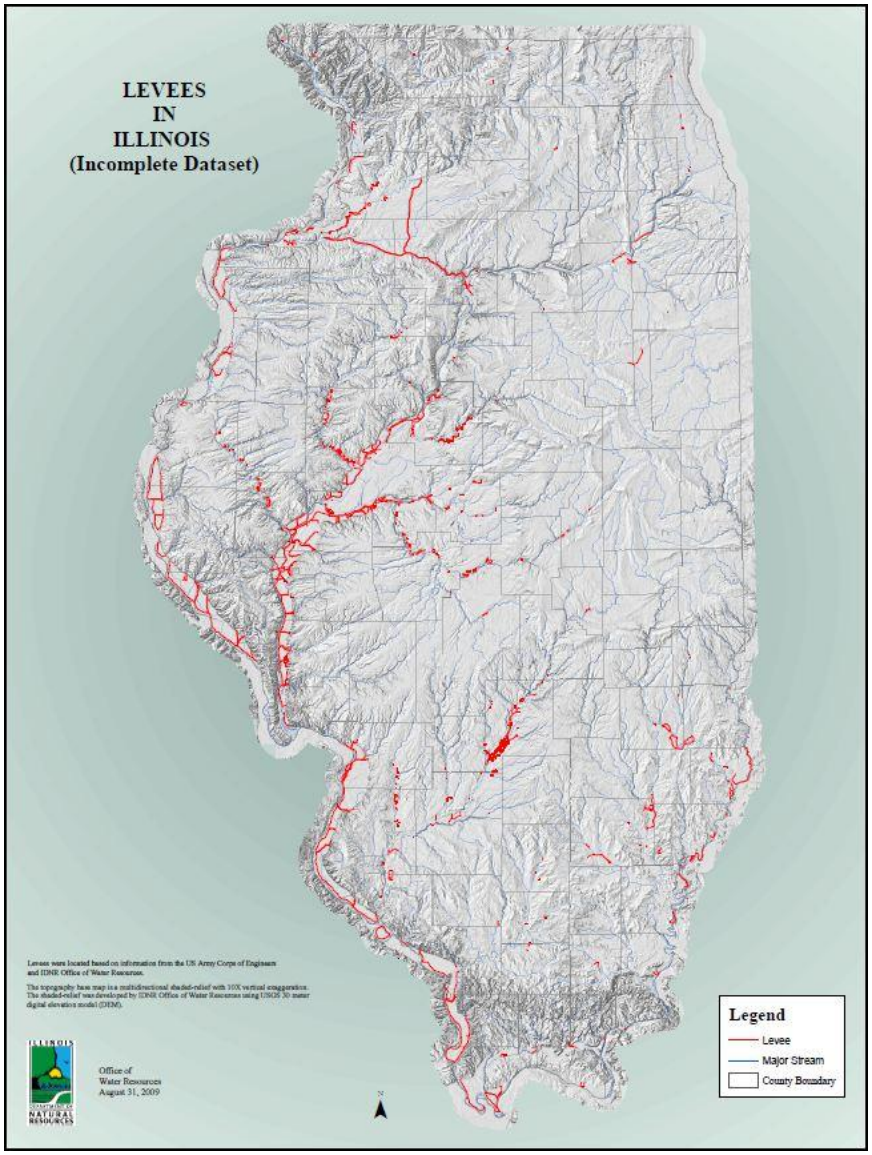
Near Real Time Levee Freeboard Estimates

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

March 15, 2012

Levees in Illinois

- Over 2000 miles of levees in Illinois
- 569 miles of levees on Mississippi River in Illinois



Levee Freeboard

Freeboard – The distance between the top of the levee and the water surface as measured in feet. This measurement can include flood protection measures.

Other Levee Concerns

- Levee overtopping is the largest reason for levee failure
- Other concerns
  - Seepage, boils
  - Levee Breach
  - Closure locations

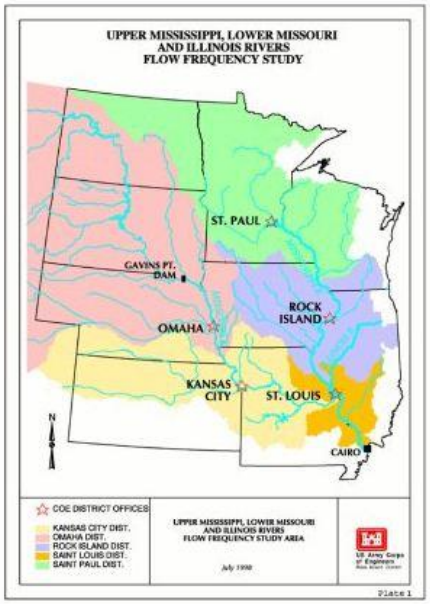
1993 Flood Levee Sheets

										River Flood Forecast Date & Time:	8:00 am 06/23/08					
	MISSISSIPPI RIVER			ILLINOIS DEPARTMENT OF NATURAL RESOURCES												
	FLOOD SURVEILLANCE			OFFICE OF WATER RESOURCES						Note: Critical Elevation is based on D.S. adjustment unless noted in "remarks"						
				REFERENCE GAGE									SITE			
	LOCATION	RM FROM	PROTECTED	NAME &	HISTORICAL	CRITICAL	6/23/2008 0:00	FORECAST		6/23/2008 0:00	FORCASTED		CRITICAL	SITE	6/23/2008 0:00	FORECAST
	Levee Dist/TOWN	RM TO	TOWNS	DATUM	STAGE & DATE	STAGE	STAGE	STAGE & DATE		FREEBOARD	FREEBOARD	REMARKS	ELEVATION	ADJUSTMENT	ELEVATION	ELEVATION
86	Sny L&D D	289.5		DAM 24	37.7	37.1	36.65	36.8		0.45	0.3	Kiser Div. to 6 Mile Ck	459.1	7.7	466.38	466.5
87	CELL 3	273.2		422	7/29/93			6/23/2008				39.85 - top of levee at US Rt 54		0.0	458.65	458.8
88	Sny L&D D	273.2		DAM 24	37.7	38.1	36.65	36.8		1.45	1.3	6 Mile Ck to End	456.7	0	458.65	458.8
89	CELL 4	262.5		422	7/29/93			6/23/2008				39.2 - top of levee at RM 271		-3.4	455.25	455.4
90	HAMBURG	258.8		DAM 25	39.6	30.2	36.32	36.7		-6.12	-6.5	30.4 - 4 houses water on foundati	443.79	6.8	450.21	450.6
91		258.3		407.09	8/1/93	NO LEVEE		6/25/2008					NO LEVEE	6.5	449.91	450.3
92	GRAFTON	219.2		GRAFTON	38	23.0	29.35	29.5		-6.35	-6.5		426.79		433.14	433.3
93		218.0		403.79	8/1/93	NO LEVEE		6/25/2008					NO LEVEE	0.0	433.14	433.3
94	CHAUTAUQUA	215.7		GRAFTON	38	27	29.35	29.5		-2.35	-2.5	430.0 -Access to Rt 100	430.29	-0.5	432.64	432.8
95		215.7		403.79	8/1/93	NO LEVEE		6/25/2008				440.0 - Homes flood		-0.5	432.64	432.8
96	ELSAH	214.3		GRAFTON	38	28	29.35	29.5		-1.35	-1.5	429.6 -Access to Rt 100	431.09	-0.7	432.44	432.6
97		214.3		403.79	8/1/93	NO LEVEE		6/25/2008				439.8 - 8 Homes flood		-0.7	432.44	432.6
98	ALTON	204.4		MELVIN PRICE	42.3	32	31.65	31.8		0.35	0.2		428.28	0.8	427.93	428.1
99		200.9		395.48	8/1/93	NO LEVEE		6/25/2008					427.48	0	427.13	427.3
100	Wood River D&L Dis	202.7	Wood River, Roxanna	MELVIN PRICE	42.3	46.7	31.65	31.8		15.05	14.9		442.18	0	427.13	427.3
101		195.0	Hartford, East Alton	395.48	8/1/93			6/25/2008					439.68	-2.5	424.63	424.8
102	Chouteau Island	193.5		ST. LOUIS	49.4	40	37.05	37.2		2.95	2.8		428.34	8.4	425.39	425.5
103	D&L Dist	189.0		379.94	8/1/93			6/25/2008					425.84	5.9	422.89	423.0
104	Metro East Sanitary	195.0	Granite City, E. St. Lolus	ST. LOUIS	49.4	54	37.05	37.2		16.95	16.8		442.64	8.7	425.69	425.8
105	Dist	175.1	& Vicinity,Cahokia, Madison	379.94	8/1/93			6/25/2008					430.24	-3.7	413.29	413.4
106	Prairie DuPont	175.0	E. Carondelet, Dupo	ST. LOUIS	49.4	52.5	37.05	37.2		15.45	15.3	Closure Structure	428.74	-3.7	413.29	413.4
107	D&L Dist	169.0		379.94	8/1/93			6/25/2008				at 50.0	426.14	-6.3	410.69	410.8
108	Fish Lake D&L #8	169		ST. LOUIS	49.4	54	37.05	37.2		16.95	16.8		427.64	-6.3	410.69	410.8
109		166		379.94	8/1/93			6/25/2008					426.74	-7.2	409.79	409.9
110	Columbia D & L #3	166.0	Merrimac, Warnock,	ST. LOUIS	49.4	44.9	37.05	37.2		7.85	7.7		417.64	-7.2	409.79	409.9
111		156.0	Fountain Gap	379.94	8/1/93			6/25/2008					412.54	-12.3	404.69	404.8
112	Harrisonville & Ivy	156.0	Valmeyer, Harrisonville,Maeys	ST. LOUIS	49.4	46	37.05	37.2		8.95	8.8		413.64	-12.3	404.69	404.8
113	Landing D&L Dist #2	140.0	Chalfin Bridge, Fountain	379.94	8/1/93			6/25/2008				THERE ARE NO	404.84	-21.1	395.89	396.0
114	Ft Chartres & Ivy	140.0	Fults	CHESTER	49.7	51	37.97	38.1		13.03	12.9	PHYSICAL BARRIERS	408.65	16.6	395.62	395.8
115	Landing	137.5		341.05	8/6/93			6/25/2008				BETWEEN	407.55	15.5	394.52	394.7
116	Stringtown Fort	137.5	Kidd	CHESTER	49.7	49.3	37.97	38.1		11.33	11.2	THESE DISTRICTS.	405.85	15.5	394.52	394.7
117	Chartres & Ivy Land	130.4		341.05	8/6/93			6/25/2008					401.25	10.9	389.92	390.1
118	Prairie Du Rocher	130.1	Prairie Du Rocher, Modoc	CHESTER	49.7	49.3	37.97	38.1		11.33	11.2		401.25	10.9	389.92	390.1
119	D&L Dist	118.0		341.05	8/6/93			6/25/2008					395.25	4.9	383.92	384.1
120	Kaskaskia Island	115.0	Kaskaskia, Dozaville	CHESTER	49.7	49	37.97	38.1		11.03	10.9	D.S. end of Island	394.05	4	383.02	383.2
121	D&L Dist	111.5		341.05	8/6/93			6/25/2008					392.45	2.4	381.42	381.6
122	CHESTER	110.8		CHESTER	49.7	37	37.97	38.1		-0.97	-1.1		379.45	1.4	380.42	380.6
123		108.0		341.05	8/6/93	NO LEVEE		6/25/2008					377.35	-0.7	378.32	378.5
124	ROCKWOOD	101.5		CHESTER	49.7	43.5	37.97	38.1		5.53	5.4	380 CONTOUR	381.35	-3.2	375.82	376.0

Water Surface Profile Data

US Army Corps
of Engineers
Rock Island District

United States Department of Defense
US Army Corps of Engineers - Rock Island District



