

Major Differences in Bulletin 17B and Bulletin 17C

The following items are the **major** areas where Bulletin 17B and Bulletin 17C differ. These differences were discussed in the June 12, 2013 recommendations made to the Subcommittee on Hydrology (see the first paper at <http://acwi.gov/hydrology/Frequency/>).

1. Historical Information, Low Floods, Interval Data and Zero floods. The Historical Weighting Procedure and the Conditional Probability Adjustment (CPA) have been replaced with an Expected Moments Algorithm (EMA) analysis, a different approach for estimating the moments of the log-Pearson Type III frequency distribution.

Why the revision? - EMA deals with interval and multiple threshold data that CPA and the Historical Weighted Moments procedures in Bulletin 17B do not. This new capability allows use of an expanded data set as well as describing better what is actually known. Crest-stage gages and sites with historical information yield observations that are best described by intervals, where thresholds often change over time.

2. Low Flood Identification. The simple Grubbs-Beck outlier test recommended in Bulletin 17B has been replaced with a new Multiple Grubbs-Beck test for the identification of several potentially influential low floods.

Why the revision? – In the more arid regions of the country, the simple Grubbs-Beck test in Bulletin 17B does not identify a sufficient number of low floods that have an undue influence on the upper end of the frequency curve. The new Multiple Grubbs-Beck test offers a more technical and objective approach for identifying several influential low floods, reducing the subjectivity in the Bulletin 17C frequency analysis.

3. Confidence Intervals. The confidence interval formulas in Bulletin 17B (Appendix 9) have been replaced with a new procedure for estimating confidence intervals.

Why the revision? – The confidence interval formulas in Bulletin 17B neglect the uncertainty in the estimated coefficient of skewness and the uncertainty in historical information and censoring of low floods. EMA considers all these sources of uncertainty plus the uncertainty in interval data.

4. Derivation of Regional Skew. The statements in Bulletin 17B on the derivation of a regional skewness estimator and its precision have been revised to reflect recent advances in regional statistical analyses.

Why the revision? – A lot of research has been completed in estimating regional skew since the publication of Bulletin 17B in 1982. The new research procedures are described and references provided that illustrate the application of the new procedures.

5. Plotting Positions. The single threshold historical plotting position has been replaced with a multiple-threshold plotting positions suggested by Bob Hirsch and Jerry Stedinger in 1987.

Why the revision? – The multiple-threshold plotting position allows for more flexibility in analyzing historical information and is consistent with EMA that allows the use of multiple historical thresholds.

6. Climate Change. The outdated statements in Bulletin 17B on “Climate Trends” have been replaced with a revised statement reflecting the current understanding of climate variability and climate change.

Why the revision? – The revised statements acknowledge that the use of time-varying parameters may be needed and a few references are provided to illustrate ways of dealing with climate variability and climate change. An Appendix was added to Bulletin 17C that illustrates a statistical approach for detecting change and nonstationarity.

7. Expected Probability. The discussion of Expected Probability was deleted from Bulletin 17C.

Why the revision? - The method is no longer used by the U.S. Army Corps of Engineers.

Finally, a digital version of Bulletin 17C is now available that can be updated in the future.

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