

**AERIAL ASSESSMENT REPORT FOR  
EAST FORK KASKASKIA RIVER  
FAYETTE, MARION AND CLINTON COUNTIES  
SEPTEMBER 2005  
PREPARED BY WAYNE KINNEY, FOR IL. DEPARTMENT OF AGRICULTURE**

A stage one TMDL report was prepared in April 2005 for Illinois EPA by Baetis Environmental Services, Inc. on behalf of Limno-Tech, Inc. The study found that one segment of the East Fork of the Kaskaskia River (OK01) is an impaired waterbody in need of TMDL development. This segment is impaired by low dissolved oxygen and fecal coliform bacteria. There are also four impaired water supply lakes in this watershed, however this aerial assessment is confined to the main channel of the East Fork Kaskaskia River and none of the supply lakes are located on the main channel.

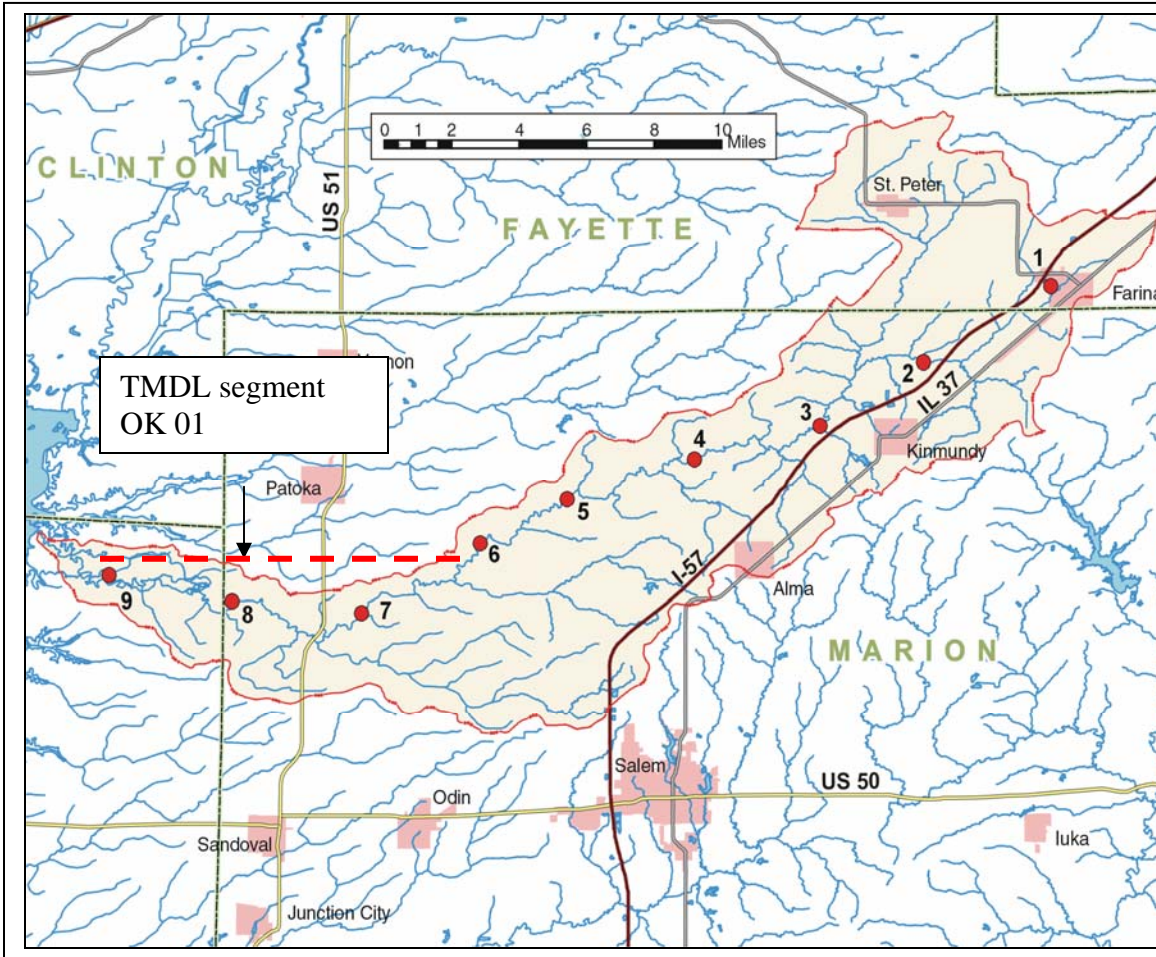


Fig. 1 Aerial Assessment Map of East Fork Kaskaskia River with Impaired Segment Location.

### Assessment Procedure

Low level geo-referenced video was taken of East Fork Kaskaskia River in March, 2004. Video taping was completed by Fostaire Helicopters, Sauget, IL, using a camera mounted beneath a helicopter to record data from just above tree top level in DVD format for further evaluation and assessment. Video mapping began at the south edge of Farina, IL in Fayette County. The mapping progressed downstream to Carlyle Lake in Clinton County. Aerial video of tributaries was not part of the project, regardless of the stream size or vegetation.

After videotaping the stream, the DVD tapes were processed by USGS to produce a geo-referenced DVD showing flight data and location. Next, USGS identified features from the video and created shapefiles containing the GPS location, type of feature identified, and the time on the DVD to allow cross referencing. The shape-files along with the DVD were then used to identify and locate the points where ground investigations were needed to verify aerial assessment assumptions and gather additional data.

The ground investigations or “ground truthing” is intended to accomplish two primary functions. First, it provides those viewing videos the opportunity to verify the correct interpretation of the video. Second, the video allows the user to identify and gather field data at the most appropriate locations to more closely represent the entire study portion of the stream.