Upper Mississippi River System Flow Frequency Study

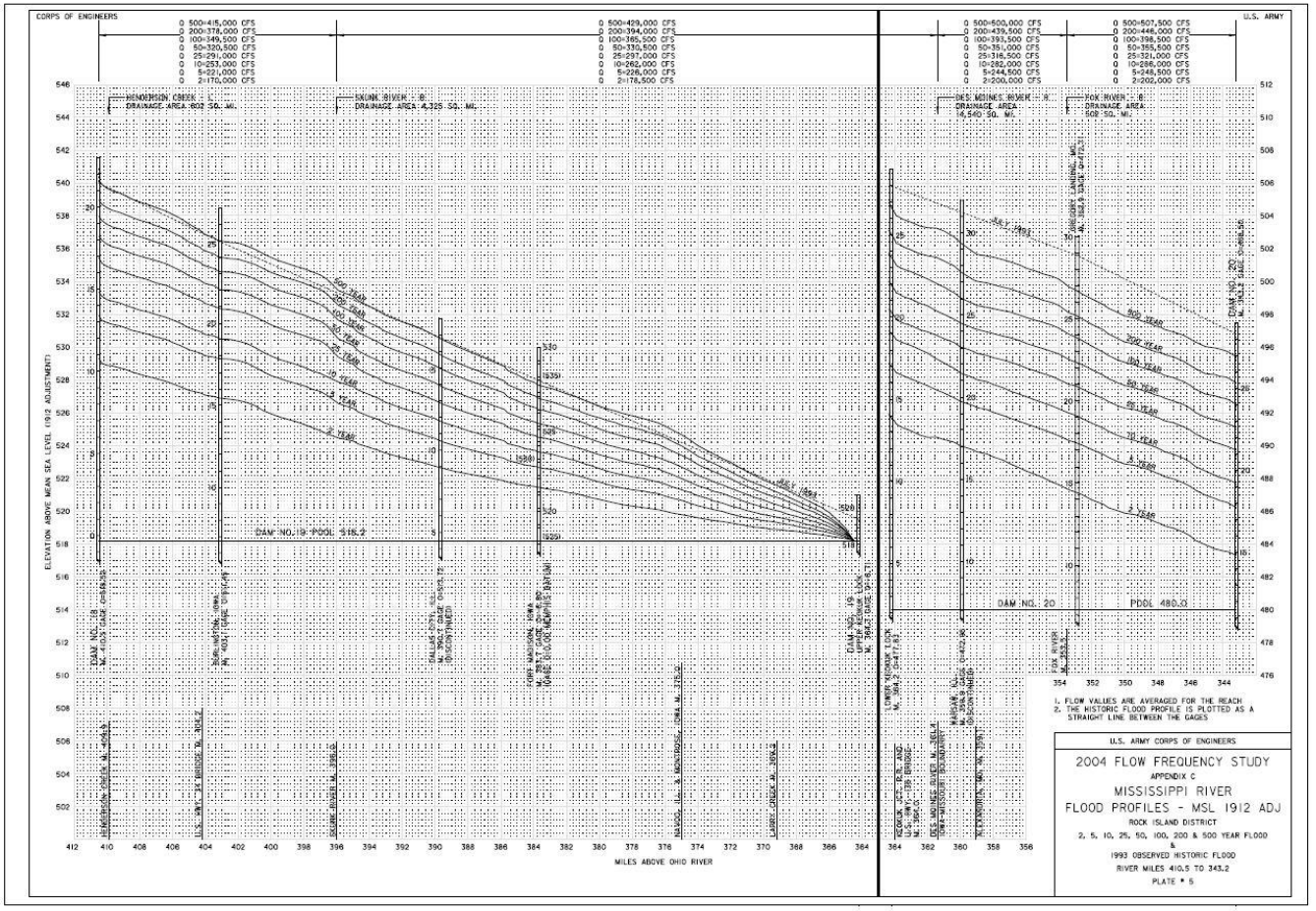
Please Note The study area included the main-stem Upper Mississippi, Lower Missouri, and Illinois Rivers. The Upper Mississippi is that portion of the river above the mouth of the Ohio River and includes the Illinois River. The Lower Missouri is that portion of the river below Gavins Point Dam.

Please direct any questions or concerns you may have with regard to this web page to Mr. Jerry Skalak, UMRS FFS Regional Project Manager, 309-794-5605 or via email: jerry.a.skalak@usace.army.mil. Thank you.

Final Report now available.

You WILL need Acrobat Reader to read the files on this website. For your free copy, click here.

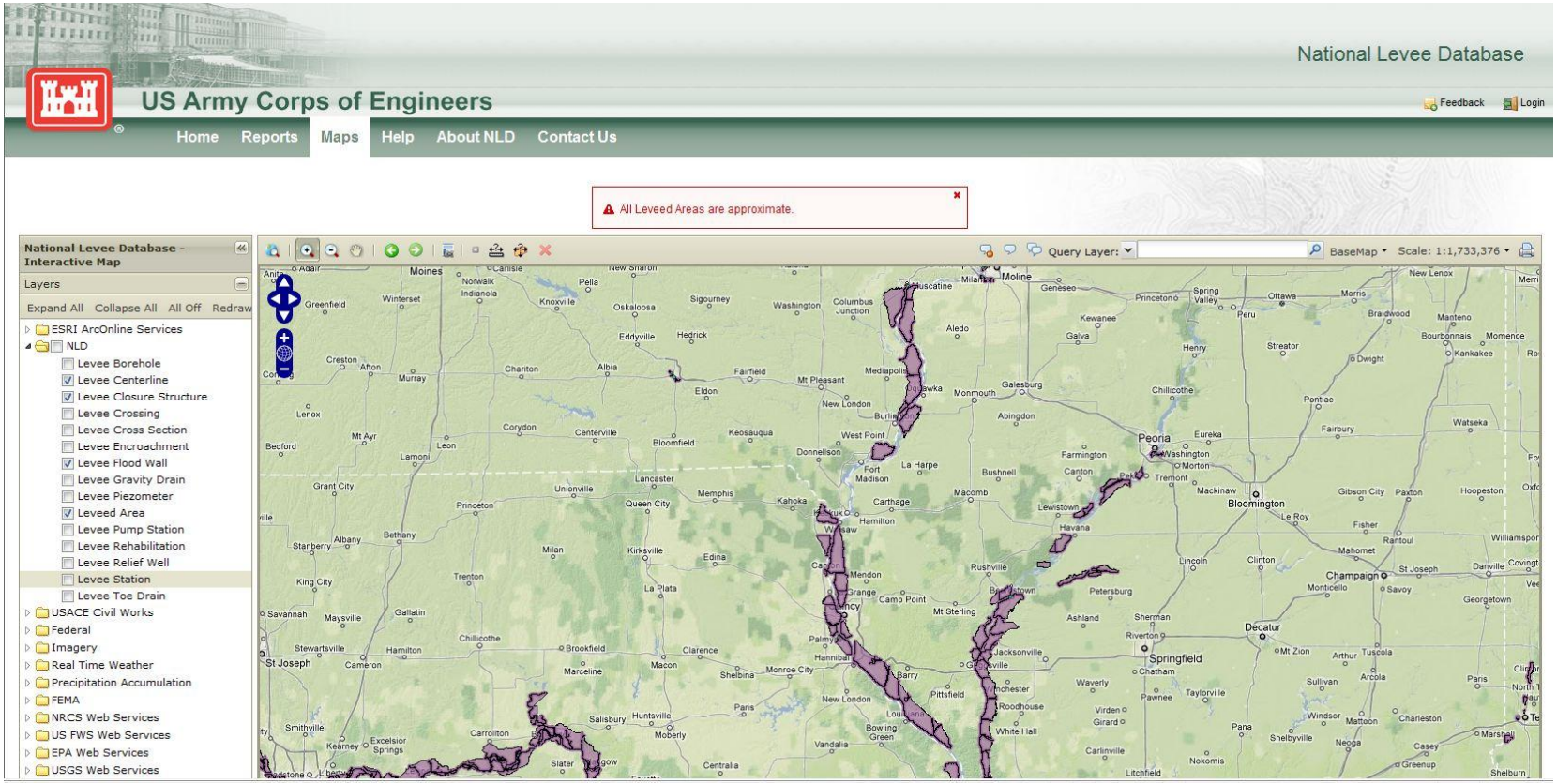
Corps' Flow Frequency Study



Corps UNET Hydraulic Model Profiles – 652 Cross Sections

Top of Levee Survey

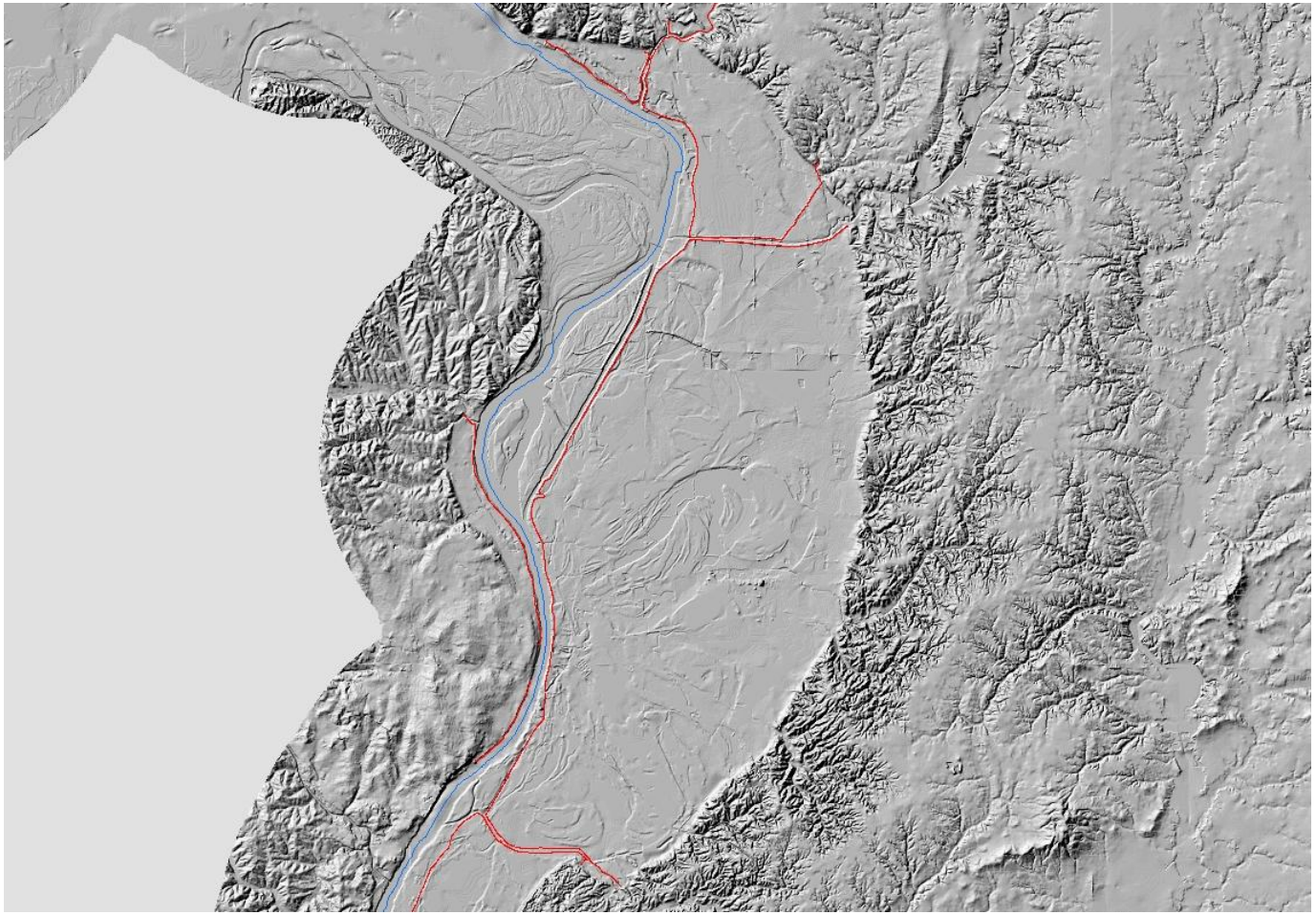
- Rock Island District – January – March 2008
- St. Louis District – 2007



