Big Blue River Region

This region was developed from stations in the Big Blue River Basin, which includes parts of southeastern Nebraska and northeastern Kansas (figs. 1 and 8). It is the same as Beckman's Region 5 (1976, p. 10–11).

Equations for the Big Blue River Region (table 8) are based on data from 32 stations with at least 10 years of record and *TDA*s of 2.0 to 4,450 mi^2. The explanatory variables, *TDA*, average maximum soil slope (*MSS*), and stream density (*SD*) are significant for all equations. *SF* is significant for all equations except Q_2, and *TTP* is significant only for Q_{10} and smaller. Except for the Q_2 equation, SEE*s* are lower than Beckman's Region 5 equations (1976, p. 60), especially for equations Q_{25} and larger.

Application of Equations

The applicability of each of the regional peak-flow frequency equations is limited to the range of values of the drainage-basin characteristics used to develop the equations. The minimum and maximum values of the characteristics used to develop the equations are listed in tables 2–8. For the best compatibility with the equations, drainage-basin characteristics should be determined using the same scale and type of data used in the development of the equations. The same method of quantification (GIS/Basinsoft) also should be used for the measurement of *MCS* and *BS*. For equations that have different explanatory variables for the various frequencies, judgment must be used, because predicted peak flows may not always increase for successively larger frequencies. One approach might be to compute estimated peak-flow values from the equations for each recurrence interval and then plot the results on probability paper. A smoothed curve then could be drawn through the points, perhaps giving more influence to points with lower SEEs.

Table 8. Peak-flow equations for the Big Blue River Region

[AEYR, average equivalent years of record; AME, average model error; ASE, average sampling error; *MSS*, average maximum soil slope, in percent; *Q*, peak discharge, in cubic feet per second, for a given recurrence interval, in years; SEE, standard error of estimate; SEP, standard error of prediction; *SD*, stream density, in miles per square mile; *SF*, shape factor, dimensionless; *TDA*, total drainage area, in square miles; *TTP*, 2–year, 24–hour precipitation, in inches]

Estimation equation	ASE (based on variables in $\log_{10}$ units)	AME (based on variables in $\log_{10}$ units)	SEP (based on variables in $\log_{10}$ units)	SEE (based on variables in $\log_{10}$ units)	SEE (percent)	AEYR (years)
(32 stations with 10 or more years of record)						
$Q_2 = 54.0 TDA^{0.627} (TTP-2)^{1.69} SD^{0.468} MSS^{0.425}$	0.007	0.027	0.185	0.164	39.1	4.9
$Q_5 = 160 TDA^{0.580} MSS^{0.492} SD^{0.533} (TTP-2)^{1.05} SF^{-0.220}$	.004	.006	.103	.079	18.4	19.6
$Q_{10} = 267 TDA^{0.546} MSS^{0.534} SF^{-0.264} SD^{0.511} (TTP-2)^{0.790}$	.004	.002	.075	.044	10.2	49.7
$Q_{25} = 463 TDA^{0.500} MSS^{0.618} SF^{-0.360} SD^{0.631}$	.004	.002	.075	.041	9.5	69.2
$Q_{50} = 607 TDA^{0.491} MSS^{0.638} SF^{-0.372} SD^{0.617}$	.005	.002	.081	.045	10.3	71.2
$Q_{100} = 764 TDA^{0.483} MSS^{0.656} SF^{-0.382} SD^{0.601}$	.006	.003	.091	.052	12.1	67.2
$Q_{200} = 936 TDA^{0.477} MSS^{0.672} SF^{-0.389} SD^{0.584}$	.006	.004	.101	.061	14.1	61.8
$Q_{500} = 1,190 TDA^{0.469} MSS^{0.692} SF^{-0.396} SD^{0.557}$	.008	.005	.116	.074	17.2	55.0

APPLICABLE RANGES OF VARIABLES: *TDA* 2.03–4,450; *TTP* 2.62–3.35; *SD* 0.14–1.39; *MSS* 1.9–14.5; *SF* 0.13–7.60

NOTE: *SD* is data-scale dependent.