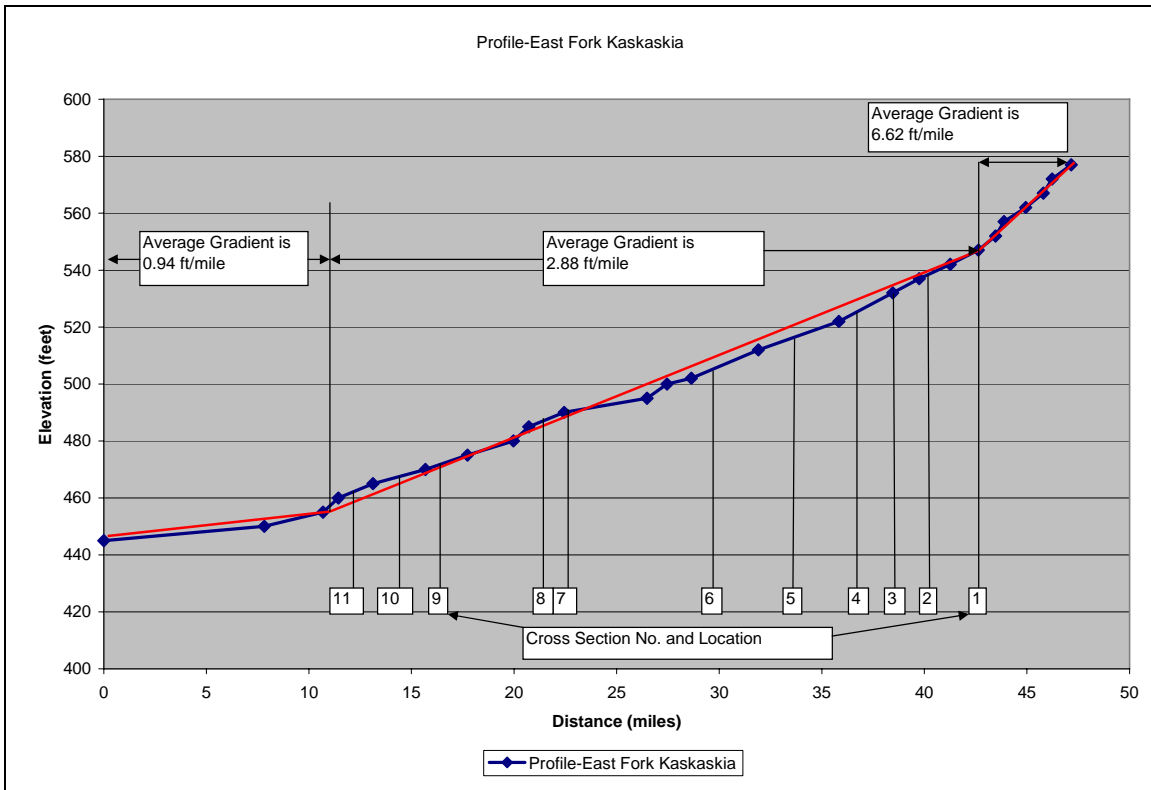


Figure 2 Channel Profile of East Fork Kaskaskia River

Detailed elevation data is not available; therefore the channel slope is calculated from USGS topo maps by measuring the channel length between contour lines. The report refers to this as “valley profile” although a true valley profile would use a straight line distance down the floodplain rather than channel length. However, this method is used because it incorporates sinuosity into the calculation and allows the channel slope to be assume equal to “valley slope” in order to estimate channel capacity, velocity, etc., although there are short segments where the channel slope may differ significantly near roads, logjams, knickpoints, etc.

CHAPTERS ON DVD AND ASSESSMENT REPORT				
DVD Disc	DVD chapter	Beginning Time	Report Chapter	Cross Sections
1	2	10:00	1	1
1	3	20:00	2	2,3,4
1	4	30:00:00	3	5
1	5	40:00:00	4	6
2	2	10:00	5	7
2	3	20:00	6	8,9
2	4	30:00:00	7	10,11
2	5	40:00:00	8	
2	6	50:00:00	9	

Note: Flight path is from downstream to upstream

Fig. 3 DVD Chapters and Report Guide

The DVD has been divided into “chapters” of approximately ten minutes of video (Fig. 3) to enhance the ability to navigate within the flight video and provide a simple way to identify and discuss different stream segments. Although the report will begin with a broader more general assessment of the entire study reach, it will also provide an assessment and treatment recommendations by chapter or group of chapters. The chapter divisions are clearly arbitrary and do not reflect “change points” in the stream characteristics or treatment recommendations. For clarity the conclusions and recommendations are presented for each stream “chapter”.

