Lesson 34: Regional Flood Analysis
Iowa Examples

Streamgage Sites (2013 study)

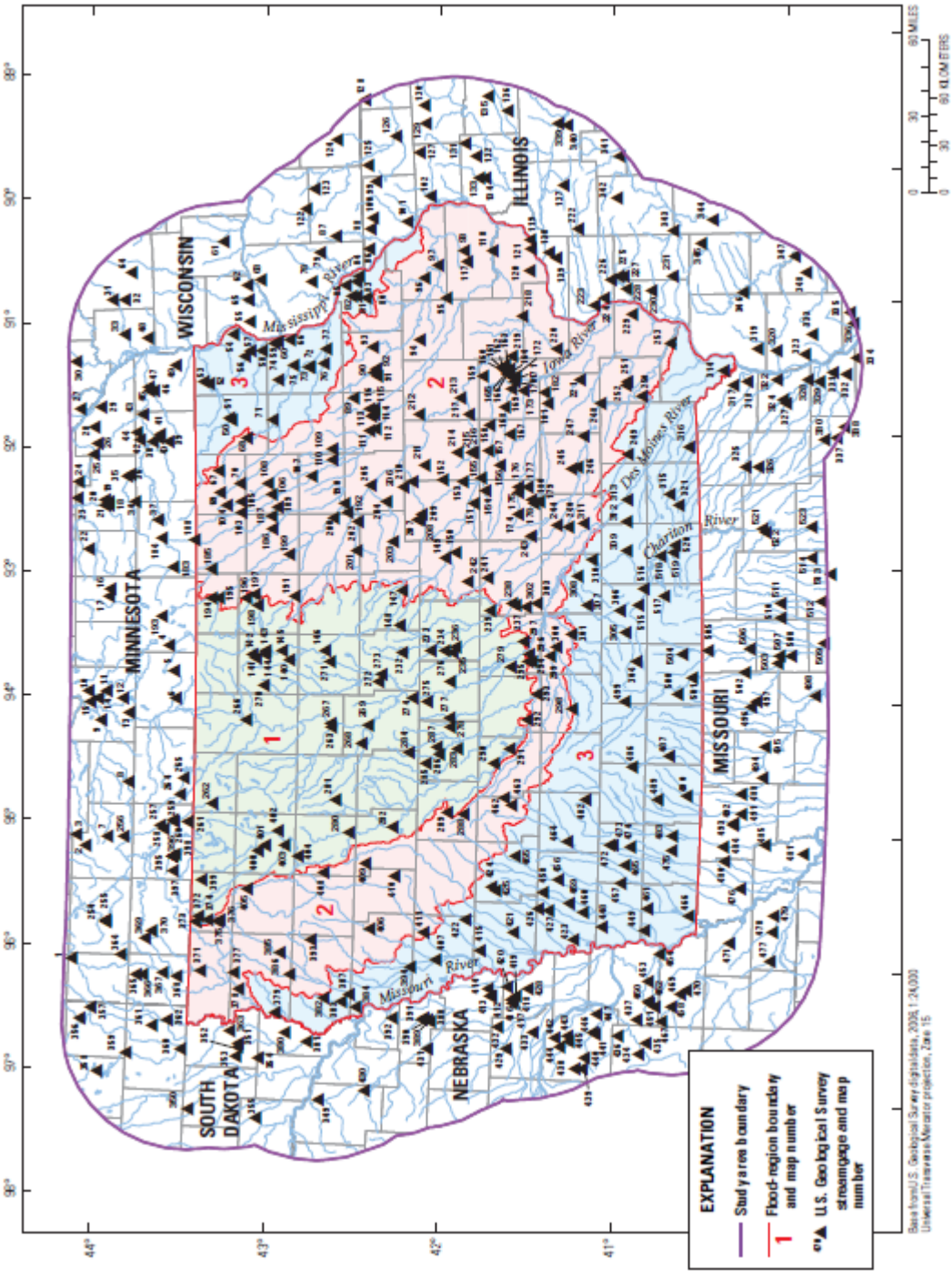
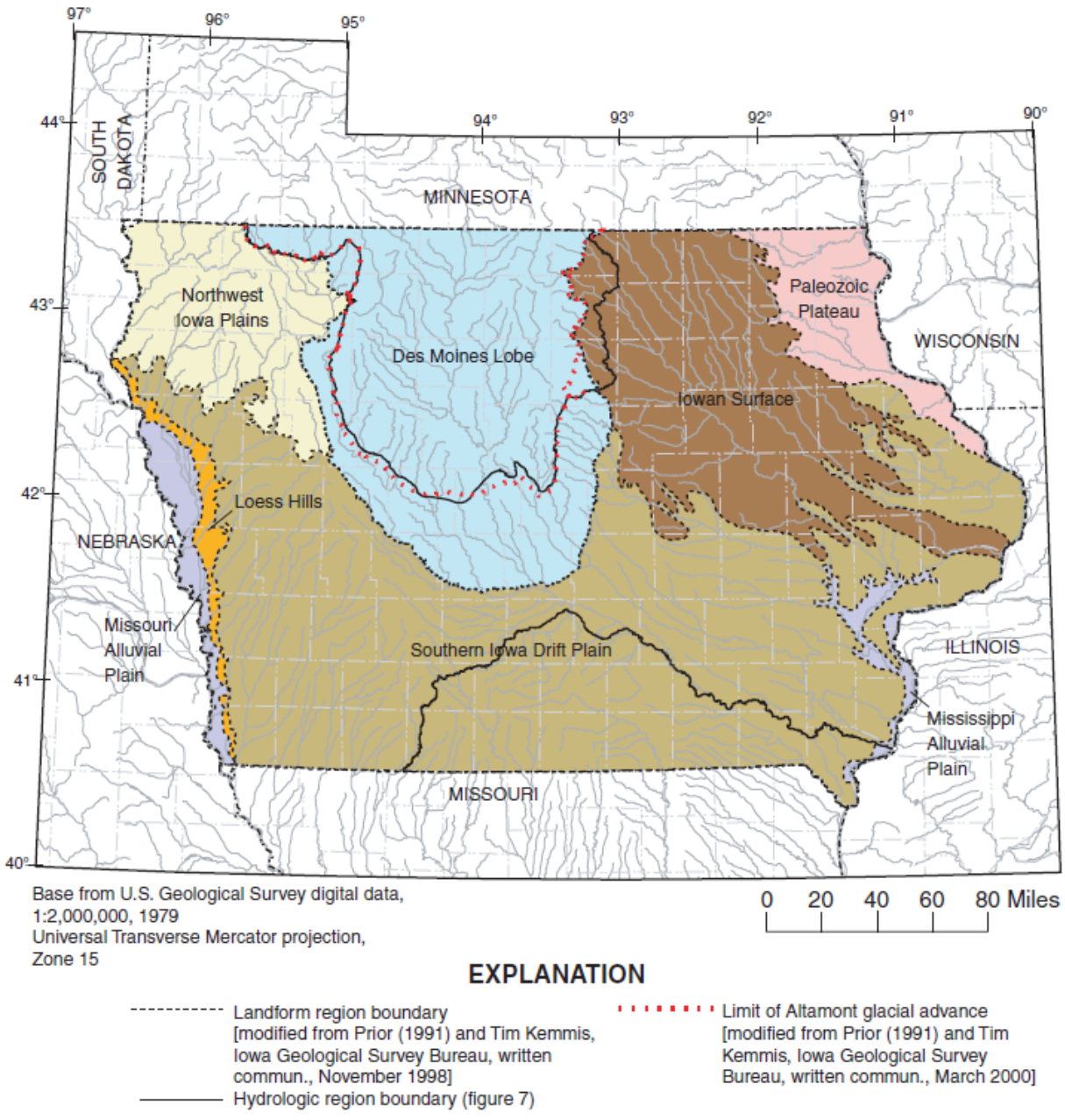


