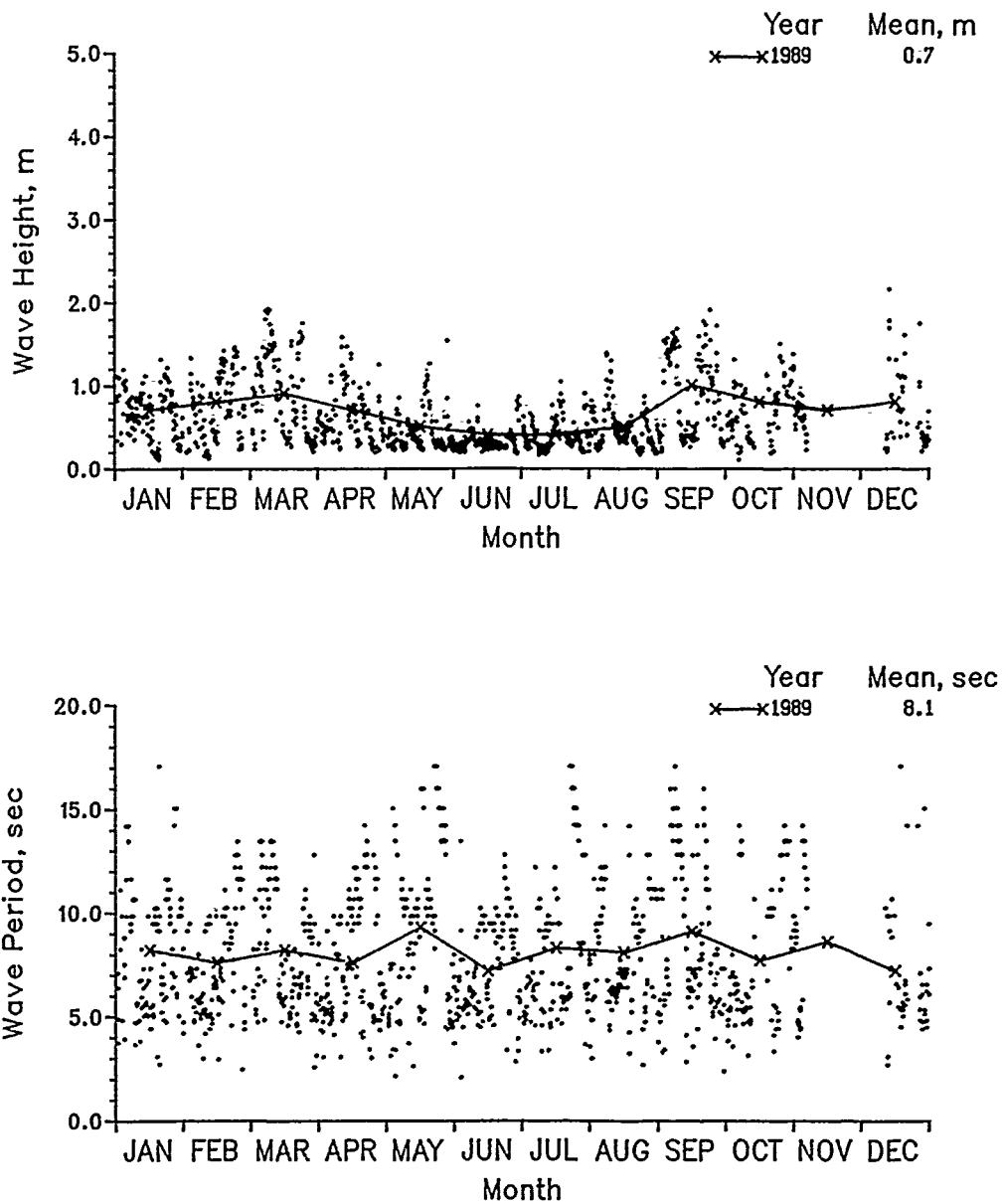


Figure E1. 1989 daily wave height and period values with monthly means for Gage 645

Table E1

Annual Joint Distribution of  $H_{mo}$  versus  $T_p$ 

| Annual 1989, Gage 645<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                              | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                        | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49                                                            | 117         | 175         | 458         | 741         | 491         | 491         | 416         | 866         | 766           | 200           | 383           | 50              | 5154  |
| 0.50 - 0.99                                                            | .           | 108         | 475         | 916         | 525         | 108         | 142         | 183         | 283           | 142           | 167           | 8               | 3057  |
| 1.00 - 1.49                                                            | .           | .           | 33          | 250         | 291         | 142         | 125         | 83          | 233           | 125           | 133           | .               | 1415  |
| 1.50 - 1.99                                                            | .           | .           | .           | 17          | 58          | 67          | 25          | 33          | 58            | 33            | 67            | 8               | 366   |
| 2.00 - 2.49                                                            | .           | .           | .           | .           | .           | 8           | .           | .           | .             | .             | .             | .               | 8     |
| 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                                                         | 117         | 283         | 966         | 1924        | 1365        | 816         | 708         | 1165        | 1340          | 500           | 750           | 66              | 0     |

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

| January 1989, Gage 645<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |      | Total |
|-------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|------|-------|
| Height, m                                                               | Period, sec |             |             |             |             |             |             |             |               |               |               |                 |      |       |
|                                                                         | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |      |       |
| 0.00 - 0.49                                                             | 85          | 171         | 171         | 342         | 85          | 171         | 85          | 1111        | 769           | 171           | 171           | 85              | 3417 |       |
| 0.50 - 0.99                                                             | .           | 256         | 598         | 1282        | 940         | 342         | 171         | 769         | 427           | 427           | .             | .               | 5212 |       |
| 1.00 - 1.49                                                             | .           | .           | 85          | 85          | 427         | 85          | 171         | .           | 513           | .             | .             | .               | 1366 |       |
| 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                                                          | 85          | 427         | 854         | 1709        | 1452        | 598         | 427         | 1880        | 1709          | 598           | 171           | 85              | 0    |       |

| February 1989, Gage 645                       |             |      |      |      |      |      |      |      |       |       |       |        |       |
|-----------------------------------------------|-------------|------|------|------|------|------|------|------|-------|-------|-------|--------|-------|
| 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                                   | 300         | .    | 100  | 500  | 600  | 400  | 100  | 900  | 600   | .     | .     | .      | 3500  |
| 0.50 - 0.99                                   | .           | 100  | 900  | 1000 | 300  | 100  | 300  | 200  | 300   | .     | 100   | .      | 3300  |
| 1.00 - 1.49                                   | .           | .    | .    | 500  | 500  | 700  | 200  | 300  | 500   | 100   | 400   | .      | 3200  |
| 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                                | 300         | 100  | 1000 | 2000 | 1400 | 1200 | 600  | 1400 | 1400  | 100   | 500   | 0      | 0     |

| March 1989, Gage 645                          |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
| Height, m                                     | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                               | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                   | 84          | 84          | 336         | 756         | 420         | 252         | 588         | 504         | 252           | .             | 84            | .               | 3360  |
| 0.50 - 0.99                                   | .           | .           | 504         | 756         | 504         | .           | 168         | 84          | 588           | .             | 84            | .               | 2688  |
| 1.00 - 1.49                                   | .           | .           | .           | 84          | 588         | 252         | 252         | .           | 588           | 420           | 252           | .               | 2436  |
| 1.50 - 1.99                                   | .           | .           | .           | 84          | 252         | 84          | 168         | 168         | 336           | 84            | 336           | .               | 1512  |
| 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                                | 84          | 84          | 840         | 1680        | 1764        | 588         | 1176        | 756         | 1764          | 504           | 756           | 0               | 0     |

(Continued)

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Table E2 (Continued)

April 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 261         | 783         | 1043        | 174         | 87          | 87          | 1043        | 696           | .             | 261           | .               | 4435  |
| 0.50 - 0.99    | .           | 87          | 522         | 1130        | 522         | 174         | 174         | 87          | 609           | 261           | 522           | .               | 4088  |
| 1.00 - 1.49    | .           | .           | 87          | 435         | 348         | 261         | .           | 174         | 87            | .             | .             | .               | 1392  |
| 1.50 - 1.99    | .           | .           | .           | .           | 87          | .           | .           | .           | .             | .             | .             | .               | 87    |
| 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           | 348         | 1392        | 2608        | 1131        | 522         | 261         | 1304        | 1392          | 261           | 783           | 0               | 0     |

May 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 163         | 407         | 894         | 488         | 163         | 569         | 407         | 732         | 1220          | 813           | 1301          | 163             | 7320  |
| 0.50 - 0.99    | .           | .           | 407         | 407         | 407         | .           | 244         | 244         | 407           | .             | .             | 81              | 2197  |
| 1.00 - 1.49    | .           | .           | .           | .           | .           | .           | .           | .           | 407           | .             | .             | .               | 407   |
| 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 | 163         | 407         | 1301        | 976         | 570         | 569         | 651         | 976         | 2034          | 813           | 1301          | 244             | 0     |

June 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 174         | 174         | 609         | 2261        | 1043        | 1130        | 957         | 1826        | 696           | 87            | 174           | .               | 9131  |
| 0.50 - 0.99    | .           | 87          | 174         | 435         | 174         | .           | .           | .           | .             | .             | .             | .               | 870   |
| 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 | 174         | 261         | 783         | 2696        | 1217        | 1130        | 957         | 1826        | 696           | 87            | 174           | 0               | 0     |

(Continued)

(Sheet 2 of 4)

Table E2 (Continued)

July 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | .           | 250         | 667         | 1250        | 750         | 583         | 1000        | 917         | 500           | 500           | 917           | 167             | 7501  |
| 0.50 - 0.99    | .           | 83          | 167         | 833         | 833         | 83          | .           | 83          | 167           | .             | 167           | .               | 2416  |
| 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           | 333         | 834         | 2166        | 1583        | 666         | 1000        | 1000        | 667           | 500           | 1084          | 167             | 0     |

August 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | 167         | .           | 500         | 167         | 917         | 1167        | 500         | 1167        | 1833          | 83            | 333           | .               | 6334  |
| 0.50 - 0.99    | .           | 167         | .           | 1000        | 833         | 83          | 83          | .           | 83            | 83            | 250           | .               | 3082  |
| 1.00 - 1.49    | .           | .           | .           | 167         | 417         | .           | .           | .           | .             | .             | .             | .               | 584   |
| 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 | 167         | 167         | 500         | 1334        | 2167        | 1250        | 583         | 1167        | 1916          | 166           | 583           | 0               | 0     |