## East Fork Kaskaskia--Chapters and Cross Sections

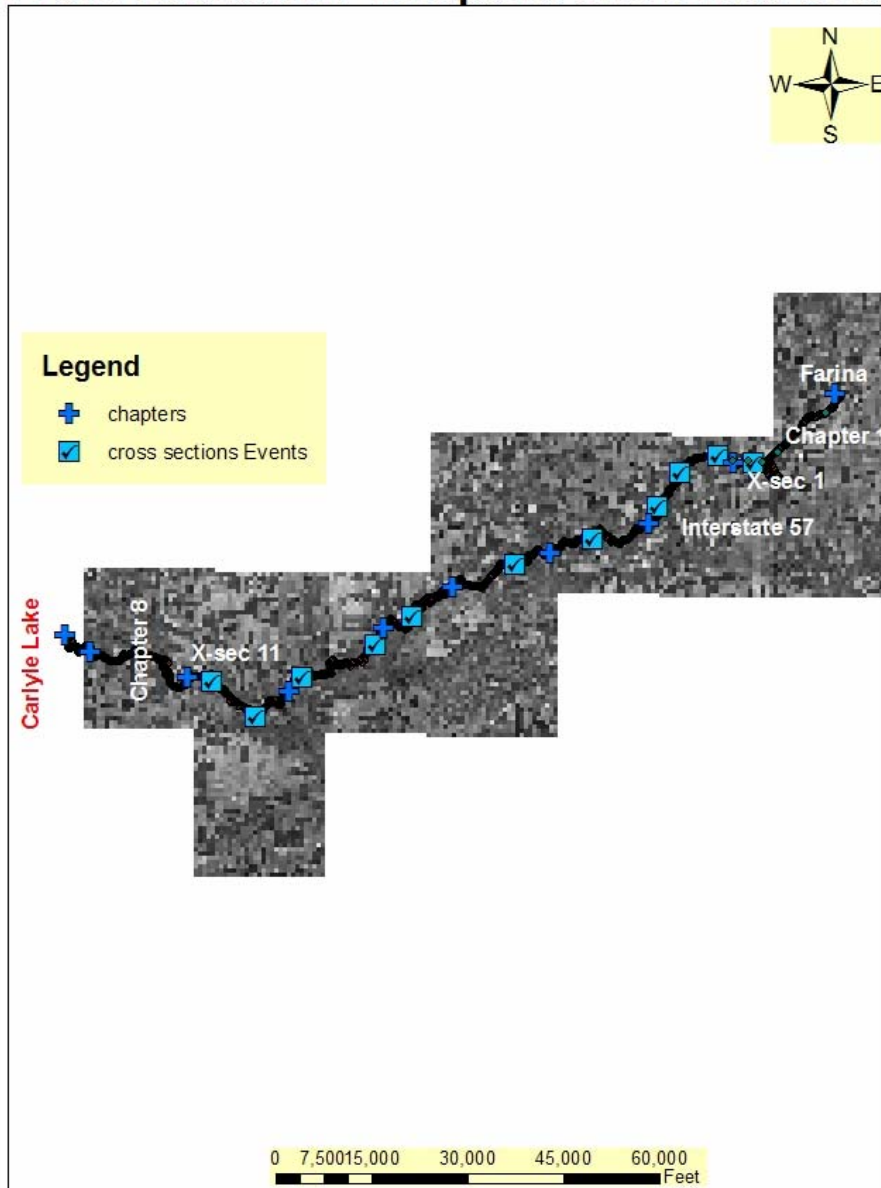


Fig. 4 Chapter Division and Cross Section locations

The major factors indicating channel conditions identified from the aerial assessment have been totaled by DVD chapter in Table 1 below. This tabulation allows a general comparison of the relative dominance of features found in each chapter and provides a

means of comparing stream characteristic between chapters. A discussion of the major differences will follow later in this report.

FEATURES IDENTIFIED BY CHAPTER								
CHAPTER	ROCK	GEOTECH		BED	BREAK	SEVERE		
	OUTCROP	LOGJAM	FAILURE	DEPOSITION	CONTROL	POINT	EROSION	EROSION
1	0	17	0	3	4	2	36	1
2	0	5	2	3	2	3	60	0
3	2	7	4	0	2	0	50	0
4	8	3	4	0	1	7	55	0
5	2	10	0	1	0	5	65	0
6	7	5	0	1	0	10	62	0
7	7	5	7	2	0	2	51	1
8	2	3	2	1	1	0	48	1
9	0	1	0	0	0	0	11	0
TOTALS	28	56	19	11	10	29	438	3

Table 1 Features by Chapter Identified with Aerial Assessment

Eleven cross sections were taken at selected locations on the East Fork Kaskaskia River after viewing the DVD's. The cross sections are located at "riffle" locations to best represent the channel characteristics and to allow for comparison of width, depth, x-sec. area, etc. along the channel at similar geometric locations. The result of the hydraulic analysis at each site is presented in summary form in Table 2 and the approximate location of each cross section along the channel profile is found in Fig. 2. Aerial views of cross sections locations are shown in Figs. and thru. Exact locations as Eastings and Northings and more detail can be found in Appendix A

Cross Section Summary –East Fork Kaskaskia River													
X-Sec	Easting	Northing	ADA	Valley Slope ft/m	Q2 CFS	BKF CFS	Width	Depth	Vel. FPS	Bedload Dia.	CEM Stage	CFS per Sq. Mi.	BKF cfs/Q2 cfs
1	341363	4296613	19.29	7.3	1310	540	47	3.83	3	1	3	28	0.41
2	339661	4296929	22.39	5	1236	525	33	5.67	2.8	1	3	23.4	0.42
3	337838	4296149	41.93	5	2015	905	53	5.53	3.1	1	3	21.6	0.45
4	336750	4294502	46.45	4.8	2144	831	68	4.53	2.7	1	1	17.9	0.39
5	333679	4292966	56.62	4.4	2409	782	54	5.71	2.5	1	1	13.8	0.32
6	329960	4291748	65.39	3.8	2528	785	76	4.39	2.4	1	1	12	0.31
7	325042	4289279	73.66	3.4	2623	793	50	6.07	2.6	2	1	10.8	0.3
8	323321	4287973	75.91	2.8	2455	876	55	5.24	3	1	3	11.5	0.36
9	319797	4286392	91.45	2.9	2882	979	58	6.44	2.6	1	3	10.7	0.34
10	317592	4284508	94.4	2.9	2955	1002	66	6.15	2.5	1	3	10.61	0.34
11	315539	4286209	115.58	2.8	3410	1166	61	6.85	2.8	1	3	10.8	0.34