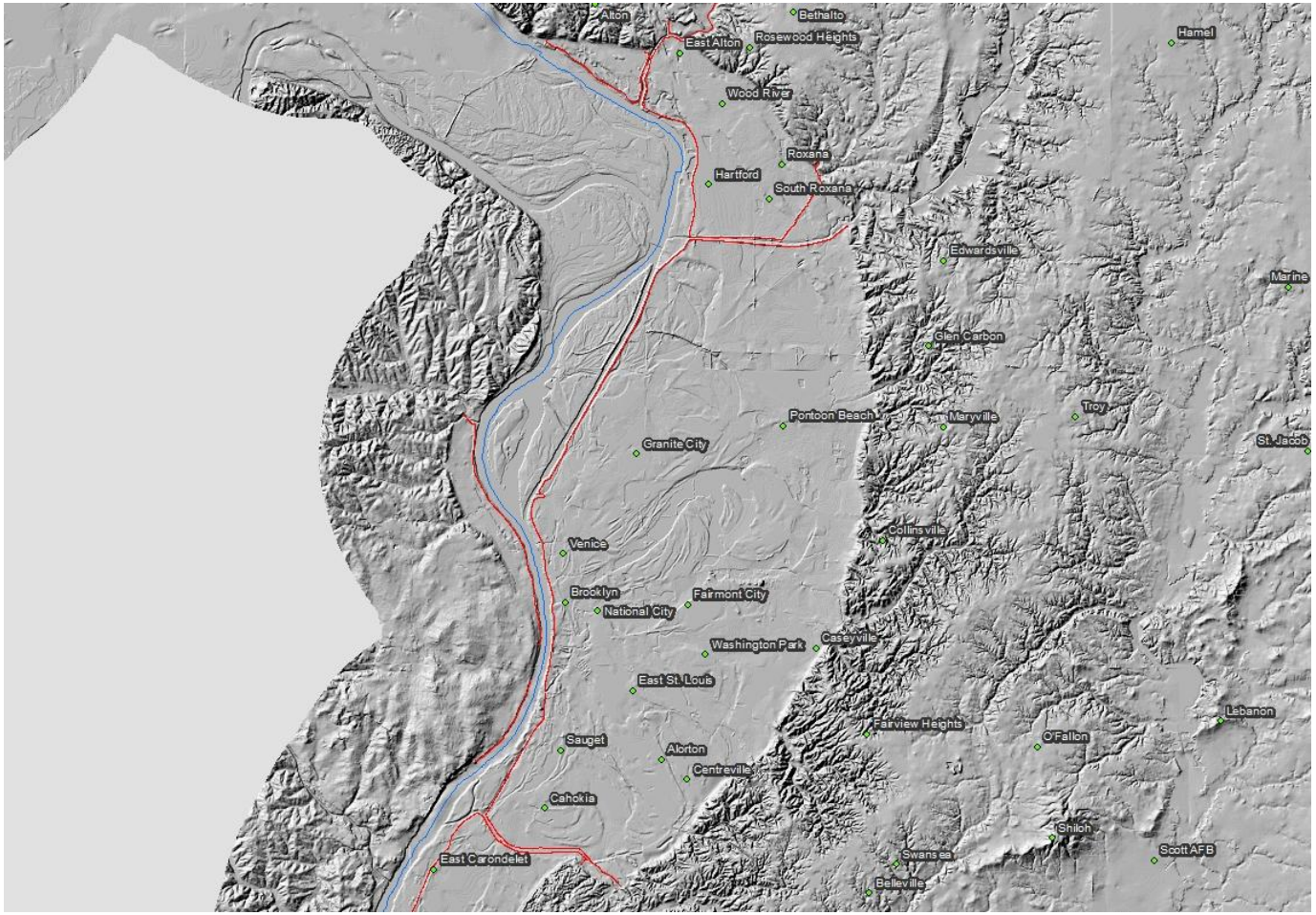
GIS PROCESS

- **Levee Analysis.** Determine low spots or "critical elevations" from levee field surveys
- **Real-Time Mapping.** Calculate free board from National Weather Service river forecast
- **Map Distribution.** Distribute map products to emergency services

Levee Analysis



Levee Analysis



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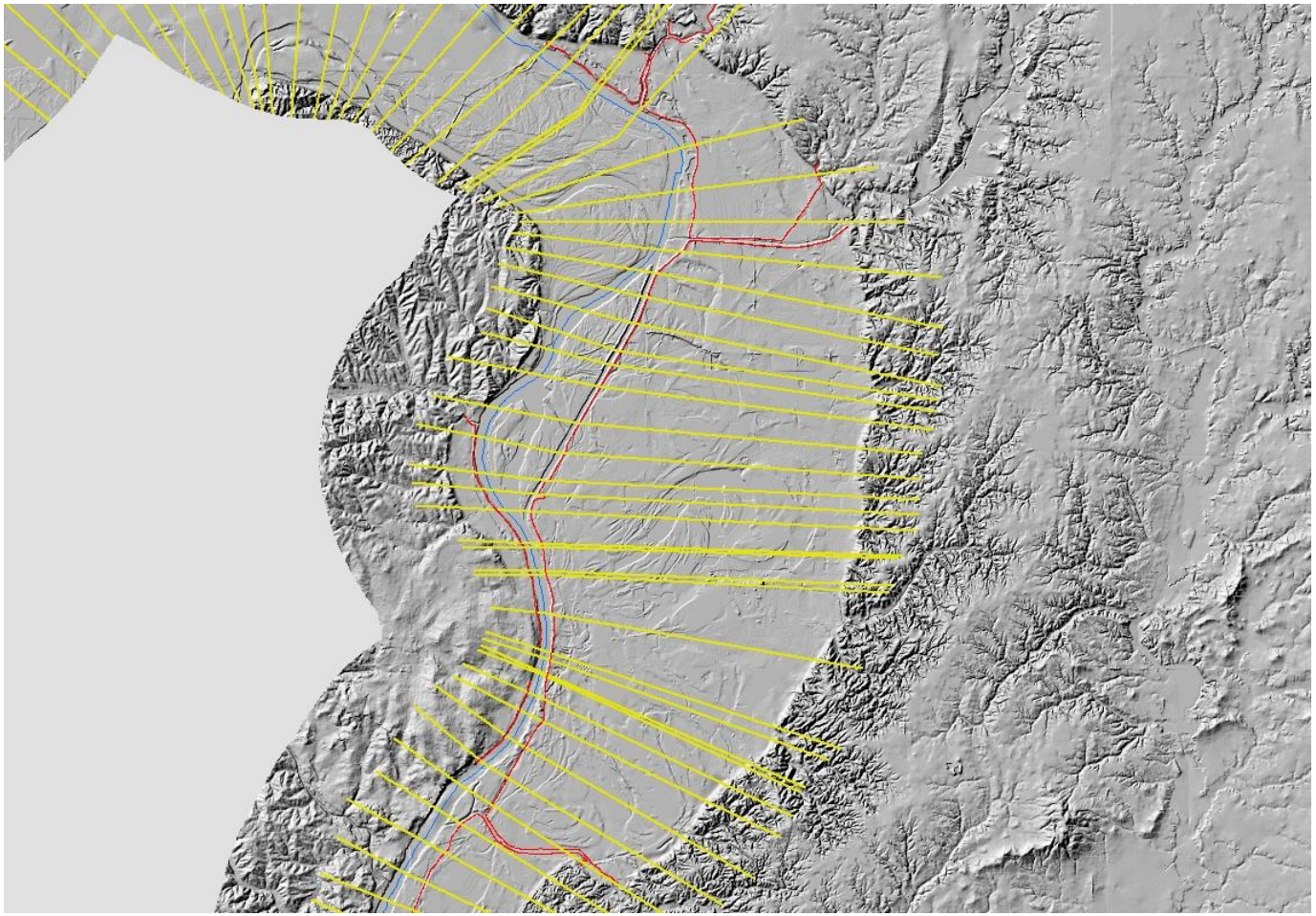
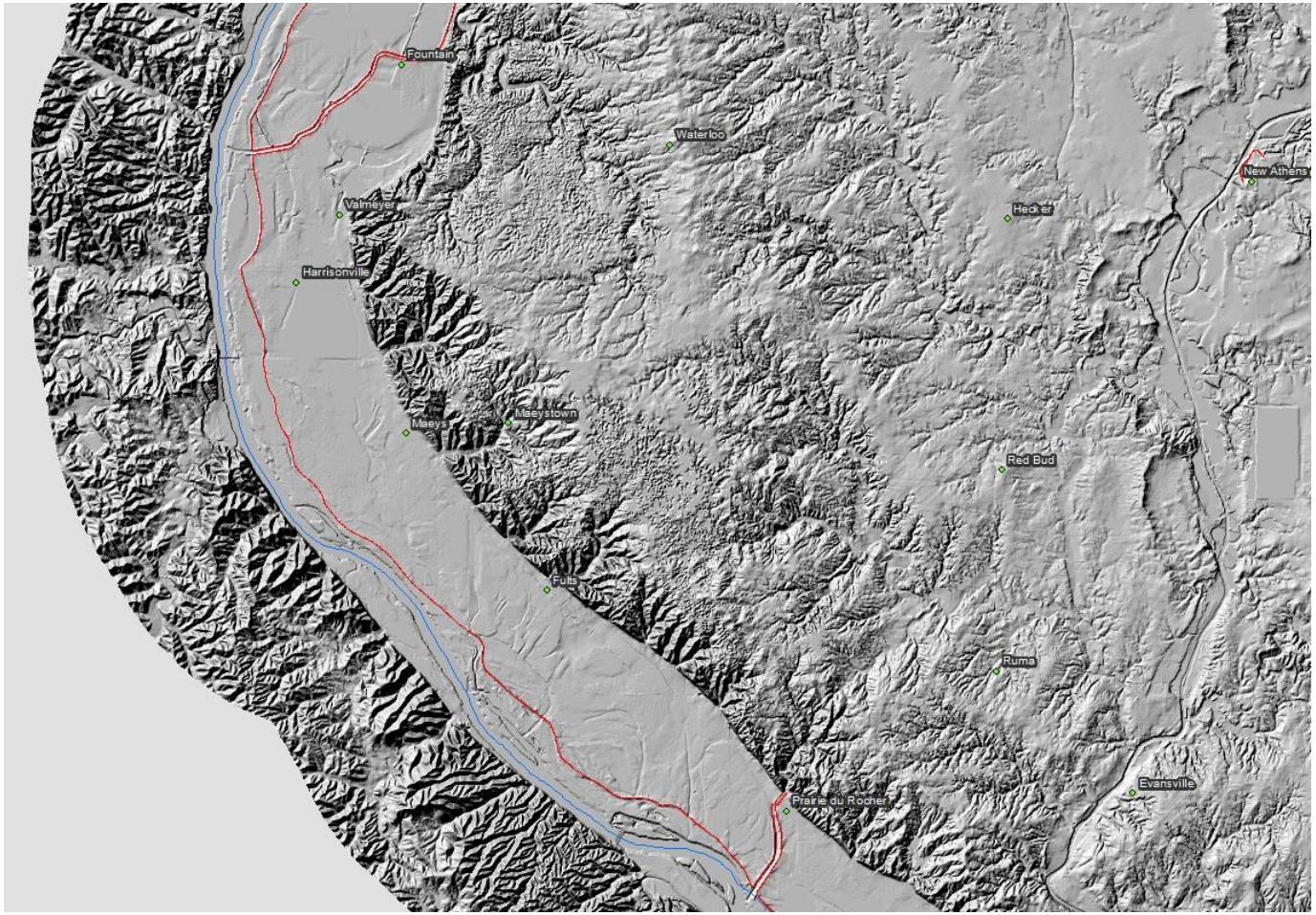
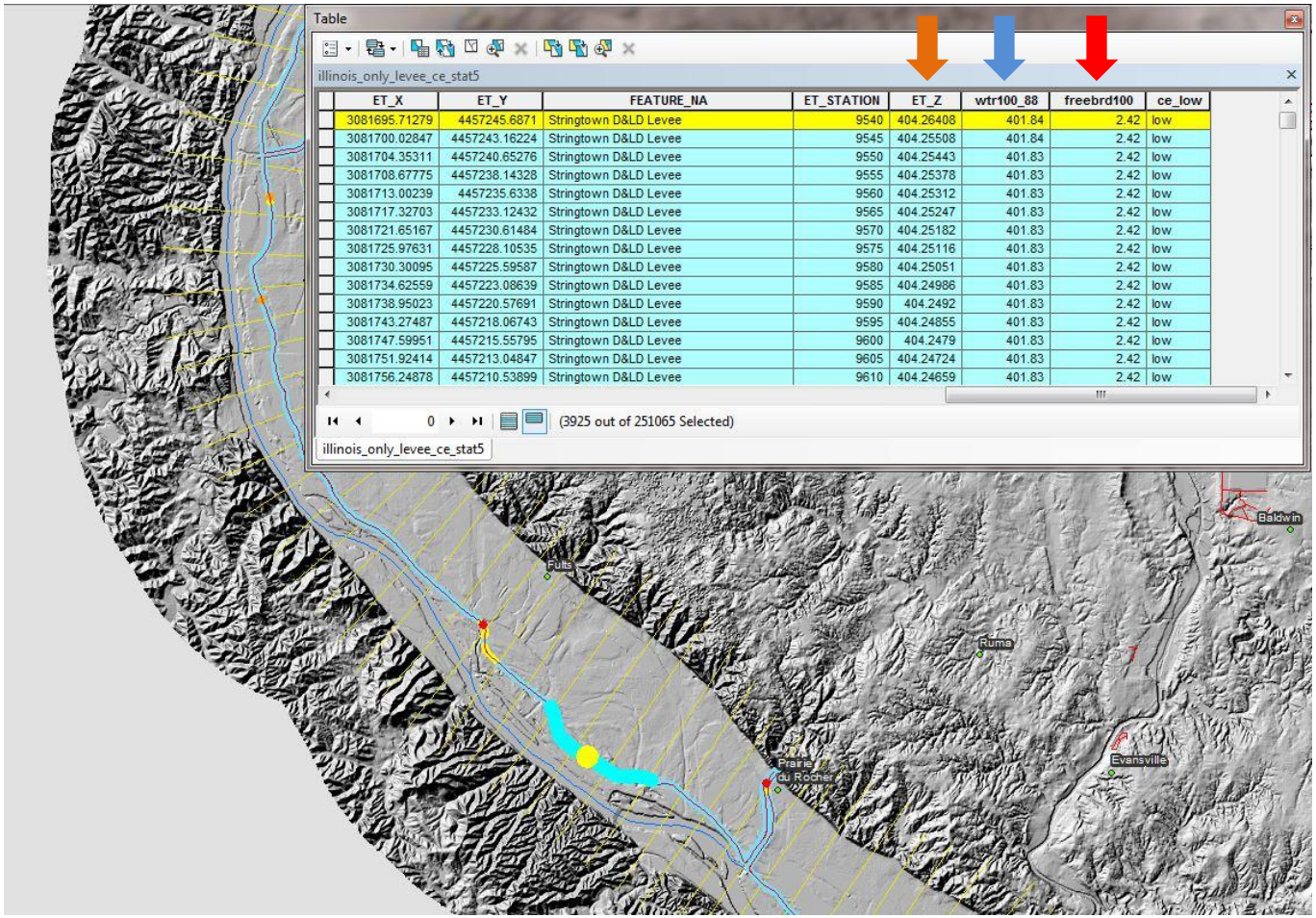