September 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer |       |
| 0.00 - 0.49    | 171         | 171         | 171         | 427         | 342         | 684         | 171         | 256         | 513           | 85            | 256           | .               | 3247  |
| 0.50 - 0.99    | .           | 171         | 85          | 513         | 256         | 171         | 171         | 85          | 171           | 85            | 342           | .               | 2050  |
| 1.00 - 1.49    | .           | .           | .           | 769         | 256         | 171         | 342         | 171         | 171           | 598           | 598           | .               | 3076  |
| 1.50 - 1.99    | .           | .           | .           | .           | 171         | 513         | 85          | .           | 171           | 256           | 342           | 85              | 1623  |
| 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 | 171         | 342         | 255         | 1709        | 1025        | 1539        | 769         | 512         | 1026          | 1024          | 1538          | 85              | 0     |

(Continued)

(Sheet 3 of 4)

Table E2 (Concluded)

October 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | 244         | 732         | 300         | 244         | .           | 225         | 244         | 488           | 244           | 244           | .               | 3172  |
| 0.50 - 0.99    | .           | 244         | 732         | 1585        | 854         | 122         | .           | 122         | 244           | 366           | 122           | .               | 4391  |
| 1.00 - 1.49    | .           | .           | 122         | 244         | 244         | 122         | 488         | 366         | 244           | 244           | 244           | .               | 2318  |
| 1.50 - 1.99    | .           | .           | .           | .           | .           | .           | .           | .           | 122           | .             | .             | .               | 122   |
| 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           | 488         | 1586        | 2195        | 1342        | 244         | 854         | 732         | 1098          | 854           | 610           | 0               | 0     |

November 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | .           | .           | 2509        | 1739        | .           | .           | 435         | .           | 1304          | .             | 435           | .               | 2174  |
| 0.50 - 0.99    | .           | .           | .           | .           | .           | .           | 435         | 870         | .             | 1304          | 870           | .               | 7827  |
| 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           | 0           | 2509        | 1739        | 0           | 0           | 870         | 870         | 1304          | 1304          | 1305          | 0               | 0     |

December 1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 200         | 200         | 1000        | 400         | 1000        | .           | .           | 200         | 400           | 200           | 200           | 200             | 4600  |
| 0.50 - 0.99    | .           | .           | 200         | 1600        | .           | 200         | 200         | 200         | .             | 200           | .             | .               | 2600  |
| 1.00 - 1.49    | .           | .           | 200         | 800         | 800         | .           | .           | .           | .             | .             | .             | .               | 1800  |
| 1.50 - 1.99    | .           | .           | .           | .           | 200         | 200         | .           | 400         | .             | .             | .             | .               | 800   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 200         | .           | .           | .             | .             | .             | .               | 200   |
| 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 | 200         | 200         | 1400        | 2800        | 2000        | 600         | 200         | 1400        | 400           | 400           | 200           | 200             | 0     |

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Table E3

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

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| Annual 1980-1989, Gage 645                    |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-----------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
| Height, m                                     | Period, sec |             |             |             |             |             |             |             |               |               |               |                 |       |
|                                               | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>longer | Total |
| 0.00 - 0.49                                   | 79          | 132         | 250         | 447         | 303         | 296         | 526         | 577         | 664           | 330           | 379           | 68              | 4051  |
| 0.50 - 0.99                                   | 24          | 173         | 468         | 966         | 670         | 309         | 307         | 289         | 501           | 137           | 251           | 28              | 4123  |
| 1.00 - 1.49                                   | .           | 1           | 50          | 332         | 355         | 161         | 106         | 87          | 183           | 94            | 147           | 7               | 1523  |
| 1.50 - 1.99                                   | .           | .           | .           | 9           | 36          | 30          | 19          | 35          | 64            | 31            | 56            | 5               | 285   |
| 2.00 - 2.49                                   | .           | .           | .           | .           | .           | 2           | 1           | 2           | 2             | 6             | 5             | .               | 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     |
|                                               | 103         | 306         | 768         | 1754        | 1364        | 798         | 959         | 990         | 1414          | 598           | 838           | 108             |       |

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

| January 1980-1989, Gage 645<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                    | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                              | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                  | 87          | 116         | 251         | 368         | 222         | 155         | 261         | 493         | 551           | 290           | 271           | 68              | 3133  |
| 0.50 - 0.99                                                                  | 29          | 184         | 406         | 1064        | 764         | 251         | 251         | 290         | 629           | 106           | 271           | 19              | 4264  |
| 1.00 - 1.49                                                                  | .           | .           | 68          | 629         | 658         | 309         | 203         | 77          | 242           | 39            | 174           | .               | 2399  |
| 1.50 - 1.99                                                                  | .           | .           | .           | 10          | 10          | 19          | 10          | 19          | 87            | 10            | 29            | .               | 194   |
| 2.00 - 2.49                                                                  | .           | .           | .           | .           | .           | .           | .           | .           | .             | 10            | .             | .               | 10    |
| 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                                                               | 116         | 300         | 725         | 2071        | 1654        | 734         | 725         | 879         | 1509          | 455           | 745           | 87              | 0     |

| February 1980-1989, Gage 645<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|-------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                     | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                               | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                   | 110         | 90          | 229         | 389         | 140         | 169         | 209         | 219         | 668           | 150           | 249           | 10              | 2632  |
| 0.50 - 0.99                                                                   | 50          | 179         | 419         | 1027        | 598         | 219         | 249         | 359         | 758           | 160           | 309           | .               | 4327  |
| 1.00 - 1.49                                                                   | .           | .           | 50          | 618         | 598         | 259         | 130         | 140         | 349           | 219           | 219           | .               | 2582  |
| 1.50 - 1.99                                                                   | .           | .           | .           | .           | 60          | 70          | 30          | 40          | 30            | 60            | 160           | .               | 450   |
| 2.00 - 2.49                                                                   | .           | .           | .           | .           | .           | .           | .           | .           | .             | 10            | .             | .               | 10    |
| 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                                                                | 160         | 269         | 698         | 2034        | 1396        | 717         | 618         | 758         | 1805          | 599           | 937           | 10              | 0     |

| March 1980-1989, Gage 645<br>Percent Occurrence(X100) of Height and Period |             |             |             |             |             |             |             |             |               |               |               |                 |       |
|----------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
| Height, m                                                                  | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|                                                                            | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49                                                                | 152         | 116         | 241         | 366         | 206         | 116         | 286         | 375         | 429           | 134           | 286           | .               | 2707  |
| 0.50 - 0.99                                                                | 54          | 223         | 429         | 1046        | 617         | 304         | 277         | 349         | 670           | 188           | 384           | 9               | 4550  |
| 1.00 - 1.49                                                                | .           | 9           | 107         | 357         | 411         | 188         | 134         | 98          | 277           | 188           | 277           | .               | 2046  |
| 1.50 - 1.99                                                                | .           | .           | .           | 18          | 27          | 27          | 45          | 98          | 188           | 116           | 143           | .               | 662   |
| 2.00 - 2.49                                                                | .           | .           | .           | .           | .           | .           | .           | .           | .             | 18            | 18            | .               | 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                                                             | 206         | 348         | 777         | 1787        | 1261        | 635         | 742         | 920         | 1564          | 644           | 1108          | 9               | 0     |

(Continued)

(Sheet 1 of 4)

Table E4 (Continued)

April 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 68          | 166         | 273         | 380         | 263         | 302         | 439         | 556         | 595           | 439           | 439           | 29              | 3949  |
| 0.50 - 0.99    | 20          | 234         | 449         | 810         | 507         | 273         | 361         | 302         | 790           | 117           | 400           | 10              | 4273  |
| 1.00 - 1.49    | .           | .           | 39          | 263         | 273         | 107         | 117         | 137         | 234           | 78            | 176           | .               | 1424  |
| 1.50 - 1.99    | .           | .           | .           | .           | 29          | 29          | 59          | 39          | 98            | 29            | 29            | .               | 312   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | .           | .           | 20          | 20            | .             | .             | .               | 40    |
| 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 | 88          | 400         | 761         | 1453        | 1072        | 711         | 976         | 1054        | 1737          | 663           | 1044          | 39              | 0     |

May 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 83          | 193         | 275         | 459         | 312         | 385         | 679         | 633         | 807           | 275           | 495           | 64              | 4660  |
| 0.50 - 0.99    | 9           | 165         | 541         | 954         | 817         | 367         | 404         | 303         | 486           | 83            | 156           | 28              | 4313  |
| 1.00 - 1.49    | .           | .           | 28          | 156         | 128         | 55          | 92          | 92          | 165           | 55            | 119           | .               | 890   |
| 1.50 - 1.99    | .           | .           | .           | 28          | 37          | .           | .           | 9           | 18            | 18            | 18            | .               | 128   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | .           | 9           | .           | .             | .             | .             | .               | 9     |
| 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 | 92          | 358         | 844         | 1597        | 1294        | 807         | 1184        | 1037        | 1476          | 431           | 788           | 92              | 0     |

June 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 123         | 255         | 397         | 926         | 548         | 577         | 992         | 983         | 624           | 388           | 208           | 151             | 6172  |
| 0.50 - 0.99    | 28          | 189         | 435         | 851         | 463         | 274         | 369         | 284         | 312           | 38            | 28            | 28              | 3299  |
| 1.00 - 1.49    | .           | .           | 28          | 142         | 142         | 28          | 47          | 9           | 104           | .             | 19            | .               | 519   |
| 1.50 - 1.99    | .           | .           | .           | .           | 9           | .           | .           | .           | .             | .             | .             | .               | 9     |
| 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 | 151         | 444         | 860         | 1919        | 1162        | 879         | 1408        | 1276        | 1040          | 426           | 255           | 179             | 0     |

(Continued)

(Sheet 2 of 4)

Table E4 (Continued)