Table 2 Cross Section Summary

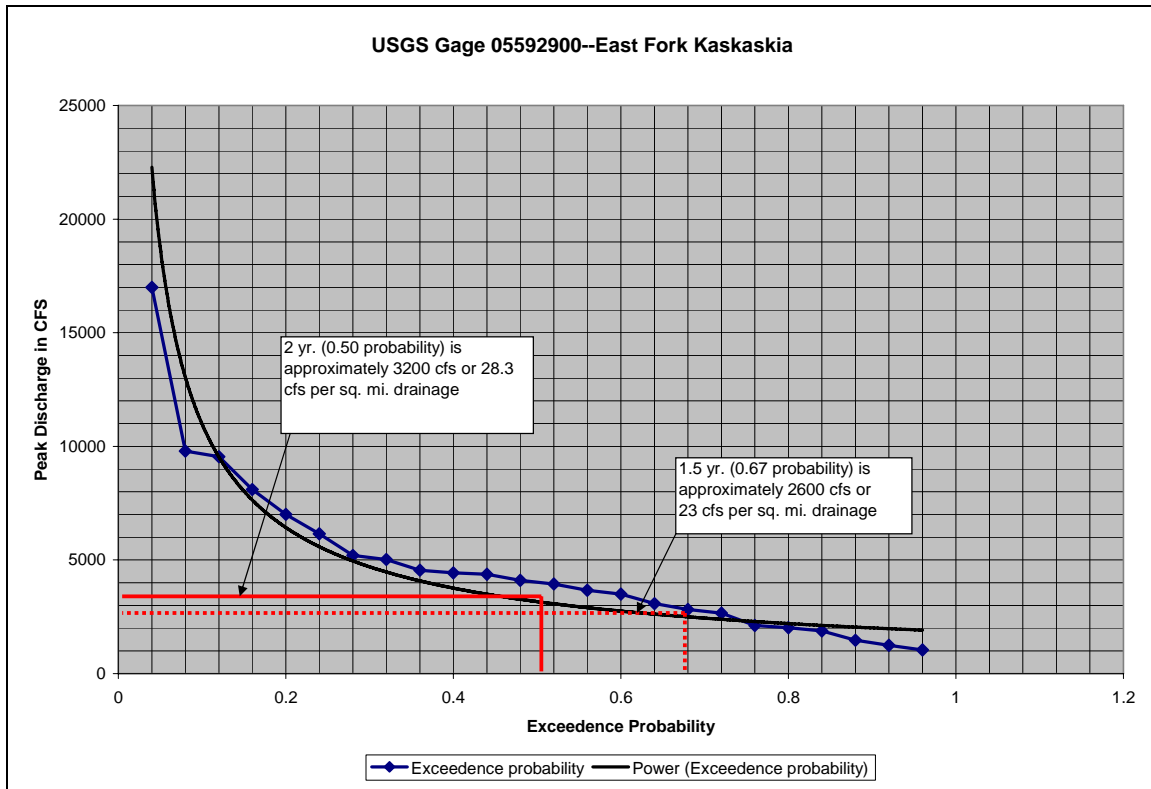


Fig. 5 Annual Maximum Peak Probability Curve: USGS Gage #05592900

A plot of the discharge probability curve from USGS Gage # 05592900 over the last 24 yrs. of continuous record (1981-2004) in Fig. 5 indicates the 2 yr. discharge (50% probability) at approx. 3200 cfs and the 1.5 yr. discharge (67% probability) at approx. 2600 cfs. The drainage area at Gage # 05592900 near Sandoval, IL. is 113 sq. miles; therefore the discharge per sq. mile is 28.3 and 23 cfs per sq. mile respectively for the 2 yr. and the 1.5 yr. R.I. discharge. The field determined “bankfull” discharge in the study area ranges from 10.6 to 28 cfs/sq. mile. Referring to Table 2 the data indicates the bankfull discharge at cross section 11 is 10.8 cfs per square mile. Cross section 11 has a drainage area of 115.58 sq. mi., therefore if the data is extrapolated to the gage site the discharge would be 1220 cfs (10.8 x 113) and represents a Return Interval (R.I.) of approx. 1.11 yrs at cross section 11 near the gage site. It is expected that the cfs/sq. mile discharge would increase as the drainage area decreases and the valley slope increases. This is the case with East Fork Kaskaskia River.

Discharges at the lower reaches where the channel is in CEM stage 3 have been calculated on “field determined” indicators. The discharge per sq. mile drops only slightly from 12 to 14 cfs/sq. mi. (cross sections 4-7) in the stable reaches to 10 to 12 cfs/sq. mi. (cross sections 8-11). This reduction is expected as the drainage area increases. The evidence is therefore reinforced that the established R.I for the “geomorphic bankfull” discharge is the 1.11 yrs. calculated at cross section 11.

## General Observations

1. Upper reaches at Cross Section 1 through 3 are incised and appear to be continuing to downcut.
2. Middle reaches at Cross Sections 4 through 7 are not incised and bankfull indicators are at or near top bank elevation.
3. Lower reaches at Cross Sections 8 through 11 are definitely incised and continuing to downcut with defined knickpoints obvious in a clay bed.
4. The channel bedload material is primarily silt and clay with very little large material and therefore little turbulence to increase DO levels within the stream. Increasing turbulence within the channel at low flow by installing Rock Riffles would be beneficial for both DO and bed stability.
5. There are 438 erosion sites identified, 172 of them in the impaired reach OK01. Many, if not most could be stabilized with installation of a riffle-pool sequence to dissipate energy in the deepened pools and turbulent flow over riffles.
6. With the fine bedload material found in East Fork the bedload transport continuity should not be interrupted with a riffle-pool sequence, even if it does not extend upstream of OK01.
7. Recommendations include cost for both riffle-pools installation and lateral bank protection; however the cost of lateral protection can be reduced dramatically if riffle-pool structures are installed in the same reach.

## Recommendations: Chapters 1 and 2

This is the very upper segment of the East Fork Kaskaskia and is approximately 8 miles long. The channel runs between the sewage treatment cells south of Farina and erosion between sewage ponds may be considered a very high priority requiring special design. There are 96 erosion sites in this segment and cross sections 1 thru 3 indicate this channel is incised. Therefore installation of Rock Riffles is recommended and will greatly reduce, although not completely eliminate the need for lateral bank protection. Table 3 provides an estimate of the quantities and cost associated with this segment.