Corps UNET Hydraulic Model Cross Sections

Levee Analysis

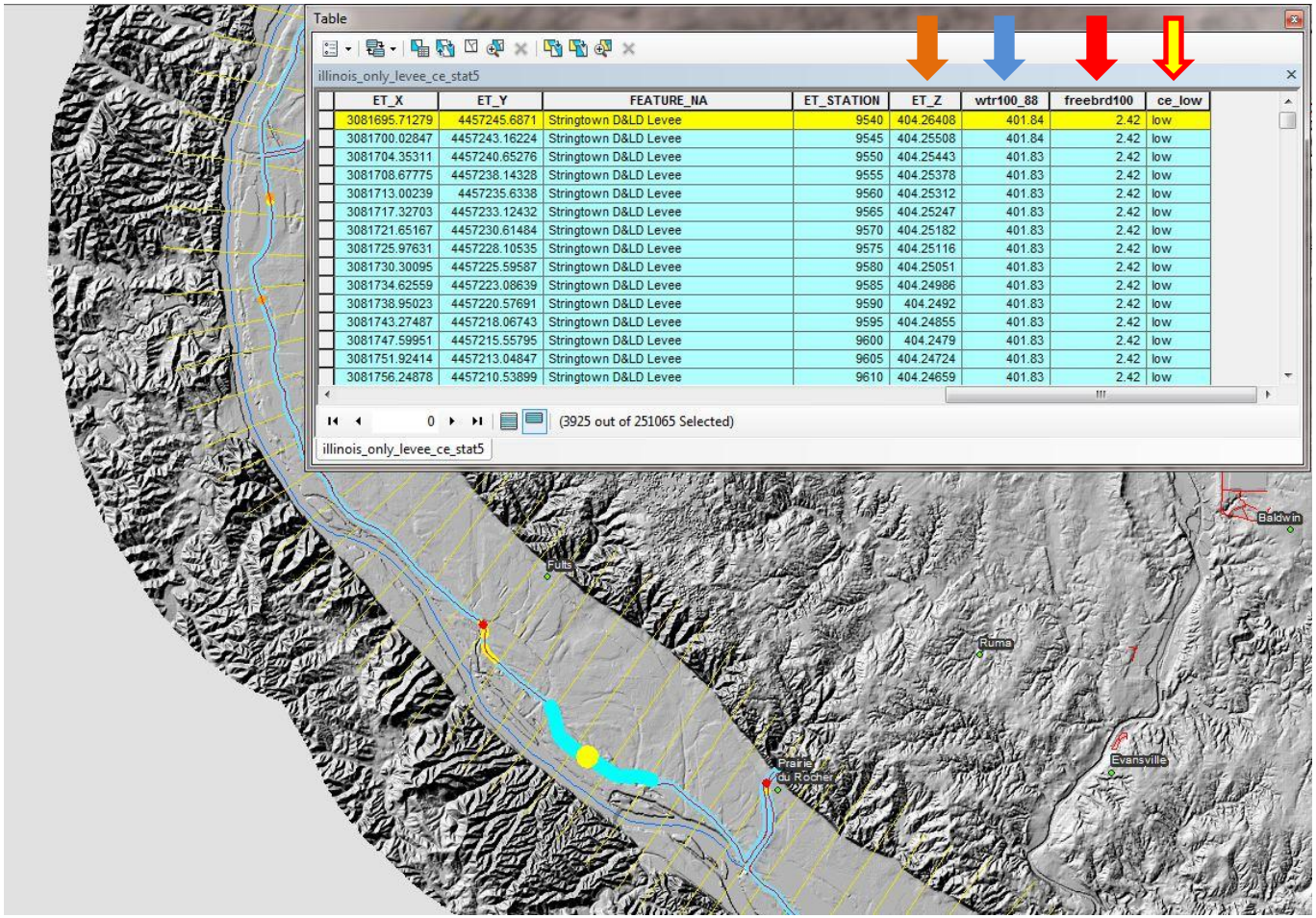


Levee Analysis



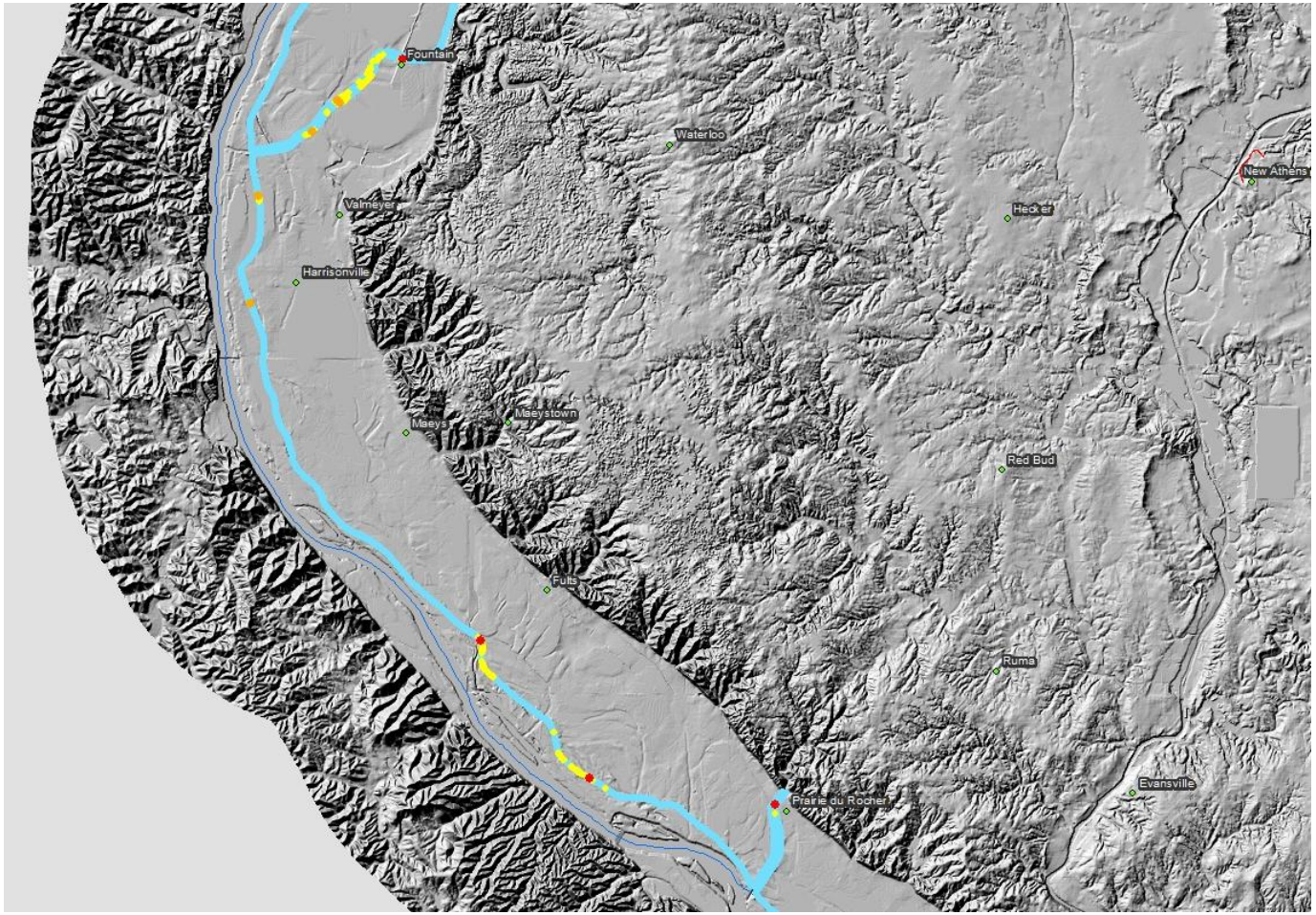
Identify Low Spots From Freeboard Available To 100-Year Profile