July 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 65          | 203         | 434         | 702         | 555         | 582         | 1377        | 1137        | 887           | 416           | 518           | 139             | 7015  |
| 0.50 - 0.99    | .           | 139         | 397         | 638         | 527         | 240         | 287         | 194         | 129           | 92            | 46            | 55              | 2744  |
| 1.00 - 1.49    | .           | .           | 9           | 129         | 37          | 18          | 28          | .           | 18            | .             | .             | .               | 239   |
| 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 | 65          | 342         | 840         | 1469        | 1119        | 840         | 1692        | 1331        | 1034          | 508           | 564           | 194             | 0     |

August 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 54          | 162         | 216         | 622         | 649         | 523         | 848         | 884         | 884           | 370           | 379           | 18              | 5609  |
| 0.50 - 0.99    | 9           | 216         | 568         | 983         | 613         | 352         | 325         | 189         | 252           | 36            | 117           | .               | 3660  |
| 1.00 - 1.49    | .           | .           | 27          | 180         | 180         | 72          | 18          | 18          | 45            | 36            | 63            | .               | 639   |
| 1.50 - 1.99    | .           | .           | .           | .           | 18          | 27          | 9           | .           | 27            | 9             | .             | .               | 90    |
| 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 | 63          | 378         | 811         | 1785        | 1460        | 974         | 1200        | 1091        | 1208          | 451           | 559           | 18              | 0     |

September 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 66          | 47          | 123         | 313         | 171         | 275         | 361         | 494         | 684           | 370           | 456           | 66              | 3426  |
| 0.50 - 0.99    | 47          | 123         | 427         | 798         | 608         | 456         | 361         | 408         | 503           | 247           | 437           | 19              | 4434  |
| 1.00 - 1.49    | .           | .           | 47          | 475         | 389         | 199         | 161         | 114         | 161           | 104           | 171           | 19              | 1840  |
| 1.50 - 1.99    | .           | .           | .           | 9           | 47          | 66          | 9           | 9           | 19            | 28            | 66            | 9               | 262   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | .           | .           | .           | .             | 9             | 19            | .               | 28    |
| 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 | 113         | 170         | 597         | 1595        | 1215        | 996         | 892         | 1025        | 1367          | 758           | 1149          | 113             | 0     |

(Continued)

(Sheet 3 of 4)

Table E4 (Concluded)

October 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 37          | 55          | 119         | 202         | 193         | 138         | 321         | 339         | 606           | 257           | 394           | 73              | 2734  |
| 0.50 - 0.99    | 9           | 92          | 450         | 936         | 651         | 239         | 312         | 303         | 771           | 202           | 284           | 46              | 4295  |
| 1.00 - 1.49    | .           | .           | 46          | 431         | 431         | 294         | 174         | 193         | 349           | 202           | 220           | 28              | 2368  |
| 1.50 - 1.99    | .           | .           | .           | 9           | 83          | 64          | 28          | 64          | 156           | 55            | 55            | 46              | 560   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 9           | .           | .           | .             | 18            | 18            | .               | 45    |
| 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 | 46          | 147         | 615         | 1578        | 1358        | 744         | 835         | 899         | 1882          | 734           | 971           | 193             | 0     |

November 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 30          | 50          | 218         | 297         | 168         | 168         | 278         | 268         | 446           | 387           | 387           | 40              | 2737  |
| 0.50 - 0.99    | 20          | 139         | 595         | 1100        | 912         | 496         | 287         | 278         | 416           | 287           | 268           | 59              | 4857  |
| 1.00 - 1.49    | .           | .           | 59          | 287         | 575         | 268         | 129         | 59          | 129           | 188           | 178           | 40              | 1912  |
| 1.50 - 1.99    | .           | .           | .           | 20          | 79          | 50          | 10          | 99          | 99            | 40            | 89            | .               | 486   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | .           | .           | .           | 10            | .             | .             | .               | 10    |
| 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 | 50          | 189         | 872         | 1704        | 1734        | 982         | 704         | 704         | 1100          | 902           | 922           | 139             | 0     |

December 1980-1989, Gage 645  
Percent Occurrence(X100) of Height and Period

| Height, m      | Period, sec |             |             |             |             |             |             |             |               |               |               |                 | Total |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|-----------------|-------|
|                | 2.0-<br>2.9 | 3.0-<br>3.9 | 4.0-<br>4.9 | 5.0-<br>5.9 | 6.0-<br>6.9 | 7.0-<br>7.9 | 8.0-<br>8.9 | 9.0-<br>9.9 | 10.0-<br>11.9 | 12.0-<br>13.9 | 14.0-<br>15.9 | 16.0-<br>Longer |       |
| 0.00 - 0.49    | 77          | 125         | 222         | 318         | 174         | 135         | 193         | 492         | 771           | 501           | 463           | 164             | 3635  |
| 0.50 - 0.99    | 10          | 193         | 501         | 1408        | 974         | 241         | 193         | 212         | 318           | 96            | 328           | 68              | 4542  |
| 1.00 - 1.49    | .           | .           | 96          | 347         | 482         | 145         | 48          | 116         | 125           | 29            | 154           | .               | 1542  |
| 1.50 - 1.99    | .           | .           | .           | 10          | 39          | 10          | 29          | 39          | 39            | 10            | 87            | .               | 263   |
| 2.00 - 2.49    | .           | .           | .           | .           | .           | 19          | .           | .           | .             | .             | .             | .               | 19    |
| 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 | 87          | 318         | 819         | 2083        | 1669        | 550         | 463         | 859         | 1253          | 636           | 1032          | 232             | 0     |

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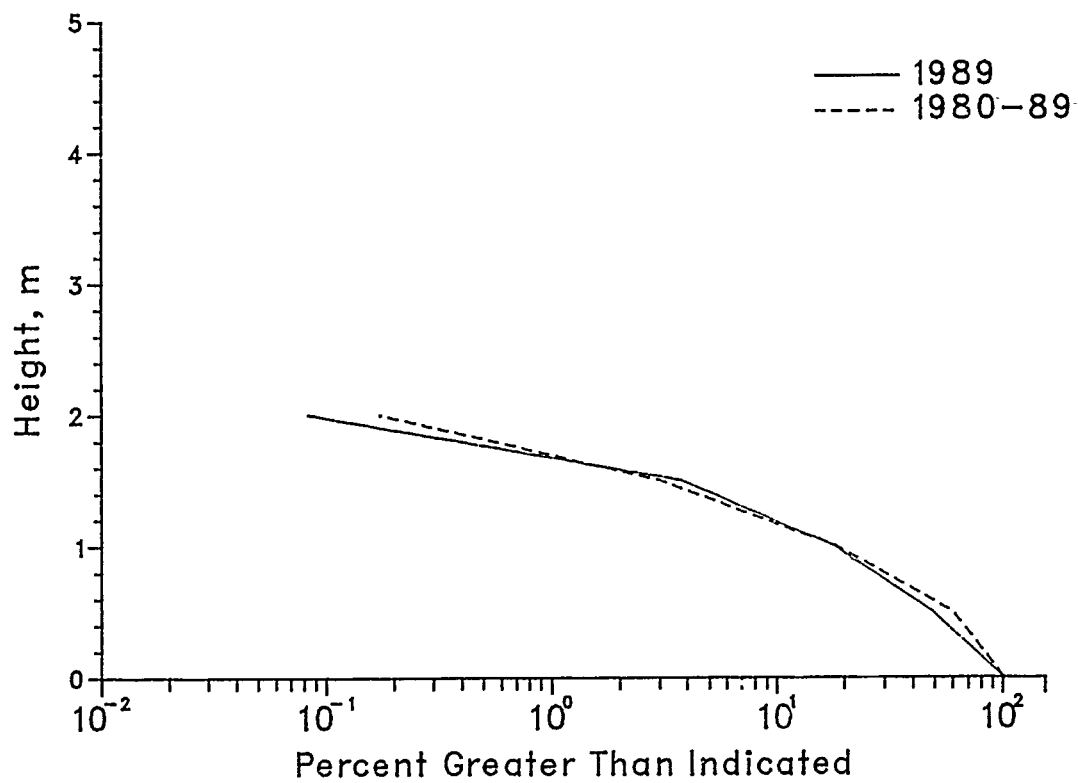