<b>TREATMENT --CHAPTERS 1 THRU 2</b>					
<b>Lateral Bank Protection</b>					
<b>Chapter</b>	<b>Erosion Sites</b>	<b>Average Length(ft)</b>	<b>Total Length</b>	<b>Average Cost/foot</b>	<b>Total Cost</b>
1	36	200	7200	\$25.00	\$180,000.00
2	60	200	12000	\$25.00	\$300,000.00
Total	96		19200		\$480,000.00

<b>Rock Riffle Grade Control</b>					
<b>Chapter</b>	<b>Rock Riffles</b>	<b>Average Tonnage</b>	<b>Ave. Cost Ton</b>	<b>Average Cost/Riffle</b>	<b>Total Cost</b>
1	90	200	\$30.00	\$6,000.00	\$540,000.00
2	92	250	\$30.00	\$7,500.00	\$690,000.00
Total	182				\$1,230,000.00

Table 3. Treatment Recommendations Chapters 1 and 2





East Fork Kaskaskia erosion site between Farina Sewage Treatment Lagoons



East Fork Kaskaskia eroding into embankment of Farina Sewage Treatment Lagoon

# East Fork Kaskaskia--Chapter 1

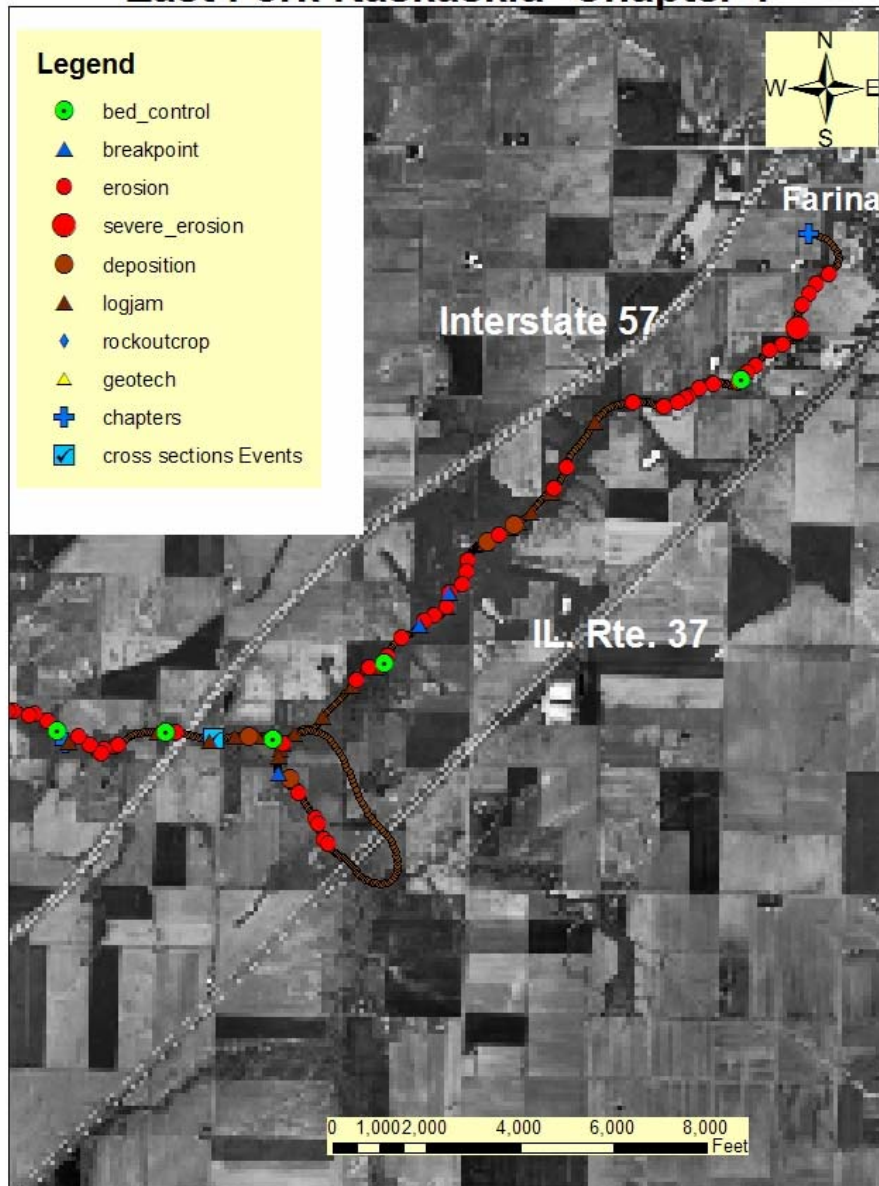


Fig. 6 Chapter 1

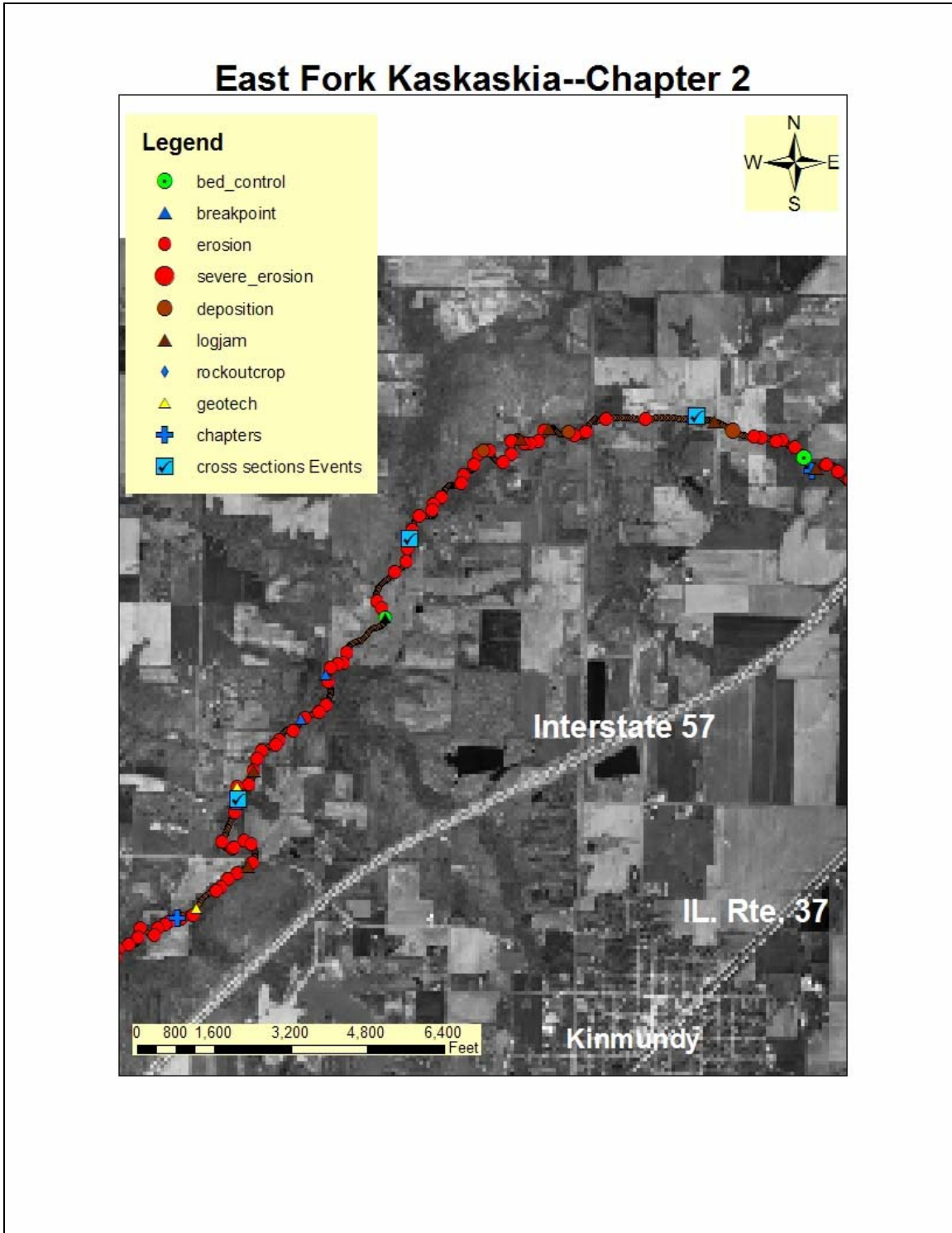


Fig. 7 Chapter 2

**Recommendations: Chapters 3, 4 and 5**

This segment is approximately 13 miles long and has a channel that is well connected to the floodplain. All cross sections (5, 6 and 7) were determined to be CEM stage 1 with geomorphic bankfull flows at or near the top bank elevation. Cross section 7 however in Chapter 5 is on a shale bed and provides the grade stability that has prevented the migration of incision in this segment.

