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## **7.1 14Mar2014**

There have been significant enhancements and revisions to the program.

The most notable enhancements are the inclusion of a generalized method-of-moments estimator denoted as the Expected Moments Algorithm (EMA) and a generalized version of the Grubbs-Beck test for low outliers. The previous Bulletin 17B analysis, denoted as 17B is still supported. EMA can accommodate interval data, which simplifies analysis of datasets containing historic or paleo data, multiple low outliers, and uncertain data points while also providing enhanced confidence intervals on the estimated discharges. Analysis results for EMA and B17B should be the same for sites with no historical or censored data.

Low outlier test – There are now two Grubbs Beck test options for identifying low outliers: Single and Multiple. The original Single method (SGB) is the default method for B17B analysis. The new Multiple method (MGB) is the default method for the EMA computations.

EMA computation requires Threshold and Interval data. The program provides default values. These can be viewed and edited on the Input/View program tab where a graphical and tabular presentation of the data is provided.

Frequency plots have been enhanced to include the confidence limits and to identify selected types of peaks (systematic, historic, low outliers.) There are some additional options for customizing individual plots.

Program now computes and reports the Kendall's Tau parameters for the systematic record. For EMA analyses, the at-site estimate of mean square error of Skew is reported. The variance of estimate is reported in the Annual Frequency Curve – Discharges at Selected Exceedance Probabilities table.

A parameter specification file (.psf) is an optional file that contains the parameters the user modified in the session and the names of input and output files. The file can be used as input to specify files and parameters in subsequent sessions.

## **6.0 No version 6 was released.**

## **5.2 01Nov2007**

Corrected problems that caused the program to fail. Failure was most likely to occur at sites that had a small amount of data with outliers.

The ability to output basin characteristics to a new tab-delimited file was added. Both the specification file and GUI have been updated to allow for this capability.

## **5.0 29Jul2005**

There have been a number of changes in PeakFQ. The program produces results equivalent to earlier versions.

A look up table was replaced with actual computations. This may cause some slight differences in the frequency curves and in the frequency curve parameters. Differences should be less than 1 percent.

The 1.50 and 2.33 year floods have been merged into the ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES table and values are now reported for all columns. These floods were previously computed separately from the other floods. The 1.50-

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	<p>flood may vary slightly because of rounding. The 2.33 year flood was not correctly computed in the last version, values may vary, but the difference should be less than 1 percent</p> <p>The program interface has been revised and enhanced. The program now consists of a batch callable program that can be compiled and run under various types of operating systems and a graphical interface that runs under Windows.</p> <p>Confidence limits have been added to the graph. The INPUT DATA SUMMARY table now reports both the Standard error and the Mean Square Error for Generalized Skew. Explanations of minus-flagged discharge, minus-flagged water year, and -8888.0 discharge have been added to the explanation of peak discharge qualification codes below the INPUT DATA LISTING table.</p>
<b>4.1 25Feb2002</b>	<p style="text-align: right;"><b>(kmf)</b></p> <p>Corrected problems with outputting the 1.5 and 2.33 -year flood peaks. Revised code to write summary of statistics to screen for case where input is from a wdm file and the user has selected YES for "pause between stations" and NONE for "additional output".</p> <p>An incorrect subscript caused the program to fail when the program attempted to write an error message indicating problems saving the 1.5 or 2.33 -year peak as attributes in the wdm data set. This could occur if either peak was below the gage base discharge (return code = -9999) or if there was not room to add an attribute to the data set (return code = -103).</p> <p>Corrected the screen that displays the computed statistics and annual flood peak recurrences. The 1.5 and 2.33 -year peaks were incorrectly listed as the 1.25 and 2 -year peaks. The screen was only displayed when the user selected YES for the "pause between stations" option and WDM, WAtstore, or Both for "additional output". In all cases, the correct values were reported in the output file.</p>
<b>4.0 01Dec2000</b>	<p style="text-align: right;"><b>(kmf)</b></p> <p>Changed how systematic frequency curve was being plotted. Added additional information to output files.</p> <p>Had been drawing the systematic frequency curve over the same annual exceedance probability range as the Bulletin 17B frequency curve. The curve is now drawn over the range of the annual peak discharges.</p> <p>The Bulletin 17B estimate for the 1.5 and 2.33 year floods has been added to the Annual Frequency Curve table.</p> <p>The "1" record containing the station number and name has been added to the optional Watstore output file.</p>
<b>14Jun2000</b>	<p style="text-align: right;"><b>(kmf)</b></p> <p>Revised how skew option was handled. There were some problems with how the skew option was handled when multiple data sets were processed and there were some data sets with missing skew options; now warns user and defaults to weighted skew for those data sets.</p> <p>For ascii input, the program will now recognize as the same, station numbers that are identical but positioned differently in the station field. Previously, if the number was the same but the justification in the field was different, the program considered them to be for different sets of data. Related to this change, a leading blank that may have been included in the station number printed in output files has been deleted.</p>