Levee Analysis



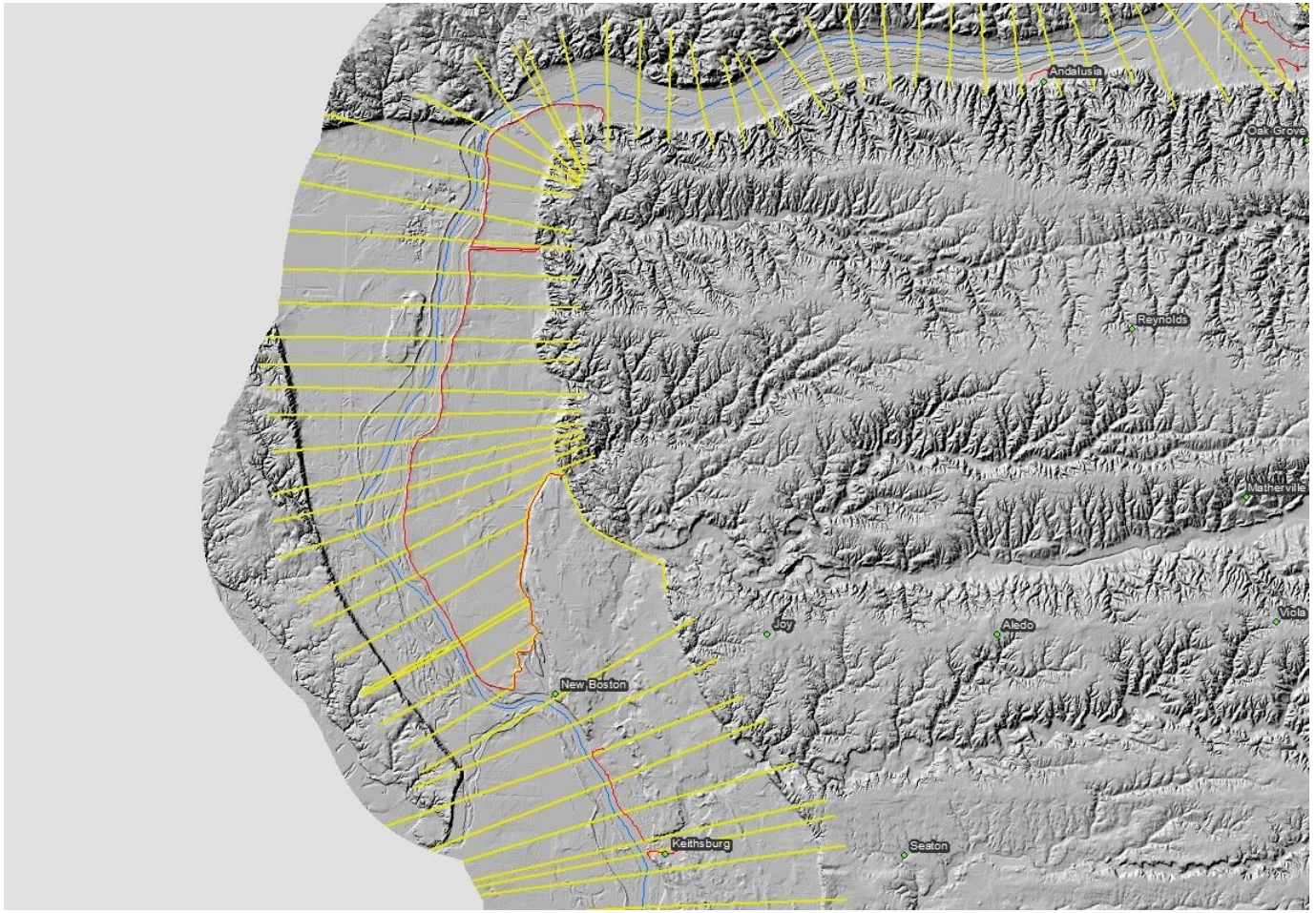
Group Low Points And Identify The Critical Elevation Point

Levee Analysis



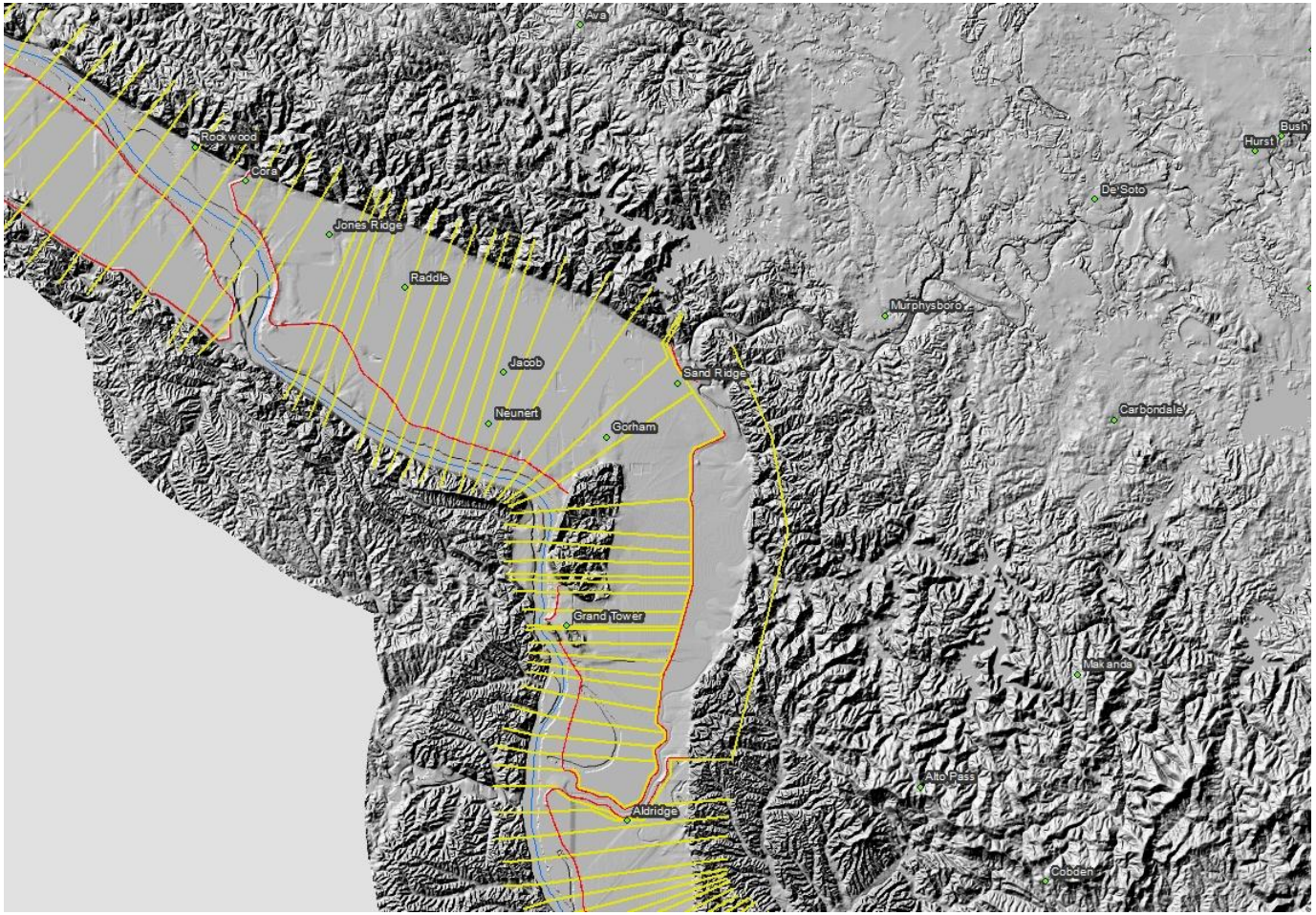
Assess Low Spot Areas Across Functioning Levee

Levee Analysis



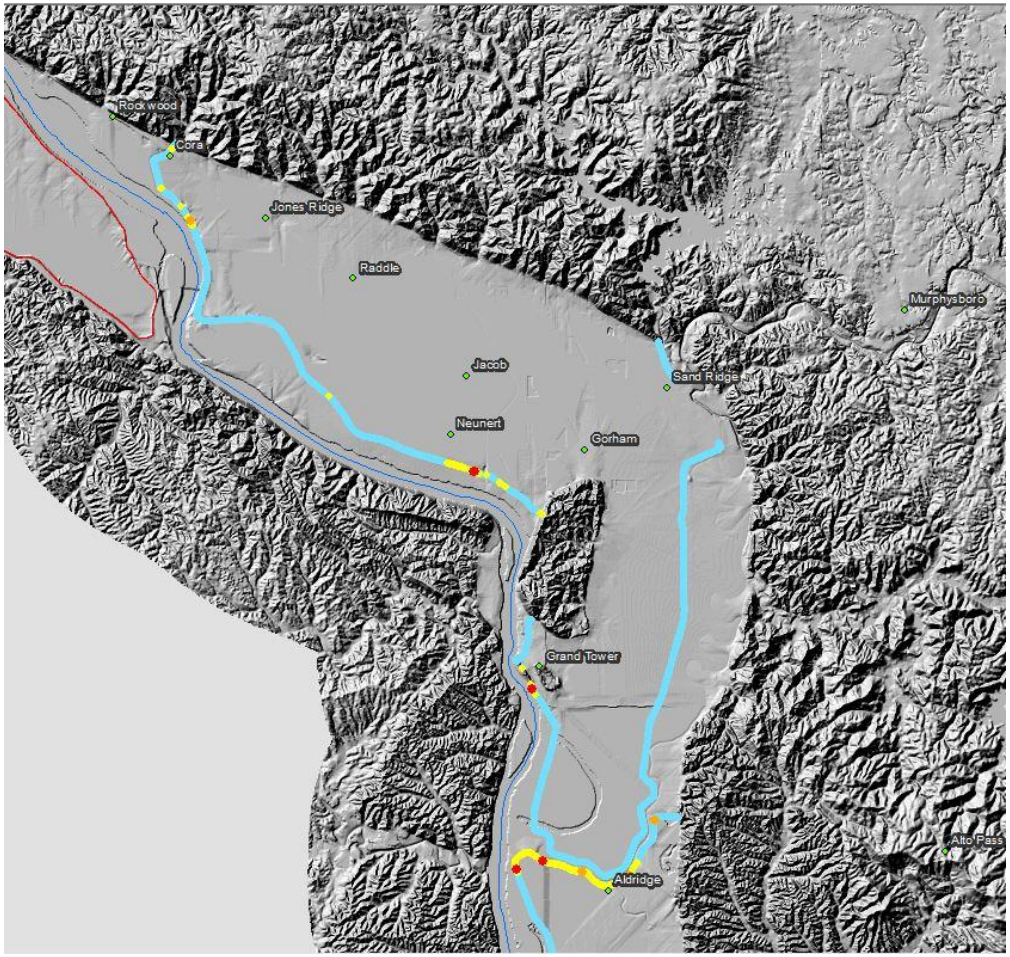
Adjustment For Backwater Situation Example