Preliminary calculations indicate that Rock Riffle Grade Controls can however be built in Chapter 5 to a height of approximately 2.5 ft. with no impact on flooding or backwater. Therefore Rock Riffle Grade Controls are recommended for Chapter 5 in this segment for bank stability and re-aeration as Chapter 5 is immediately above the impaired reach OK01.

Table 4 provides an estimate of treatment needs for this reach.

<b>TREATMENT --CHAPTERS 3 through 5</b>					
<b>Lateral Bank Treatment</b>					
<b>Chapter</b>	<b>Erosion Sites</b>	<b>Average Length(ft)</b>	<b>Total Length</b>	<b>Average Cost/foot</b>	<b>Total Cost</b>
3	50	250	12500	\$25.00	\$312,500.00
4	55	250	13750	\$25.00	\$343,750.00
5	65	250	16250	\$25.00	\$406,250.00
<b>Total</b>	<b>170</b>				<b>\$1,062,500.00</b>
<b>Rock Riffle Grade Control</b>					
	<b>Rock Riffles</b>	<b>Average Tonnage</b>	<b>Ave. Cost Ton</b>	<b>Average Cost/Riffle</b>	
3	n/a	0	\$0.00	\$0.00	\$0.00
4	n/a	0	\$0.00	\$0.00	\$0.00
5	77	275	\$30.00	\$8,250.00	\$635,250.00
<b>Total</b>	<b>77</b>				<b>\$635,250.00</b>