Figure E2. Annual cumulative wave height distributions  
for Gage 645

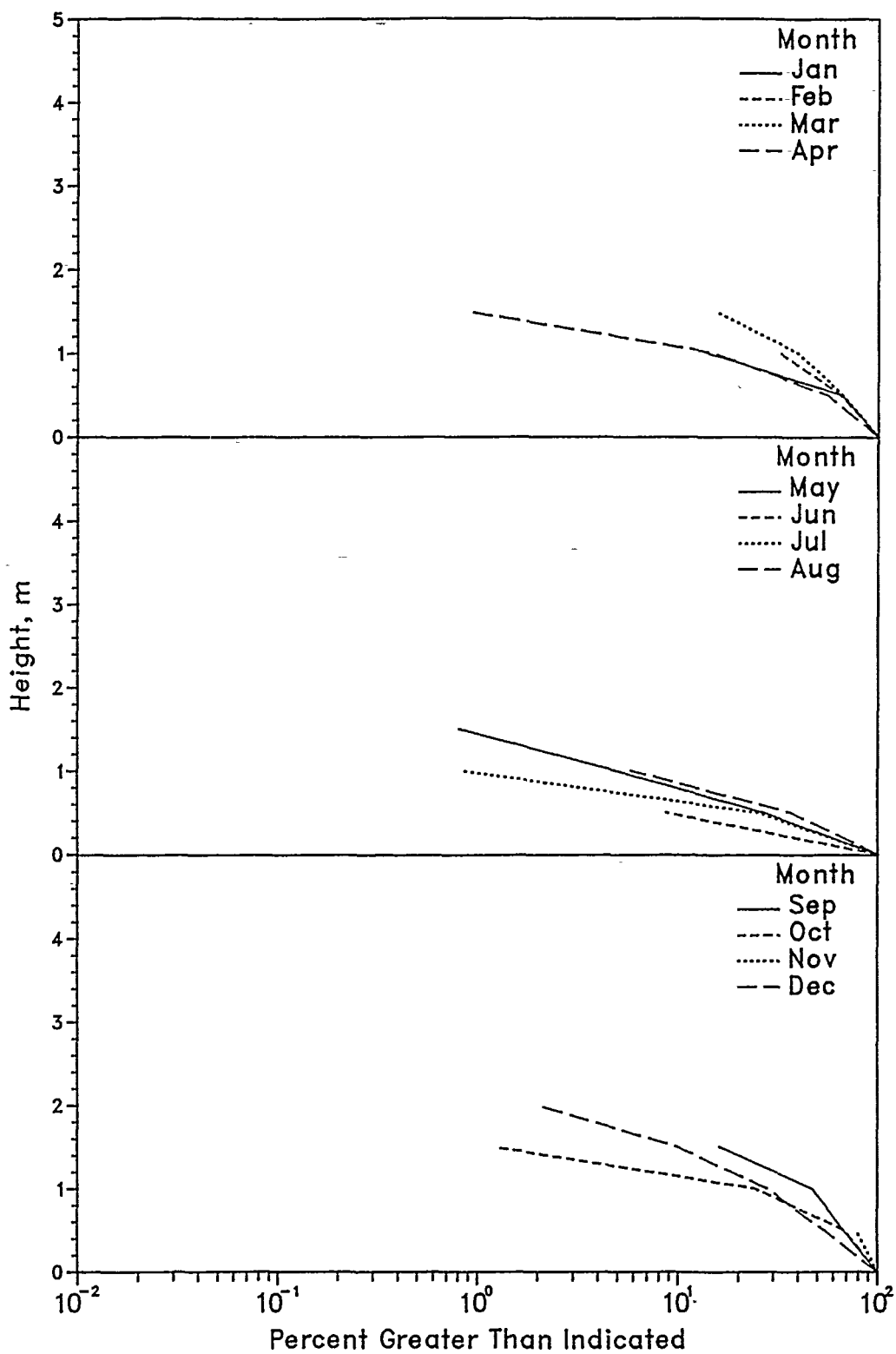


Figure E3. 1989 monthly wave height distributions  
for Gage 645

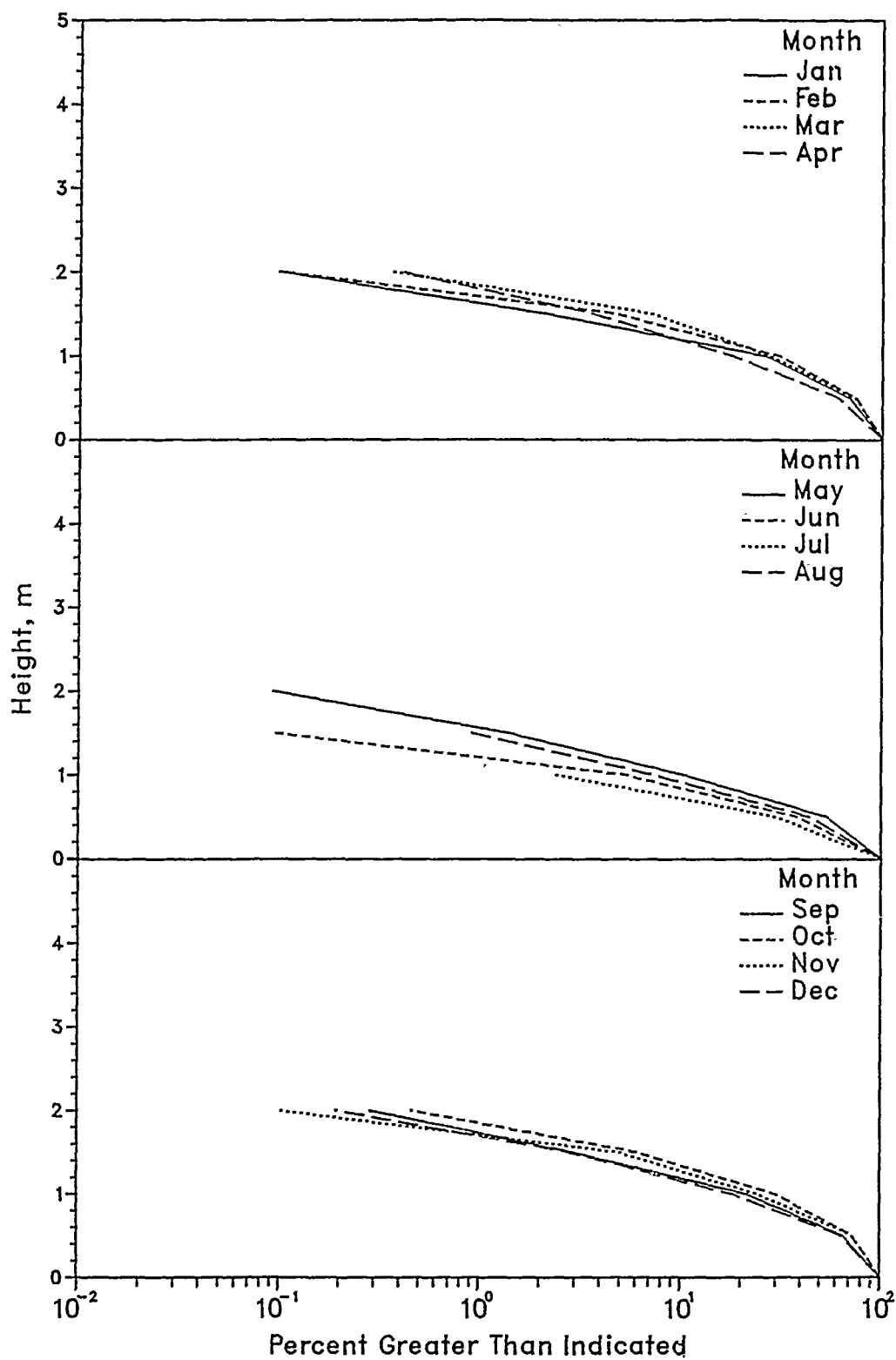


Figure E4. 1980-1989 monthly wave height distributions  
for Gage 645

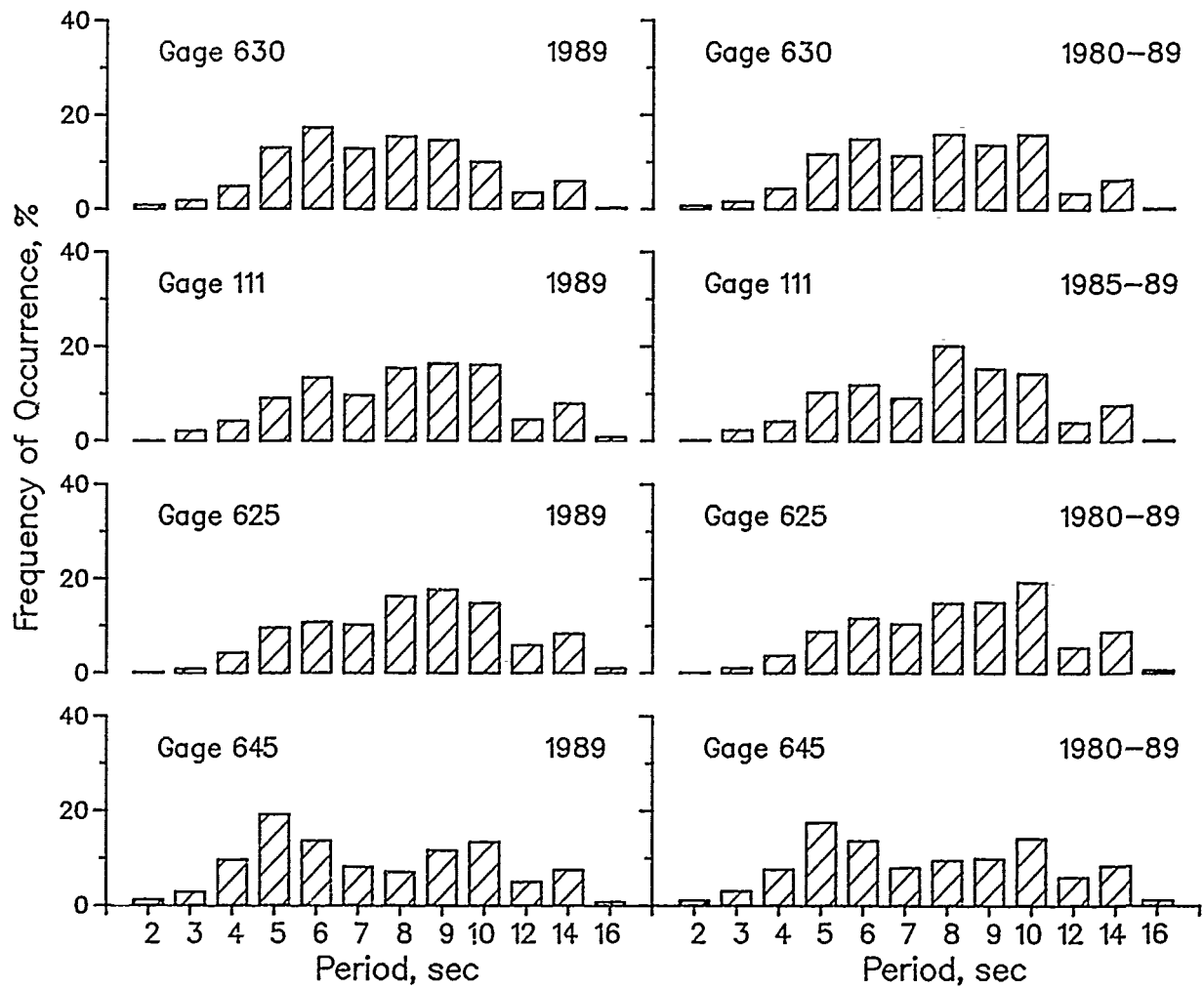


Figure E5. Annual wave period distributions for all gages

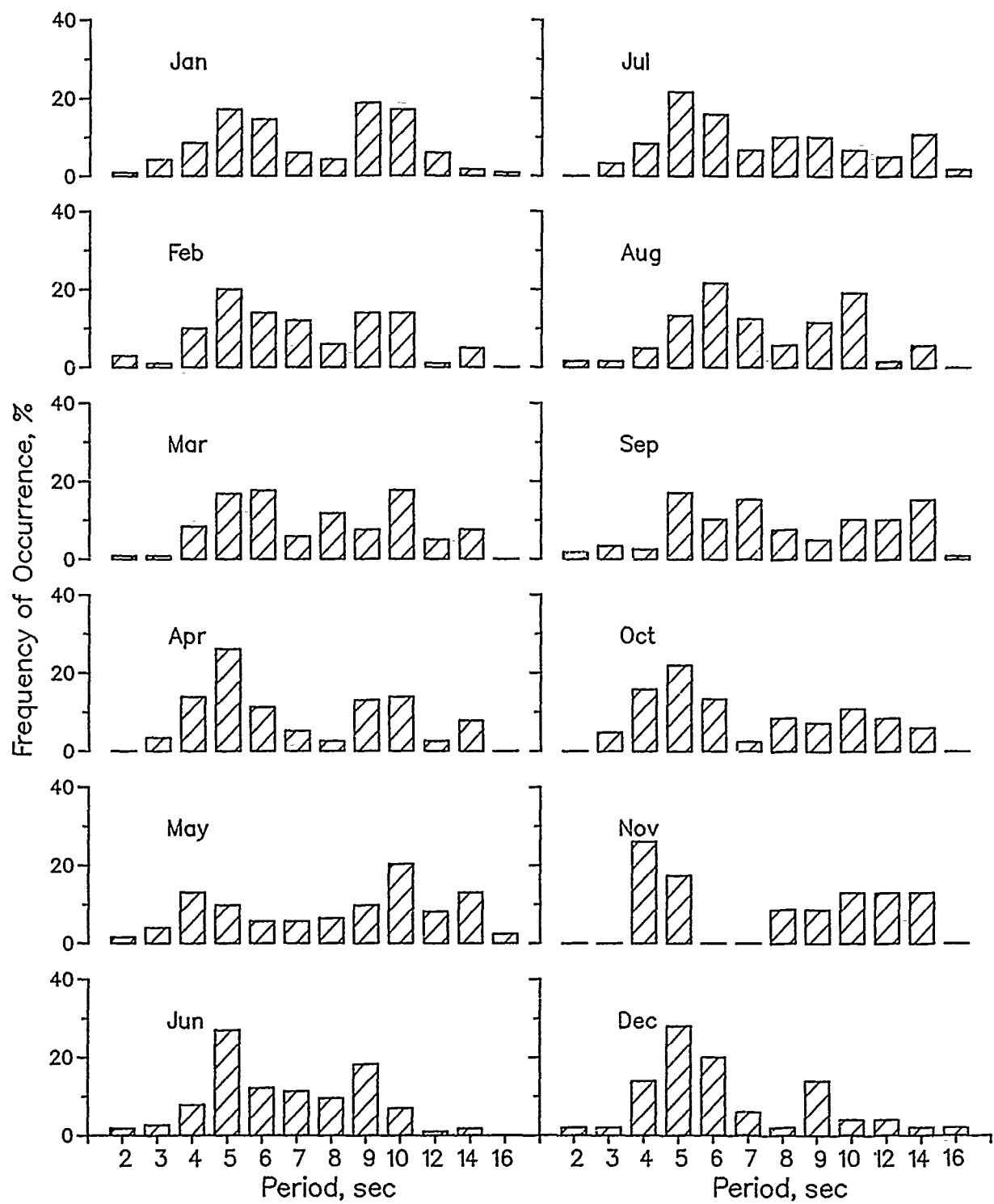


Figure E6. 1989 monthly wave period distributions for Gage 645

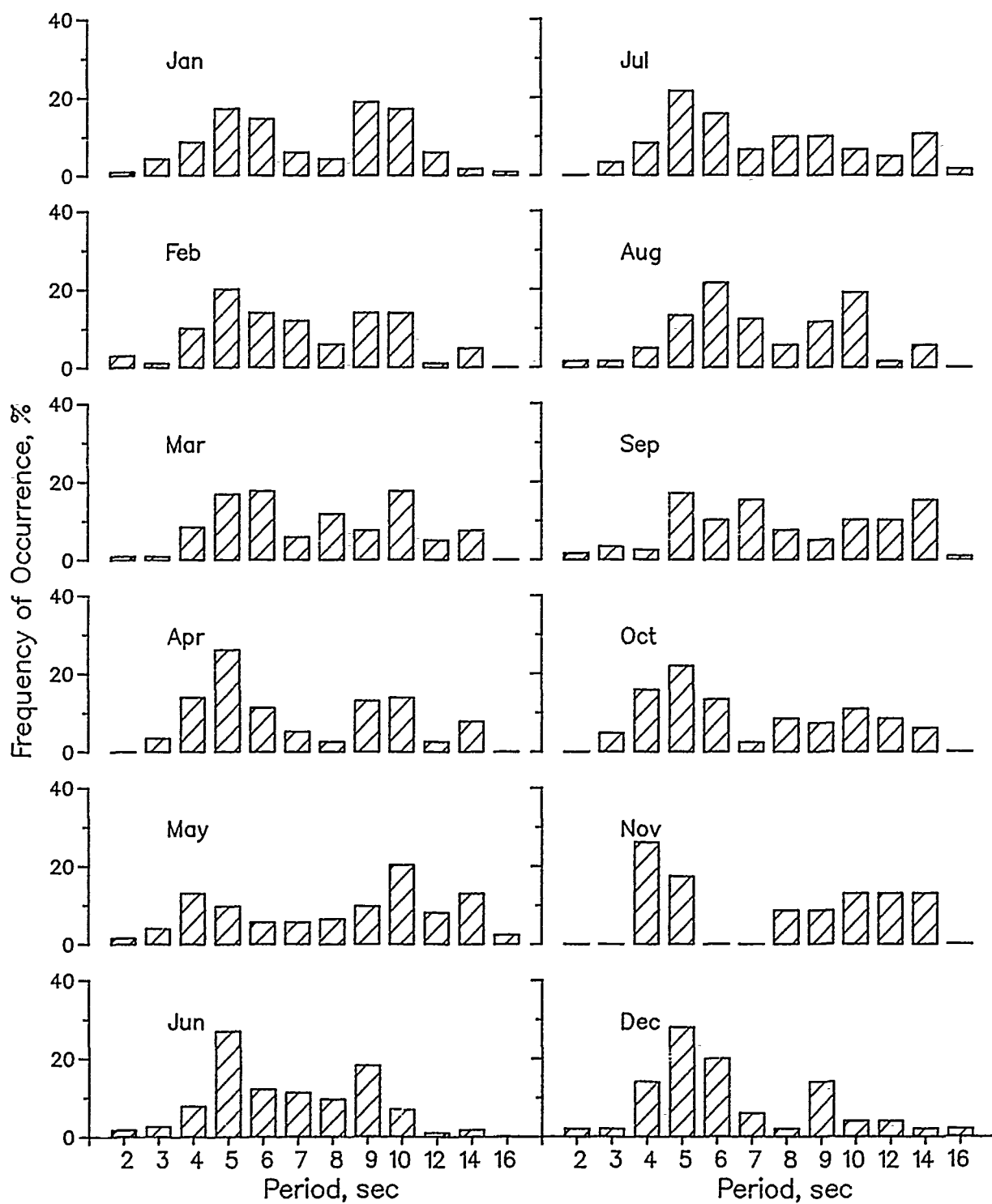


Figure E7. 1980-1989 monthly wave period distributions for Gage 645

Table E5  
1989 Persistence of  $H_{mo}$  for Gage 645

| Height<br>(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           | 48                           | 31 |    | 26 | 19 | 15 | 12 | 9 |   | 7  |    |    |    | 6  |    | 5  |    | 4  | 2   |
| 1.0           | 43                           | 27 | 17 | 10 | 9  |    | 6  | 4 | 1 |    |    |    |    |    |    |    |    |    |     |
| 1.5           | 22                           | 11 | 8  | 5  | 3  | 2  | 1  |   |   |    |    |    |    |    |    |    |    |    |     |
| 2.0           |                              | 6  | 3  | 1  |    |    |    |   |   |    |    |    |    |    |    |    |    |    |     |
| 2.5           |                              | 3  | 2  |    |    |    |    |   |   |    |    |    |    |    |    |    |    |    |     |
| 3.0           |                              | 3  | 2  |    |    |    |    |   |   |    |    |    |    |    |    |    |    |    |     |
| 3.5           |                              | 2  | 1  |    |    |    |    |   |   |    |    |    |    |    |    |    |    |    |     |
| 4.0           |                              | 2  |    |    |    |    |    |   |   |    |    |    |    |    |    |    |    |    |     |

Table E6  
1980 Through 1989 Persistence of  $H_{mo}$  for Gage 645

| Height<br>(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           | 43                           | 35 | 29 | 24 | 19 | 15 | 12 | 11 | 9 | 8  | 7  |    | 6  | 5  |    |    | 4  |    | 3   |
| 1.0           | 43                           | 25 | 15 | 9  | 5  | 3  | 2  | 1  |   |    |    |    |    |    |    |    |    |    |     |
| 1.5           | 13                           | 6  | 3  |    | 1  |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 2.0           | 2                            | 1  | 1  |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 2.5           |                              |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 3.0           |                              |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 3.5           |                              |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |
| 4.0           |                              |    |    |    |    |    |    |    |   |    |    |    |    |    |    |    |    |    |     |