Levee Analysis



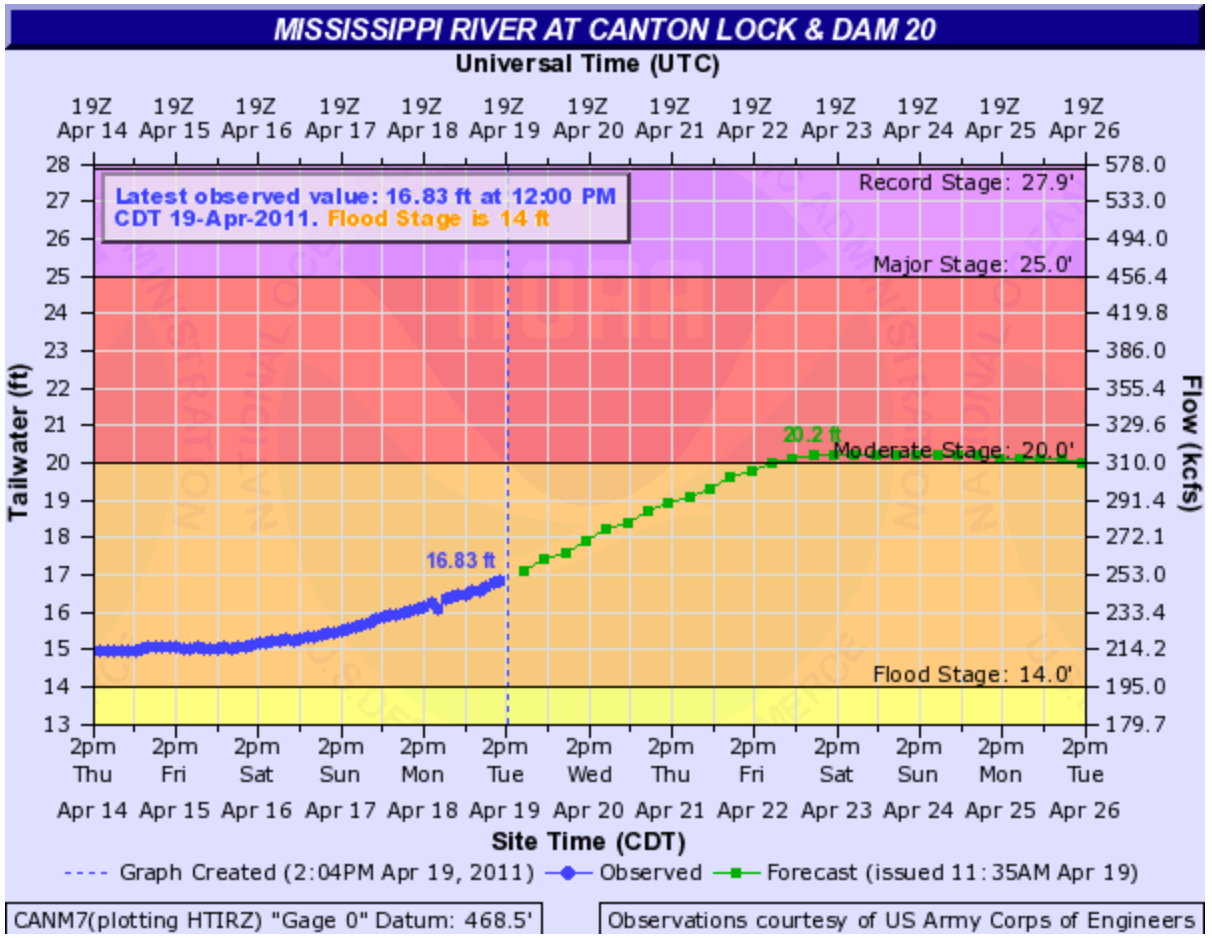
Adjustment For Backwater Situation Example

Levee Analysis



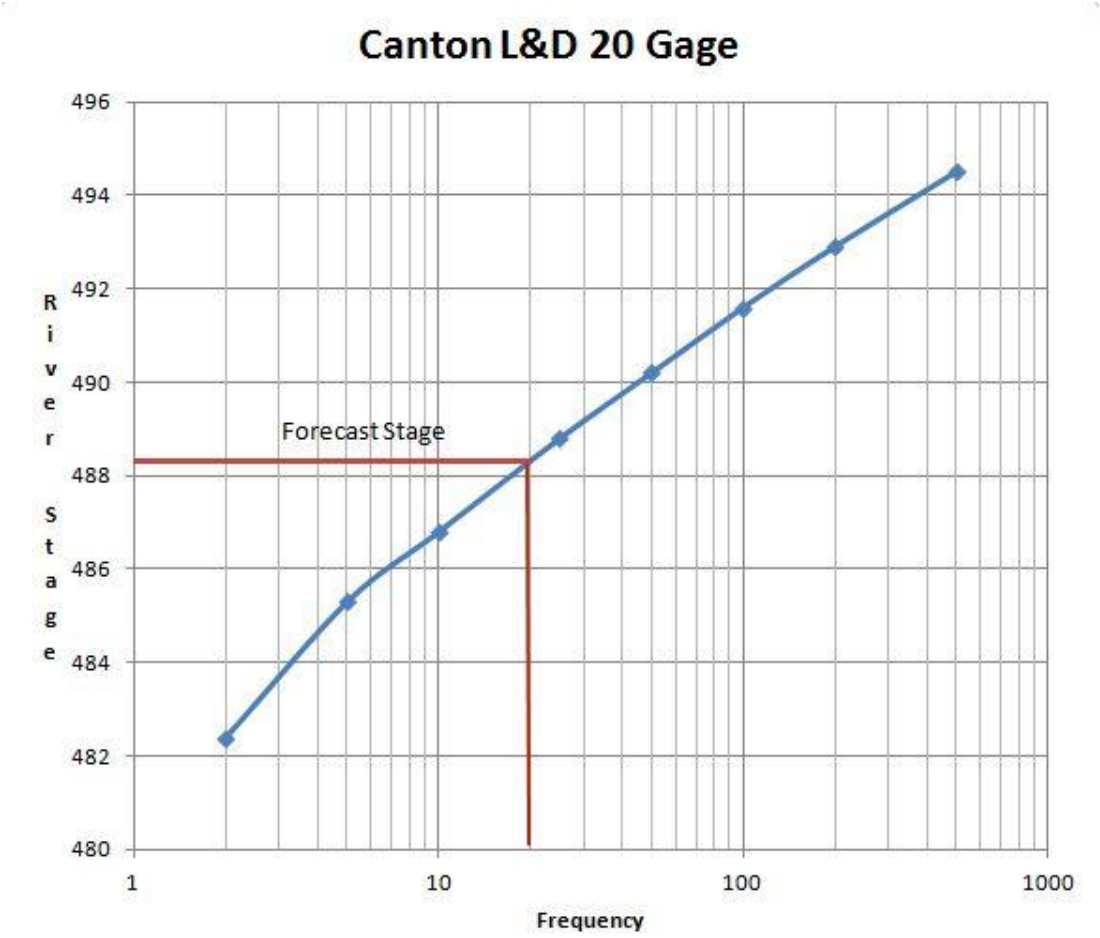
Location And Elevation of Low Spots Are Identified For Each Levee District