Table 4. Treatment Recommendations Chapter 3, 4 and 5



### East Fork Kaskaskia--Chapter 3

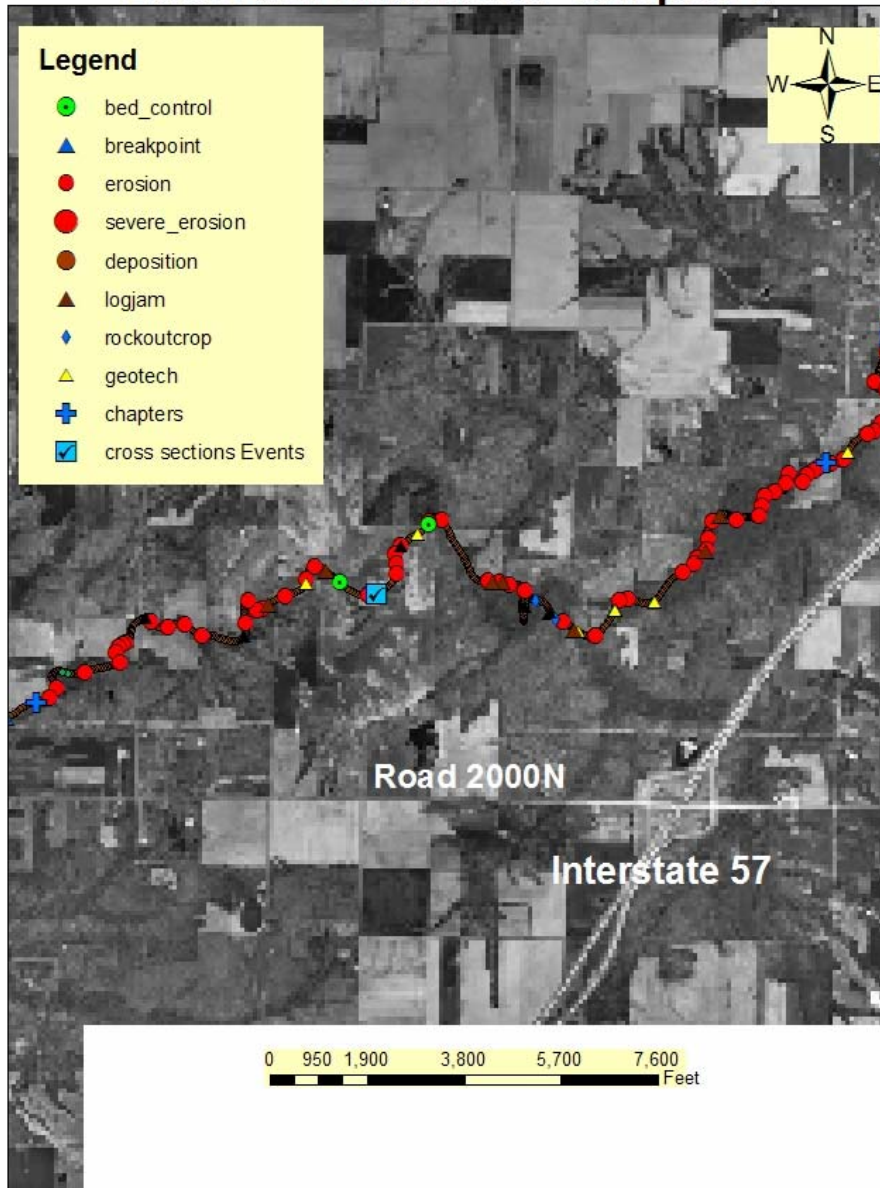


Fig. 8 Chapter 3

# East Fork Kaskaskia--Chapter 4

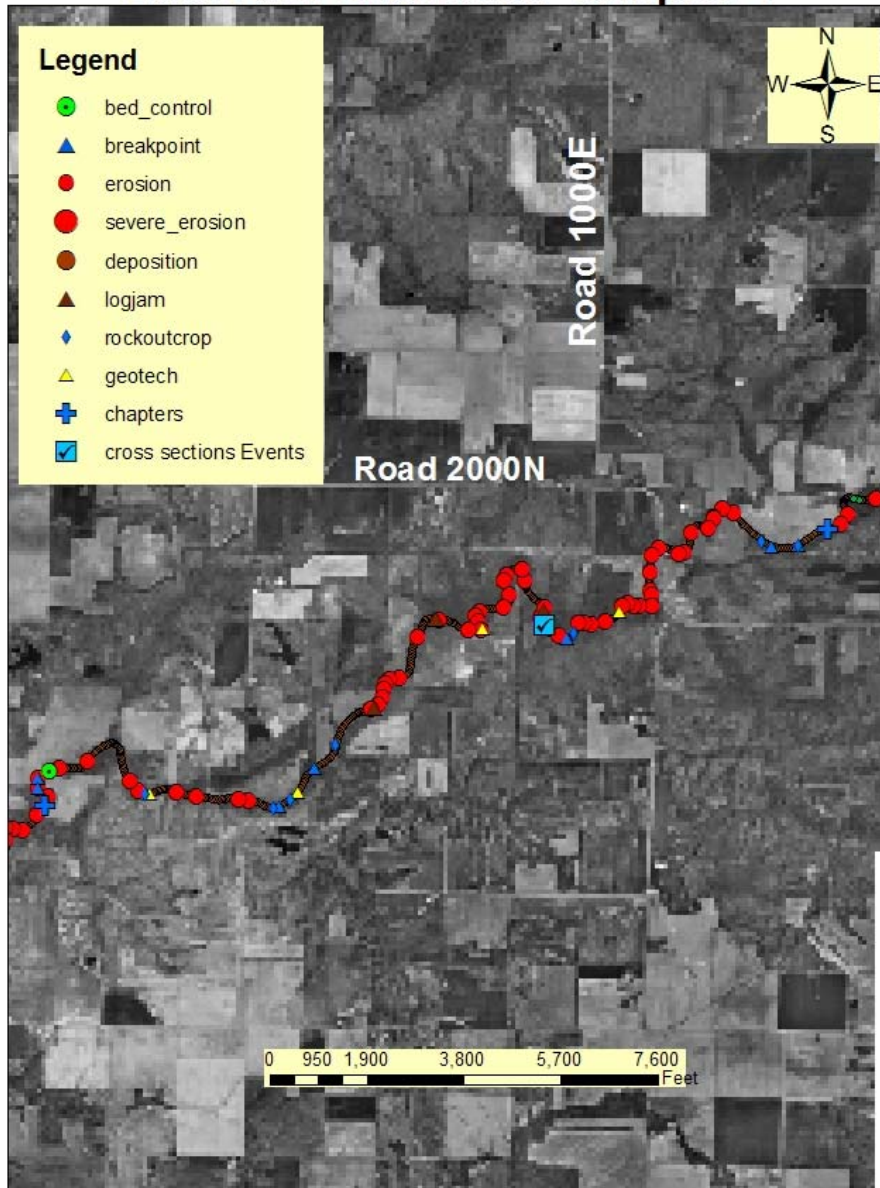


Fig. 9 Chapter 4

# East Fork Kaskaskia--Chapter 5

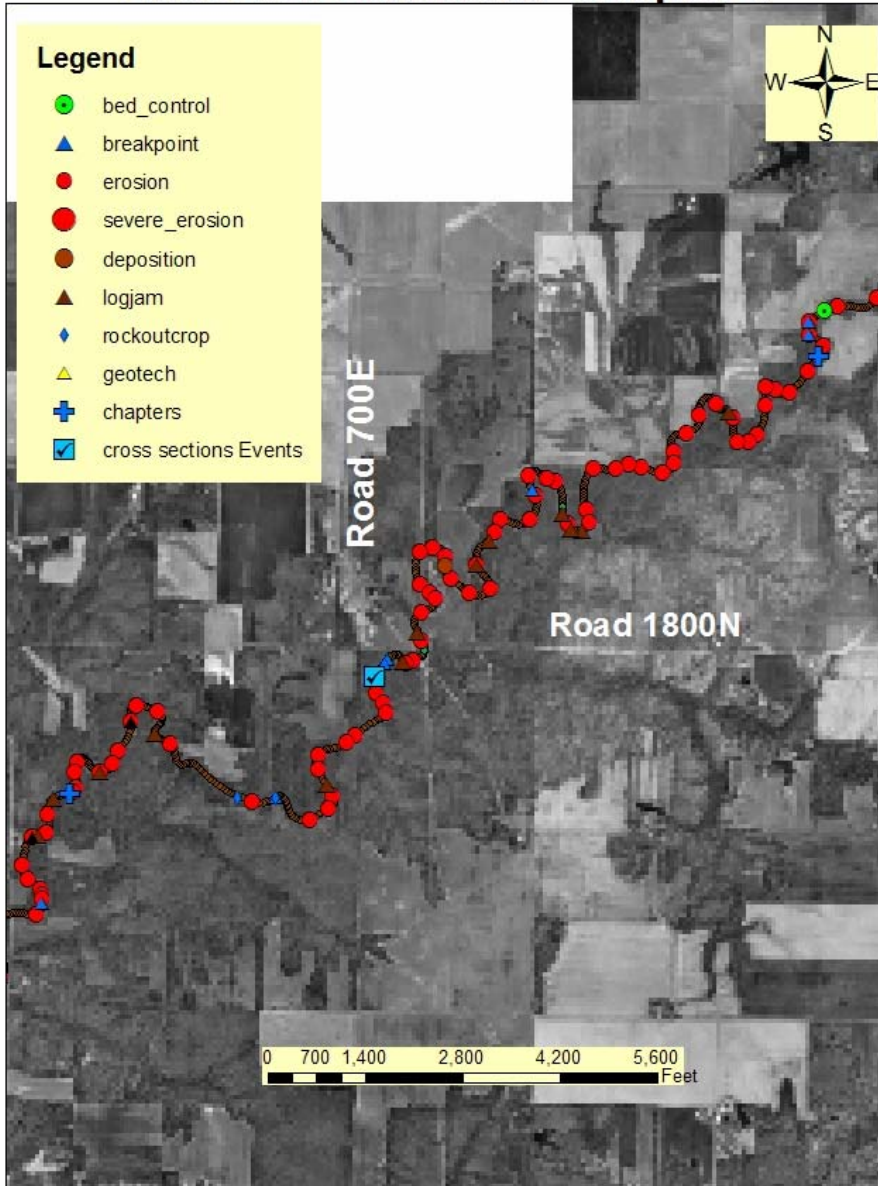


Figure 10 Chapter 5



### **Recommended Treatment: Chapters 6, 7 and 8**

This segment along with Chapter 9 represents the impaired segment OK01. All cross sections in this reach are incised with no evidence of shale or other natural grade control. There are 161 erosion sites identified in this segment and cross sections (8, 9, 10 and 11) in this reach are all incised by 2 ft. at x-sec 8 to 5 ft. at x-sec 10 and 11. The erosion sites can be treated with Stone Toe Protection, Stream Barbs or similar techniques, however if an effective riffle-pool sequence is established the need for lateral protection will be greatly reduced.

The treatment recommendation is therefore to install a series of Rock Riffle Grade Controls at an approximate spacing of 350 ft. to stabilize the channel bed, reduce lateral bank erosion and provide re-aeration benefits to improve DO levels. The final design should consider the use of emergent boulders and a significant narrowing