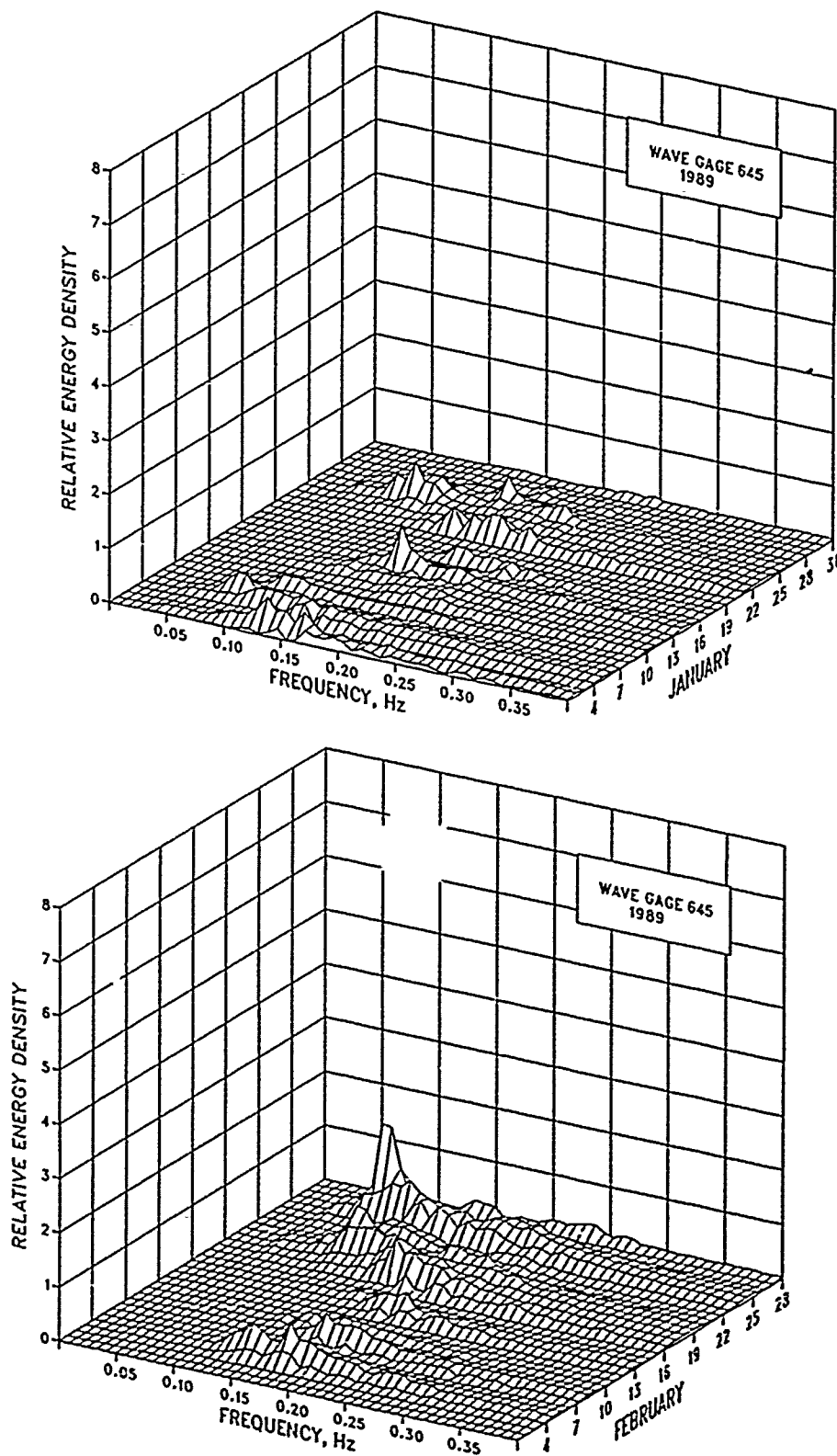


Figure E8. 1989 monthly spectra for Gage 645  
(Sheet 1 of 6)

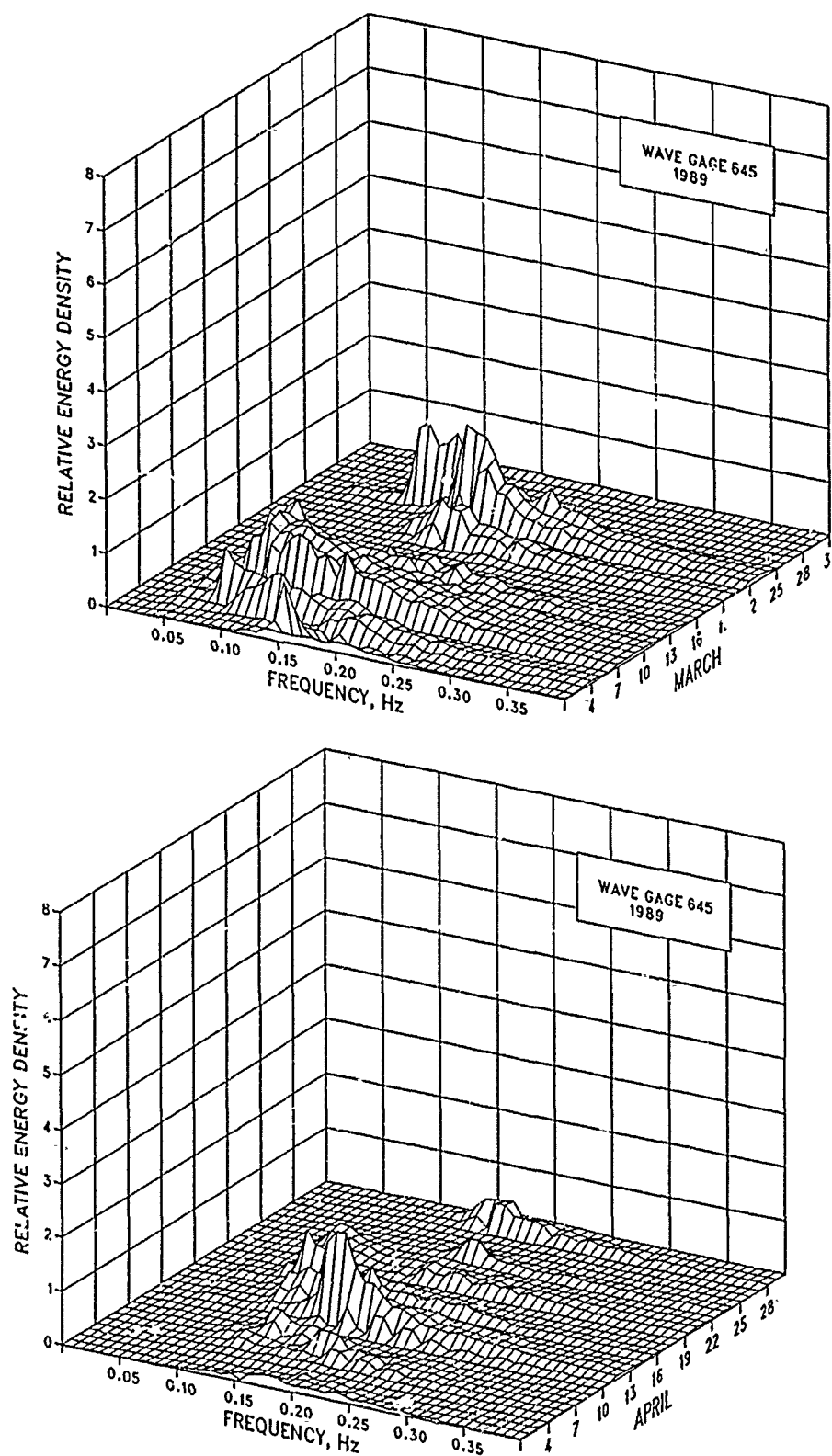


Figure E8. (Sheet 2 of 6)

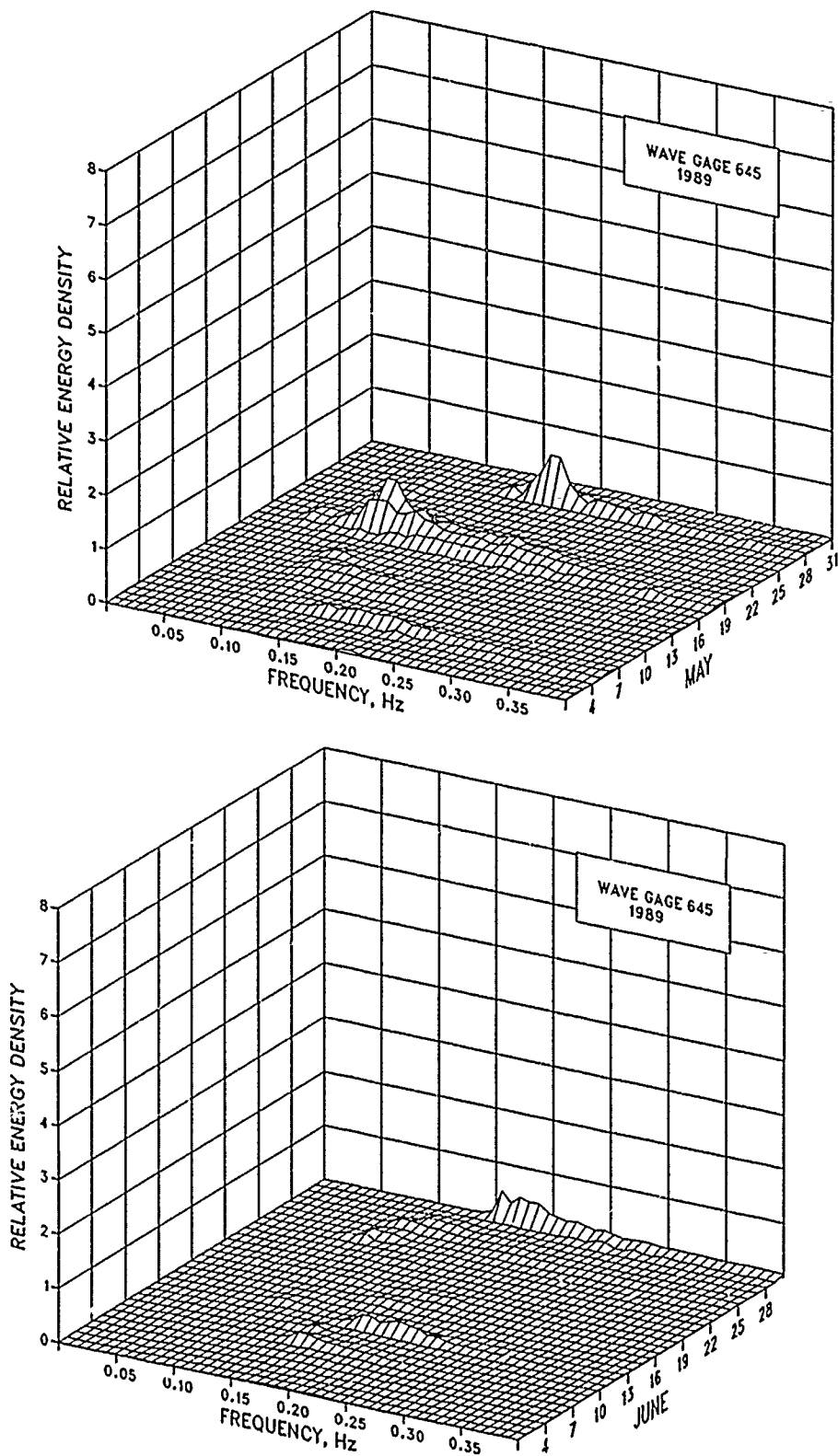


Figure E8. (Sheet 3 of 6)