Near Real-Time Freeboard Analysis



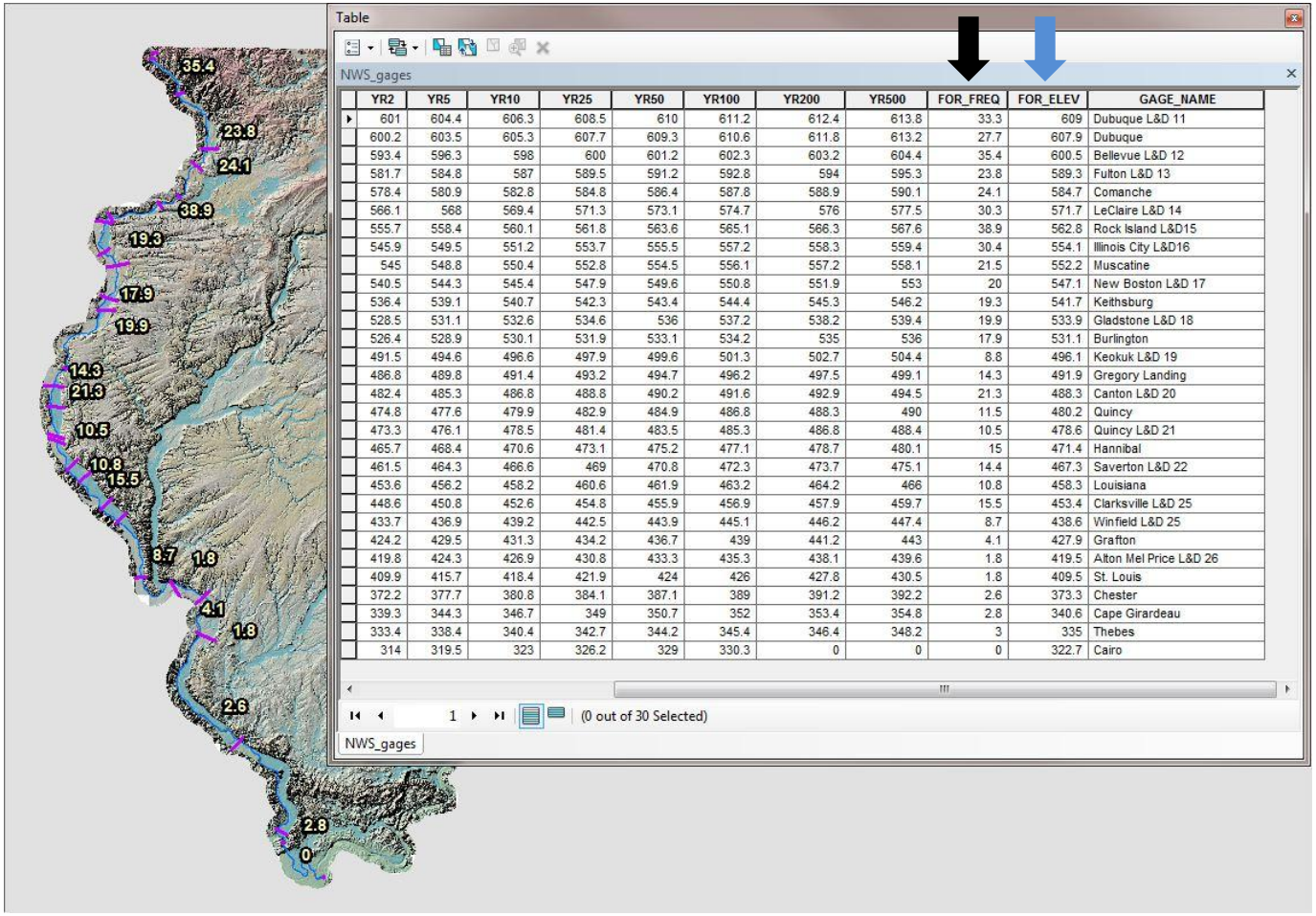
National Weather Service River Forecast

Near Real-Time Freeboard Analysis



UNET Model Rating Curve For Gage Location

Near Real-Time Freeboard Analysis



Table

NWS_gages

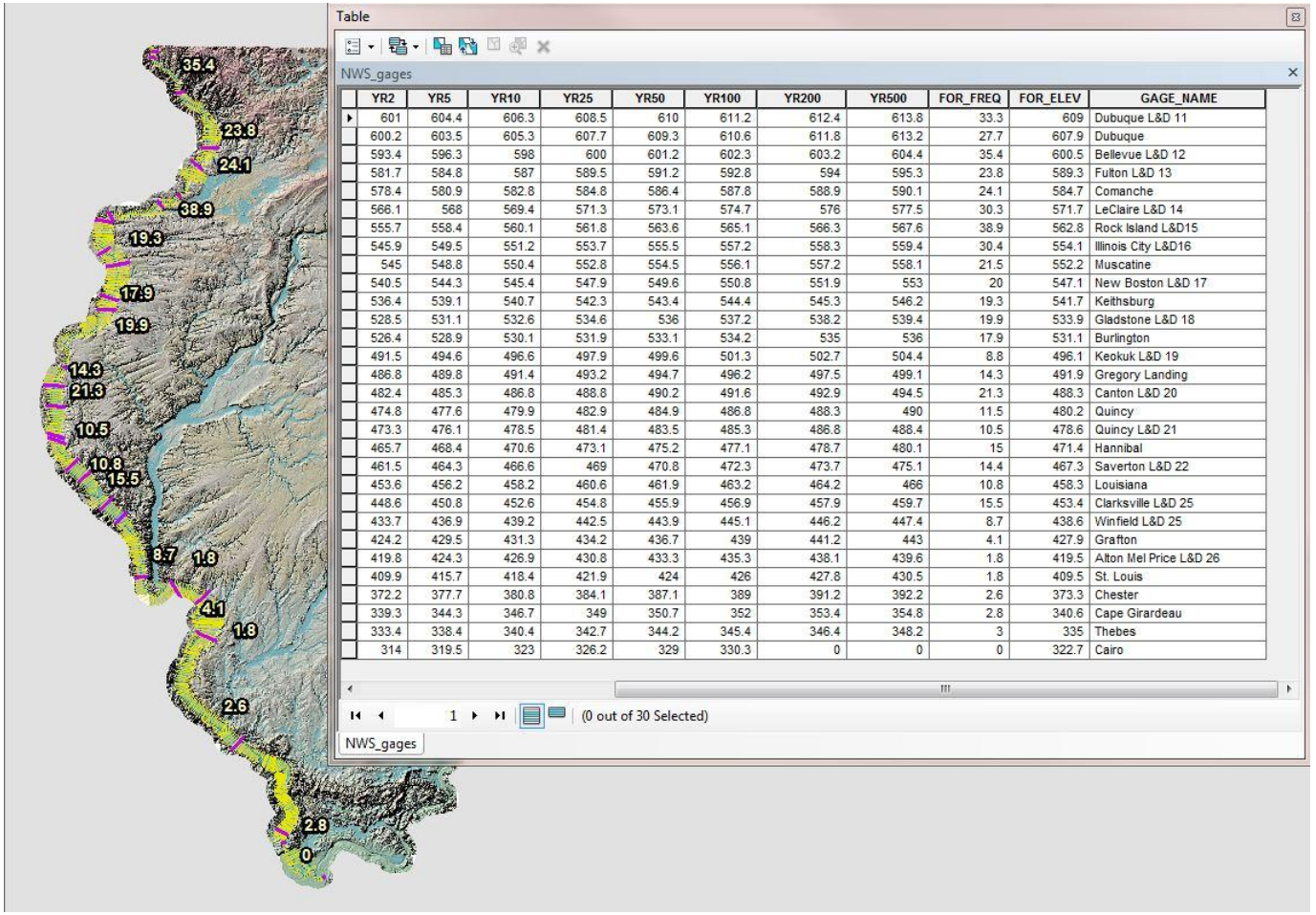
YR2	YR5	YR10	YR25	YR50	YR100	YR200	YR500	FOR_FREQ	FOR_ELEV	GAGE_NAME
601	604.4	606.3	608.5	610	611.2	612.4	613.8	33.3	609	Dubuque L&D 11
600.2	603.5	605.3	607.7	609.3	610.6	611.8	613.2	27.7	607.9	Dubuque
593.4	596.3	598	600	601.2	602.3	603.2	604.4	35.4	600.5	Bellevue L&D 12
581.7	584.8	587	589.5	591.2	592.8	594	595.3	23.8	589.3	Fulton L&D 13
578.4	580.9	582.8	584.8	586.4	587.8	588.9	590.1	24.1	584.7	Comanche
566.1	568	569.4	571.3	573.1	574.7	576	577.5	30.3	571.7	LeClaire L&D 14
555.7	558.4	560.1	561.8	563.6	565.1	566.3	567.6	38.9	562.8	Rock Island L&D15
545.9	549.5	551.2	553.7	555.5	557.2	558.3	559.4	30.4	554.1	Illinois City L&D16
545	548.8	550.4	552.8	554.5	556.1	557.2	558.1	21.5	552.2	Muscatine
540.5	544.3	545.4	547.9	549.6	550.8	551.9	553	20	547.1	New Boston L&D 17
536.4	539.1	540.7	542.3	543.4	544.4	545.3	546.2	19.3	541.7	Keithsburg
528.5	531.1	532.6	534.6	536	537.2	538.2	539.4	19.9	533.9	Gladstone L&D 18
526.4	528.9	530.1	531.9	533.1	534.2	535	536	17.9	531.1	Burlington
491.5	494.6	496.6	497.9	499.6	501.3	502.7	504.4	8.8	496.1	Keokuk L&D 19
486.8	489.8	491.4	493.2	494.7	496.2	497.5	499.1	14.3	491.9	Gregory Landing
482.4	485.3	486.8	488.8	490.2	491.6	492.9	494.5	21.3	488.3	Canton L&D 20
474.8	477.6	479.9	482.9	484.9	486.8	488.3	490	11.5	480.2	Quincy
473.3	476.1	478.5	481.4	483.5	485.3	486.8	488.4	10.5	478.6	Quincy L&D 21
465.7	468.4	470.6	473.1	475.2	477.1	478.7	480.1	15	471.4	Hannibal
461.5	464.3	466.6	469	470.8	472.3	473.7	475.1	14.4	467.3	Saverton L&D 22
453.6	456.2	458.2	460.6	461.9	463.2	464.2	466	10.8	458.3	Louisiana
448.6	450.8	452.6	454.8	455.9	456.9	457.9	459.7	15.5	453.4	Clarksville L&D 25
433.7	436.9	439.2	442.5	443.9	445.1	446.2	447.4	8.7	438.6	Winfield L&D 25
424.2	429.5	431.3	434.2	436.7	439	441.2	443	4.1	427.9	Grafton
419.8	424.3	426.9	430.8	433.3	435.3	438.1	439.6	1.8	419.5	Alton Mel Price L&D 26
409.9	415.7	418.4	421.9	424	426	427.8	430.5	1.8	409.5	St. Louis
372.2	377.7	380.8	384.1	387.1	389	391.2	392.2	2.6	373.3	Chester
339.3	344.3	346.7	349	350.7	352	353.4	354.8	2.8	340.6	Cape Girardeau
333.4	338.4	340.4	342.7	344.2	345.4	346.4	348.2	3	335	Thebes
314	319.5	323	326.2	329	330.3	0	0	0	322.7	Cairo

1 (0 out of 30 Selected)

NWS_gages

National Weather Service River Forecast Gages

Near Real-Time Freeboard Analysis



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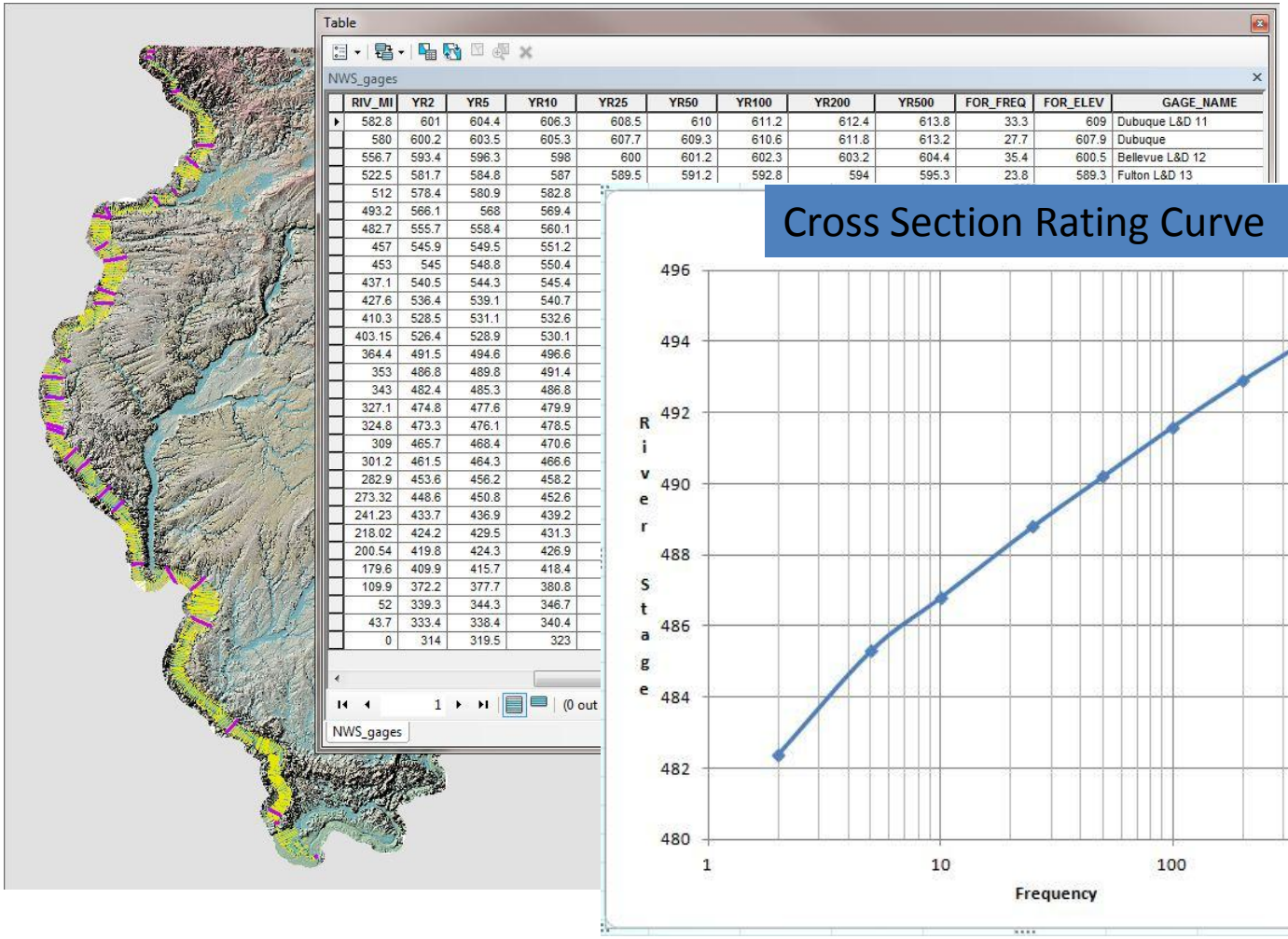
578.4	580.9	582.8	584.8	586.4	587.8	588.9	590.1	24.1	584.7	Comanche
566.1	568	569.4	571.3	573.1	574.7	576	577.5	30.3	571.7	LeClaire L&D 14
555.7	558.4	560.1	561.8	563.6	565.1	566.3	567.6	38.9	562.8	Rock Island L&D15
545.9	549.5	551.2	553.7	555.5	557.2	558.3	559.4	30.4	554.1	Illinois City L&D16
545	548.8	550.4	552.8	554.5	556.1	557.2	558.1	21.5	552.2	Muscatine
540.5	544.3	545.4	547.9	549.6	550.8	551.9	553	20	547.1	New Boston L&D 17
536.4	539.1	540.7	542.3	543.4	544.4	545.3	546.2	19.3	541.7	Keithsburg
528.5	531.1	532.6	534.6	536	537.2	538.2	539.4	19.9	533.9	Gladstone L&D 18
526.4	528.9	530.1	531.9	533.1	534.2	535	536	17.9	531.1	Burlington
491.5	494.6	496.6	497.9	499.6	501.3	502.7	504.4	8.8	496.1	Keokuk L&D 19
486.8	489.8	491.4	493.2	494.7	496.2	497.5	499.1	14.3	491.9	Gregory Landing
482.4	485.3	486.8	488.8	490.2	491.6	492.9	494.5	21.3	488.3	Canton L&D 20
474.8	477.6	479.9	482.9	484.9	486.8	488.3	490	11.5	480.2	Quincy
473.3	476.1	478.5	481.4	483.5	485.3	486.8	488.4	10.5	478.6	Quincy L&D 21
465.7	468.4	470.6	473.1	475.2	477.1	478.7	480.1	15	471.4	Hannibal
461.5	464.3	466.6	469	470.8	472.3	473.7	475.1	14.4	467.3	Saverton L&D 22
453.6	456.2	458.2	460.6	461.9	463.2	464.2	466	10.8	458.3	Louisiana
448.6	450.8	452.6	454.8	455.9	456.9	457.9	459.7	15.5	453.4	Clarksville L&D 25
433.7	436.9	439.2	442.5	443.9	445.1	446.2	447.4	8.7	438.6	Winfield L&D 25
424.2	429.5	431.3	434.2	436.7	439	441.2	443	4.1	427.9	Grafton
419.8	424.3	426.9	430.8	433.3	435.3	438.1	439.6	1.8	419.5	Alton Mel Price L&D 26
409.9	415.7	418.4	421.9	424	426	427.8	430.5	1.8	409.5	St. Louis
372.2	377.7	380.8	384.1	387.1	389	391.2	392.2	2.6	373.3	Chester
339.3	344.3	346.7	349	350.7	352	353.4	354.8	2.8	340.6	Cape Girardeau
333.4	338.4	340.4	342.7	344.2	345.4	346.4	348.2	3	335	Thebes
314	319.5	323	326.2	329	330.3	0	0	0	322.7	Cairo

