# Cumulative Frequency Analysis of Precipitation data from the Wareham Cranberry Experiment Station for the period October 1, 1988 to October 1, 2010. 

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## Cumulative Frequency of Events

The Buzzards Bay NEP analyzed precipitation data for East Wareham collected by the UMass Cranberry Experiment Station that was available for the past 22 years to calculate the 95 th percentile storm. There are $3,00024-\mathrm{hr}$ rainfall events for this 22 -year record, but 232 of these are "trace" measurements, with no numeric value recorded. Including these trace rainfalls in the analysis, the 95th percentile rainfall is 1.40 inches. Excluding these trace events (as is typically done to define storm size storms for regulations), results in a 95th percentile rainfall of 1.45 inches. However, if all events under 0.1 inches are discarded because they do not generate appreciable runoff, which was suggested as a possible methodology by EPA (note that this is about a third of all measurable rain events in East Wareham), then the 95 th percentile value is 1.72 inches. The average annual rainfall in this data set is 50.73 inches. Note also that cumulative frequency of events at or below an amount are much higher that the cumulative frequency of volume for that threshold. This is because a relatively small number of large volume storm account for a large portion of annual rainfalls.

| interval (inches) | Frequency (with trace) | Cumulative Frequency | percent <=high value | percent <=high value, exclude <=0.1 |
| :---: | :---: | :---: | :---: | :---: |
| 0.0-0.1 | 1020 | 1020 | 36.9\% |  |
| 0.1-0.2 | 392 | 1412 | 51.0\% | 22.4\% |
| 0.2-0.3 | 263 | 1675 | 60.5\% | 37.5\% |
| 0.3-0.4 | 183 | 1858 | 67.1\% | 48.0\% |
| 0.4-0.5 | 168 | 2026 | 73.2\% | 57.6\% |
| 0.5-0.6 | 133 | 2159 | 78.0\% | 65.2\% |
| 0.6-0.7 | 104 | 2263 | 81.8\% | 71.2\% |
| 0.7-0.8 | 88 | 2351 | 85.0\% | 76.2\% |
| 0.8-0.9 | 68 | 2419 | 87.4\% | 80.1\% |
| 0.9-1.0 | 45 | 2464 | 89.0\% | 82.7\% |
| 1.0-1.1 | 60 | 2524 | 91.2\% | 86.1\% |
| 1.1-1.2 | 41 | 2565 | 92.7\% | 88.4\% |
| 1.2-1.3 | 23 | 2588 | 93.5\% | 89.8\% |
| 1.3-1.4 | 29 | 2617 | 94.6\% | 91.4\% |
| 1.4-1.5 | 21 | 2638 | 95.3\% | 92.6\% |
| 1.5-1.6 | 19 | 2657 | 96.0\% | 93.7\% |
| 1.6-1.7 | 15 | 2672 | 96.6\% | 94.6\% |
| 1.7-1.8 | 12 | 2684 | 97.0\% | 95.2\% |
| 1.8-1.9 | 13 | 2697 | 97.5\% | 96.0\% |
| 1.9-2.0 | 11 | 2708 | 97.9\% | 96.6\% |
| 2.0-2.1 | 5 | 2713 | 98.0\% | 96.9\% |