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	<p>There was some reorganization of the code. Moved the plotting subroutine frqplg from j4wdio.f to pkplot.f in the libanne awstat library. The keyboard input subroutines pkintr, gppktb, and mktbbf were moved from peakfq.f to pkkeyb.f. The wdm input and output subroutines input1 and outpt1 were moved from j4wdio.f to pkwdm.f; j4wdio.f no longer exists. Calls to new libanne library routines dsinf1 (found in awstat) and svati4, svatr1, and svatr2 (found in waide) replaced duplicated code segments in peakfq.f and pkwdm.f Calls to new subroutine pklook in pkutil.f replaced duplicated code in peakfq.f.</p> <p>The test data sets have been reordered so that the first 2 tests use the ascii input option and the third test uses the wdm input option. A fourth optional test to export the wdm file from test 3 has been added.</p> <p>There were a number of miscellaneous housekeeping changes. The full 15-character station id is reported for those stations not having a valid integer station number. Replaced stray remaining "wrc"s with "17B". Text files that previously had a suffix of doc or no suffix have been renamed to have a suffix of .txt.</p>
<b>3.0</b>	<b>No version 3 was released</b>
<b>2.4</b>	<b>06Mar1998 <span style="float: right;">(kmf)</span></b>
	<p>There are no corrections made to the actual computations in peakfq, all changes are cosmetic or made to clarify meaning. User's log files may need to be modified for cases that specify no pause and no modifications for Ascii input. Modified steps for building message file to include building the data/test.wdm file, which is otherwise created using the program iowdm as the first step in testing.</p> <p>For Ascii input, the screen that previously indicated processing had been completed for a particular station in the input file is now replaced with a screen that includes a summary of the computed statistics (new subroutine outpt2 in j407xe.f). This screen does not appear if the user selects the Option No pause. The test 4 log file was modified to include selection of the No pause option.</p> <p>Previously missing window names have been added to a number of windows that appear when the Input format is Ascii.</p> <p>The first test previously built the test.wdm using the iowdm program. The test.wdm file is used by the second step in testing. When the test.wdm file is available, iowdm does not need to be installed to run test 2.</p>
<b>2.3</b>	<b>07Jan1997 <span style="float: right;">(kmf)</span></b>
	<p>Implemented option to save the computed statistics in the WATSTORE basin characteristics 'card' format. Correction in computation of generalized skew caused by incorrect conversion of degree-minute-second latitude and longitude to decimal degrees. Correction in the y-axis scale for printer plot options. Additions to test data sets. Miscellaneous changes to installation and testing instructions.</p> <p>Corrected problem with integer degrees-minutes-seconds latitudes and longitudes being incorrectly converted to decimal degrees. The resultant values were off by a factor of 10. (Note, condition was very unlikely to occur, the problem was never reported.) peakfq computes generalized skew using latitude and longitude. When the data is read from a WDM file, latitude and longitude may be read as decimal degrees from the attributes LATDEG and LNGDEG or as</p>

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	<p>integer values of the format degrees-minutes-seconds from the attributes LATDMS and LNGDMS. Data stored in a wdm file will usually have latitude and longitude in decimal degrees and there will be no problem. In order for the data set to contain LATDMS and LNGDMS, the user would have to manually enter these values. This condition does not occur when peaks are read from an ascii file or manually entered.</p> <p>In some instances, when the y-axis scale value was 1.0 or smaller, the value printed was incorrect. This was observed to occur in the pc version when the minimum value for the y scale should have been 1.0 but was printed as .3 (note the data was actually correctly scaled, just mislabeled.) The method used to compute this value has been modified.</p> <p>The option to save the computed statistics in the WATSTORE basin characteristics 'card' format has been implemented. Previously, this output option was not available.</p> <p>The input data for test 2 (and the resulting output file) have been modified so that the data for Back Creek agrees with the example data in Bulletin 17B. The log file for test 4 was modified to include the WATSTORE basin characteristics output option.</p>
<b>2.2 27Oct1995</b>	<p style="text-align: right;"><b>(kmf)</b></p> <p>miscellaneous changes, most notably:</p> <p>Correct problem where the option flag for including regulated flows was not always correctly set.</p> <p>option added under Option/Option to allow user to specify that they want to [yes/no] pause between stations. Useful when many stations are being processed.</p>
<b>2.0 Feb1994</b>	<p style="text-align: right;"><b>(wrk)</b></p> <p>A new interpolation method for looking up frequency-curve ordinates (discharges) for given exceedance probabilities. The new method uses computations equivalent to straight- line interpolation on probability paper, whereas the original method was equivalent to straight-line interpolation on ordinary arithmetic (rectangular) graph paper. The interpolations are performed only when the flood record contains low outliers, zero flows, or flows below the gage base. The magnitude of the difference between the two methods can be assessed roughly by plotting the frequency curves tabulated in Bulletin 17-B for skews of 0 and 1.0 on ordinary arithmetic graph paper and comparing straight-line interpolation between the plotted points with a smooth curve drawn through the points. (For skew of -1.0, the results can be obtained by interchanging the upper and lower tails of the +1.0-skew curve.)</p> <p>The new method is considered to be an improvement over the original method. However, the original method also conformed to Bulletin 17-B, and the results of the original method are not considered significantly different from those of the new method. In interpreting or applying the results of any flood frequency computation, the statistical-sampling uncertainty entailed by the length of the flood-data record should be kept in mind. The magnitude of this uncertainty is indicated by the confidence limits printed along with the Bulletin-17B flood magnitude estimates.</p> <p>Results computed with the February 1994 version (and later) of the peakfq program are based on the new interpolation method. Results from earlier versions of the program are still usable.</p>