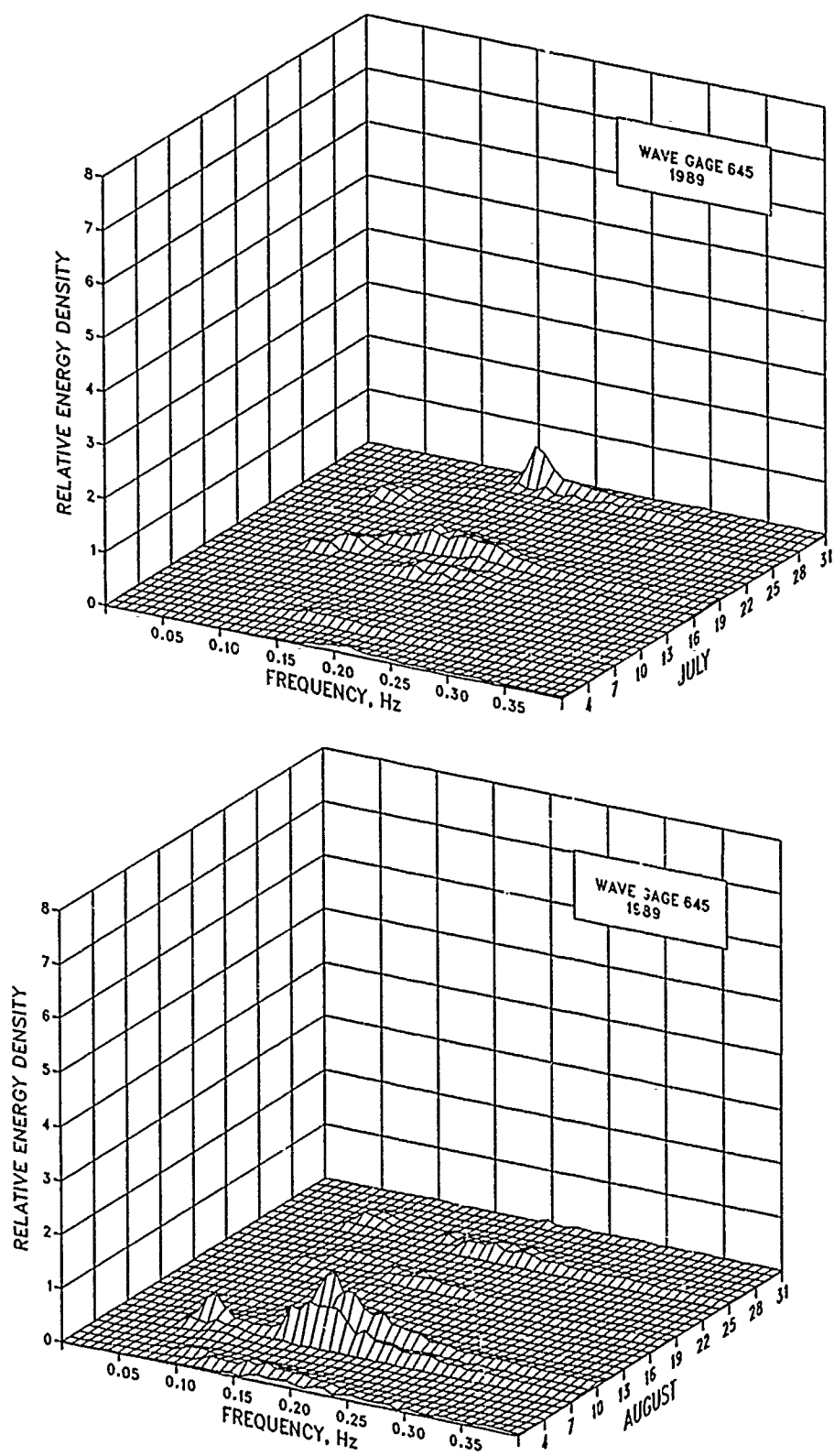


Figure E8. (Sheet 4 of 6)

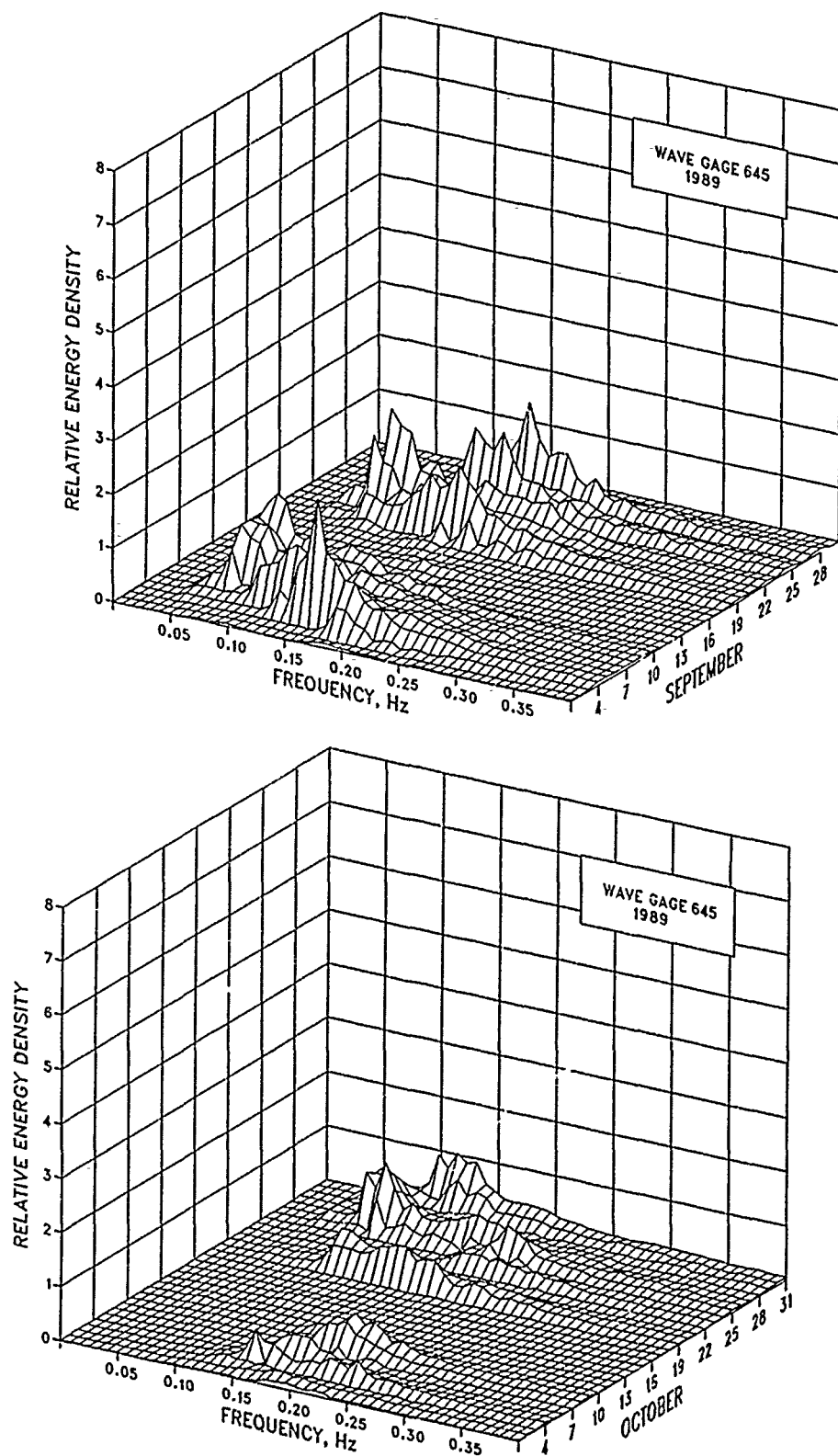


Figure E8. (Sheet 5 of 6)

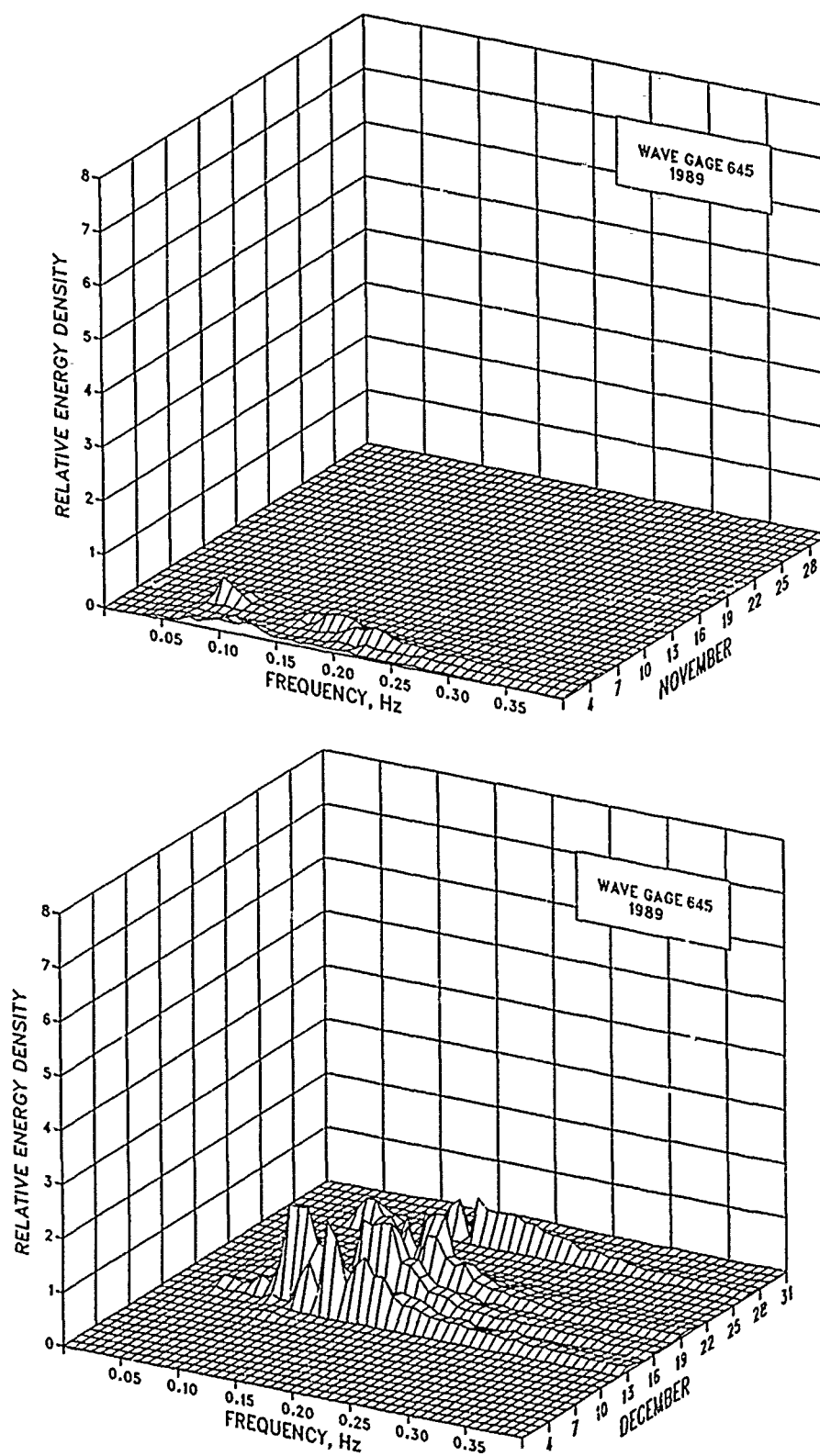


Figure E8. (Sheet 6 of 6)