1 (0 out of 30 Selected)

NWS_gages

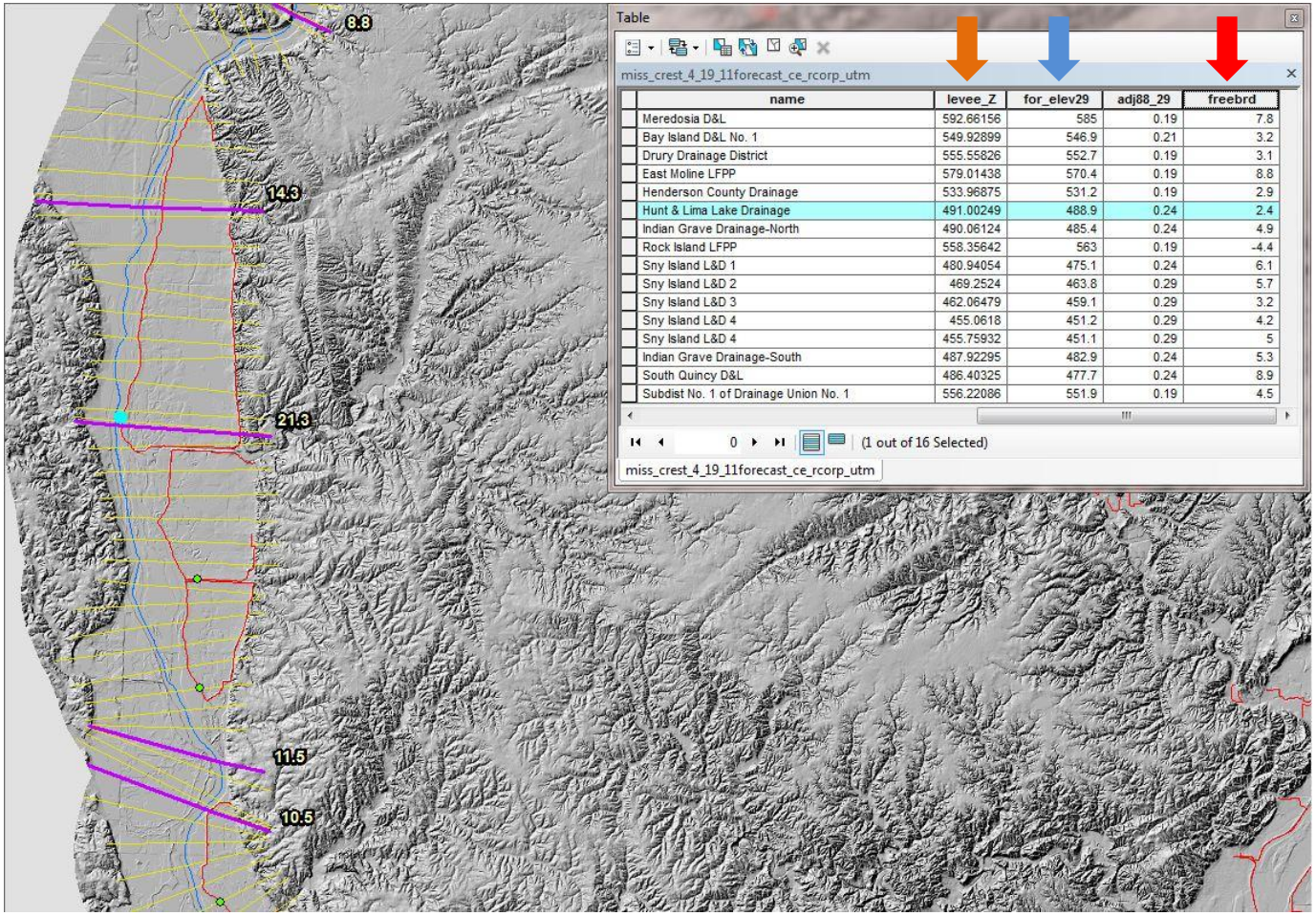
Determine The Event At Each Cross Section Based On
Linear Interpolation Of Up And Down Stream Forecast Gage Event Distance

Near Real-Time Freeboard Analysis



Translate Event or Frequency To Elevation Based On Rating Curve

Near Real-Time Freeboard Analysis



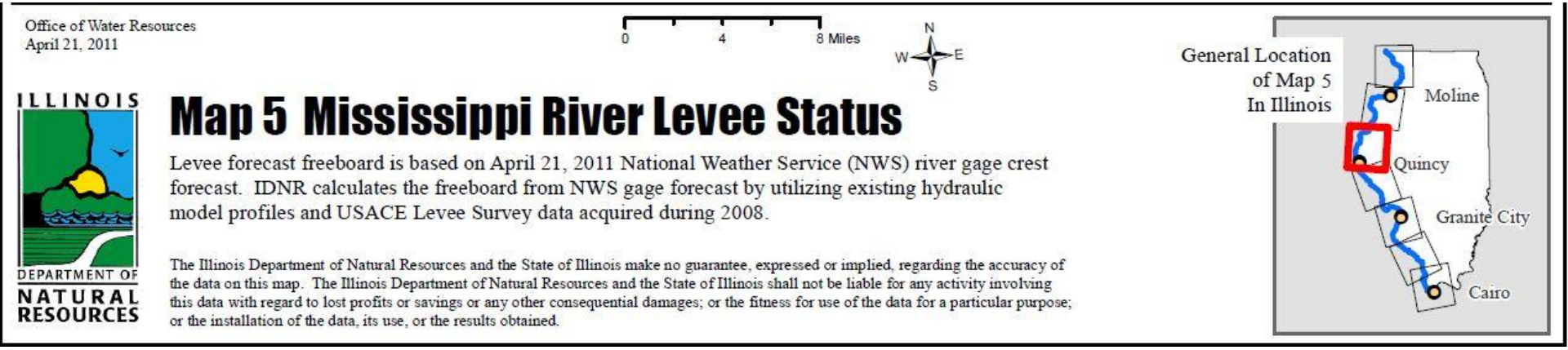
name	levee_Z	for_elev29	adj88_29	freebrd
Meredosia D&L	592.66156	585	0.19	7.8
Bay Island D&L No. 1	549.92899	546.9	0.21	3.2
Drury Drainage District	555.55826	552.7	0.19	3.1
East Moline LFPP	579.01438	570.4	0.19	8.8
Henderson County Drainage	533.96875	531.2	0.19	2.9
Hunt & Lima Lake Drainage	491.00249	488.9	0.24	2.4
Indian Grave Drainage-North	490.06124	485.4	0.24	4.9
Rock Island LFPP	558.35642	563	0.19	-4.4
Sny Island L&D 1	480.94054	475.1	0.24	6.1
Sny Island L&D 2	469.2524	463.8	0.29	5.7
Sny Island L&D 3	462.06479	459.1	0.29	3.2
Sny Island L&D 4	455.0618	451.2	0.29	4.2
Sny Island L&D 4	455.75932	451.1	0.29	5
Indian Grave Drainage-South	487.92295	482.9	0.24	5.3
South Quincy D&L	486.40325	477.7	0.24	8.9
Subdist No. 1 of Drainage Union No. 1	556.22086	551.9	0.19	4.5

Determine Freeboard At Critical Elevations In Near Real-Time
To National Weather Service River Forecasts

Near Real-Time Freeboard Analysis

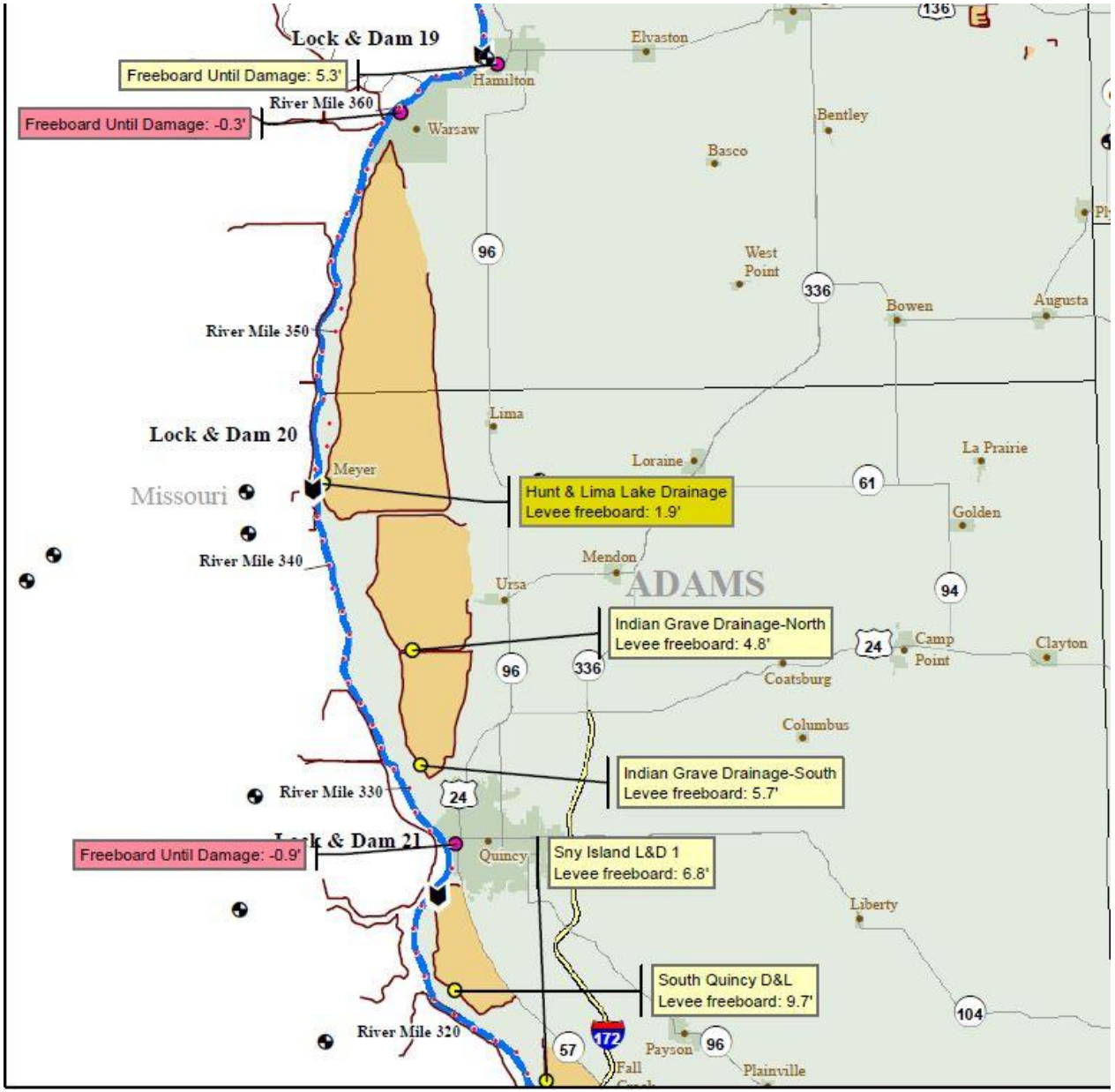
Field Verified Critical Freeboard Locations By The Corps

Map Distribution



ArcGIS Map Book

Map Distribution



Map Distribution