Figure 1. Location of flood regions and streamgages evaluated for use in the regional skew analysis and annual exceedance-probability regressions for Iowa.

Lesson 34: Regional Flood Analysis
Iowa Examples

Regional Delineation (2001 study)



Lesson 34: Regional Flood Analysis
Iowa Examples

Regional equations (2001)

Table 4. Flood-frequency estimation equations for Region 2

[SEE, standard error of estimate; SEP, average standard error of prediction; EYR, equivalent years of record; Q, peak discharge, in cubic feet per second for recurrence interval, in years, indicated as subscript; DA, drainage area, in square miles; MCS, main-channel slope, in feet per mile; DML, Des Moines Lobe, ratio of basin area within Des Moines Lobe landform region to total area of basin]

Estimation equation	SEE (percent)	SEP (percent)	EYR (years)
(One-variable equations; number of streamflow-gaging stations = 188)			
$Q_2 = 182\ DA^{.540}$	43.0	44.6	3.6
$Q_5 = 464\ DA^{.490}$	31.2	38.1	7.9
$Q_{10} = 728\ DA^{.465}$	26.9	35.4	13.5
$Q_{25} = 1{,}120\ DA^{.441}$	25.2	34.4	20.5
$Q_{50} = 1{,}440\ DA^{.427}$	25.6	34.8	24.0
$Q_{100} = 1{,}800\ DA^{.415}$	26.8	35.6	25.9
$Q_{200} = 2{,}200\ DA^{.403}$	28.6	36.7	26.5
$Q_{500} = 2{,}790\ DA^{.389}$	31.4	38.4	26.0
(Three-variable equations; number of streamflow-gaging stations = 188)			
$Q_2 = 52.2\ DA^{.677}\ MCS^{.316}\ (DML+1)^{-.753}$	37.3	41.7	4.6
$Q_5 = 144\ DA^{.616}\ MCS^{.305}\ (DML+1)^{-.653}$	25.4	34.5	11.3
$Q_{10} = 225\ DA^{.590}\ MCS^{.306}\ (DML+1)^{-.601}$	21.6	32.0	19.9
$Q_{25} = 337\ DA^{.567}\ MCS^{.309}\ (DML+1)^{-.567}$	20.4	31.3	29.5
$Q_{50} = 430\ DA^{.554}\ MCS^{.311}\ (DML+1)^{-.555}$	21.2	31.9	33.2
$Q_{100} = 531\ DA^{.542}\ MCS^{.313}\ (DML+1)^{-.549}$	22.6	32.9	34.3
$Q_{200} = 641\ DA^{.532}\ MCS^{.316}\ (DML+1)^{-.545}$	24.6	34.4	33.7
$Q_{500} = 800\ DA^{.519}\ MCS^{.320}\ (DML+1)^{-.542}$	27.8	36.5	31.7

Regional equations (2013)

Table 10. Regression equations for estimating annual exceedance-probability discharges for unregulated streams in flood region 2 of Iowa.

[SEP, average standard error of prediction; Pseudo-R^2, pseudo coefficient of determination; SEM, average standard error of model; AVP, average variance of prediction; %, percent; DRNAREA, geographic information system drainage area; DESMOIN, percent of area within Des Moines Lobe landform region; BSHAPE, measure of basin shape]

Annual exceedance-probability equation	SEP (percent)	Pseudo-R^2 (percent)	SEM (percent)	AVP $(\log ft^3/s)^2$
176 streamgages used to develop equations				
$Q_{50\%}=10^{(-49.0+51.2\ x\ DRNAREA^{0.0305})\ x\ (DESMOIN+1)^{-0.069}}$	46.8	91.5	45.7	0.037
$Q_{20\%}=10^{(30.4-27.8\ x\ DRNAREA^{-0.009}\ -0.001\ x\ DESMOIN\ -0.016\ x\ BSHAPE)}$	25.7	96.7	24.4	0.012
$Q_{10\%}=10^{(17.4-14.6\ x\ DRNAREA^{-0.017}\ -0.002\ x\ DESMOIN\ -0.019\ x\ BSHAPE)}$	20.8	97.7	19.3	0.008
$Q_{4\%}=10^{(13.7-10.7\ x\ DRNAREA^{-0.023}\ -0.002\ x\ DESMOIN\ -0.022\ x\ BSHAPE)}$	19.4	97.9	17.6	0.007
$Q_{2\%}=10^{(12.2-9.10\ x\ DRNAREA^{-0.027}\ -0.002\ x\ DESMOIN\ -0.024\ x\ BSHAPE)}$	20.4	97.6	18.5	0.008
$Q_{1\%}=10^{(11.1-7.92\ x\ DRNAREA^{-0.031}\ -0.002\ x\ DESMOIN\ -0.025\ x\ BSHAPE)}$	22.3	96.9	20.3	0.009
$Q_{0.5\%}=10^{(10.5-7.20\ x\ DRNAREA^{-0.034}\ -0.002\ x\ DESMOIN\ -0.026\ x\ BSHAPE)}$	24.9	96.0	22.9	0.011
$Q_{0.2\%}=10^{(9.95-6.60\ x\ DRNAREA^{-0.037}\ -0.002\ x\ DESMOIN\ -0.028\ x\ BSHAPE)}$	28.2	94.7	26.1	0.014