Table E7  
Wave Statistics for Gage 645

| Month  | 1989   |      |         |      |        |      |        | 1980-1989 |      |         |          |        |      |        |
|--------|--------|------|---------|------|--------|------|--------|-----------|------|---------|----------|--------|------|--------|
|        | Height |      |         | Date | Period |      |        | Height    |      |         | Date     | Period |      |        |
|        | Std.   |      | Extreme |      | Std.   |      | Number | Std.      |      | Extreme |          | Std.   |      | Number |
|        | Mean   | Dev. |         |      | Mean   | Dev. |        | Mean      | Dev. |         |          | Mean   | Dev. |        |
|        | m      | m    |         |      | m      | sec  |        | sec       | Obs. |         |          | m      | m    |        |
| Jan    | 0.7    | 0.3  | 1.3     | 21   | 8.2    | 3.1  | 117    | 0.8       | 0.4  | 2.0     | 1980     | 7.9    | 3.2  | 1034   |
| Feb    | 0.8    | 0.4  | 1.5     | 24   | 7.6    | 2.6  | 100    | 0.8       | 0.4  | 2.0     | 1983     | 8.1    | 3.2  | 1003   |
| Mar    | 0.9    | 0.6  | 1.9     | 8    | 8.2    | 2.8  | 119    | 0.8       | 0.5  | 2.3     | 1980     | 8.2    | 3.3  | 1119   |
| Apr    | 0.7    | 0.4  | 1.6     | 11   | 7.6    | 2.9  | 115    | 0.7       | 0.4  | 2.3     | 1987     | 8.5    | 3.3  | 1025   |
| May    | 0.5    | 0.3  | 1.5     | 28   | 9.3    | 3.9  | 123    | 0.6       | 0.4  | 2.0     | 1987     | 8.1    | 3.2  | 1090   |
| Jun    | 0.4    | 0.2  | 0.9     | 30   | 7.2    | 2.3  | 115    | 0.5       | 0.3  | 1.6     | 1987     | 7.6    | 3.1  | 1058   |
| Jul    | 0.4    | 0.2  | 1.0     | 18   | 8.3    | 3.4  | 120    | 0.5       | 0.2  | 1.3     | 1985     | 8.1    | 3.2  | 1082   |
| Aug    | 0.5    | 0.3  | 1.4     | 8    | 8.1    | 2.6  | 120    | 0.6       | 0.3  | 1.7     | 1982     | 7.8    | 2.9  | 1109   |
| Sep    | 1.0    | 0.5  | 1.9     | 24   | 9.1    | 3.7  | 117    | 0.7       | 0.4  | 2.1     | 1985     | 8.6    | 3.3  | 1053   |
| Oct    | 0.8    | 0.4  | 1.5     | 25   | 7.7    | 3.2  | 82     | 0.8       | 0.5  | 2.2     | 1982     | 8.7    | 3.3  | 1090   |
| Nov    | 0.7    | 0.2  | 0.9     | 3    | 8.6    | 3.5  | 23     | 0.8       | 0.4  | 2.0     | 1981     | 8.3    | 3.5  | 1009   |
| Dec    | 0.8    | 0.5  | 2.2     | 13   | 7.2    | 3.1  | 50     | 0.7       | 0.4  | 2.2     | 1989     | 8.2    | 3.6  | 1037   |
| Annual | 0.7    | 0.4  | 2.2     | Dec  | 8.1    | 3.2  | 1201   | 0.7       | 0.4  | 2.3     | Apr 1987 | 8.2    | 3.3  | 12709  |

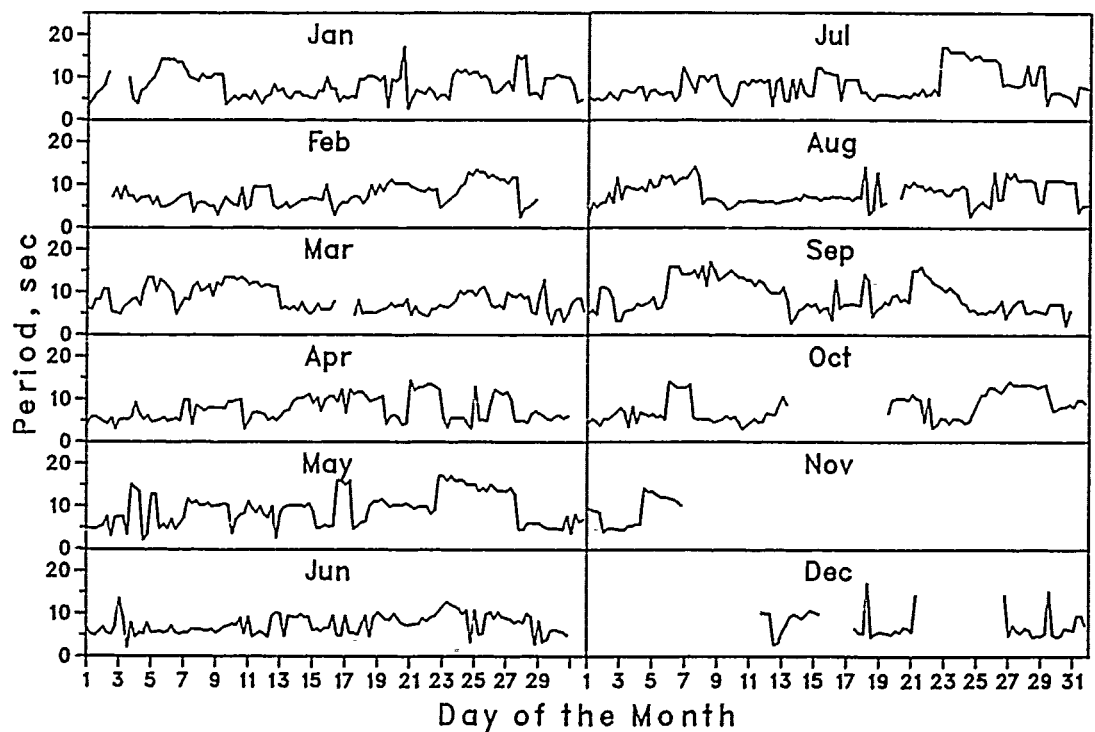
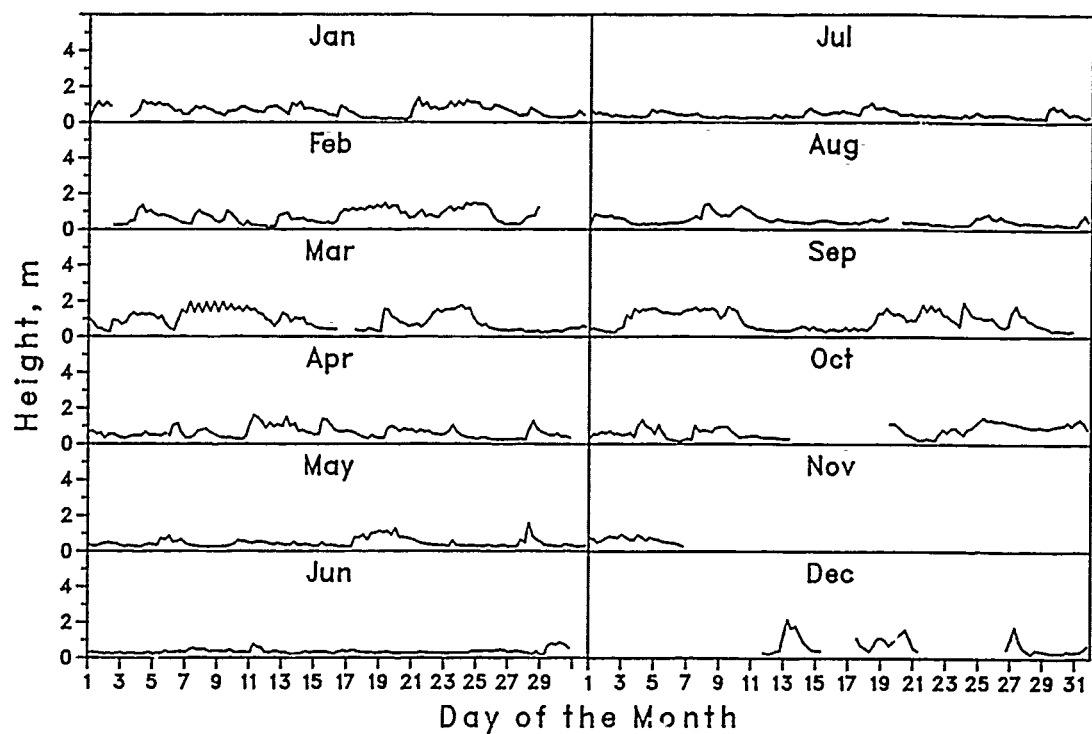


Figure E9. Time-histories of wave height and period  
for Gage 645