of the channel cross section at very low flows to gain maximum re-aeration during times of low flow. Table 5 provides an estimate of the treatment needs for this segment, although the lateral bank treatment needs should be significantly reduced by installation of the Rock Riffles. The recommendation is to begin with the Rock Riffles and monitor for several years before determining the need for lateral bank protection.



Cross section 11 showing degrading clay channel bed



<b>TREATMENT --CHAPTERS 6 through 8</b>					
<b>Lateral Bank Treatment</b>					
<b>Chapter</b>	<b>Erosion Sites</b>	<b>Average Length(ft)</b>	<b>Total Length</b>	<b>Average Cost/foot</b>	<b>Total Cost</b>
6	62	250	15500	\$25.00	\$387,500.00
7	51	250	12750	\$25.00	\$318,750.00
8	48	250	12000	\$25.00	\$300,000.00
<b>Total</b>	<b>161</b>		<b>40250</b>		<b>\$1,006,250.00</b>

<b>Rock Riffle Grade Control</b>					
<b>Chapter</b>	<b>Number Riffles</b>	<b>Average Tons Stone</b>	<b>Total Tons Stone</b>	<b>Average Cost/ton</b>	<b>Total Cost</b>
6	78	300	23400	\$30.00	\$702,000.00
7	79	450	35550	\$30.00	\$1,066,500.00
8	81	450	36450	\$30.00	\$1,093,500.00
<b>Total</b>	<b>238</b>		<b>95400</b>		<b>\$2,862,000.00</b>

Table 5. Treatment Recommendations Chapter 6, 7 and 8

# East Fork Kaskaskia--Chapter 6

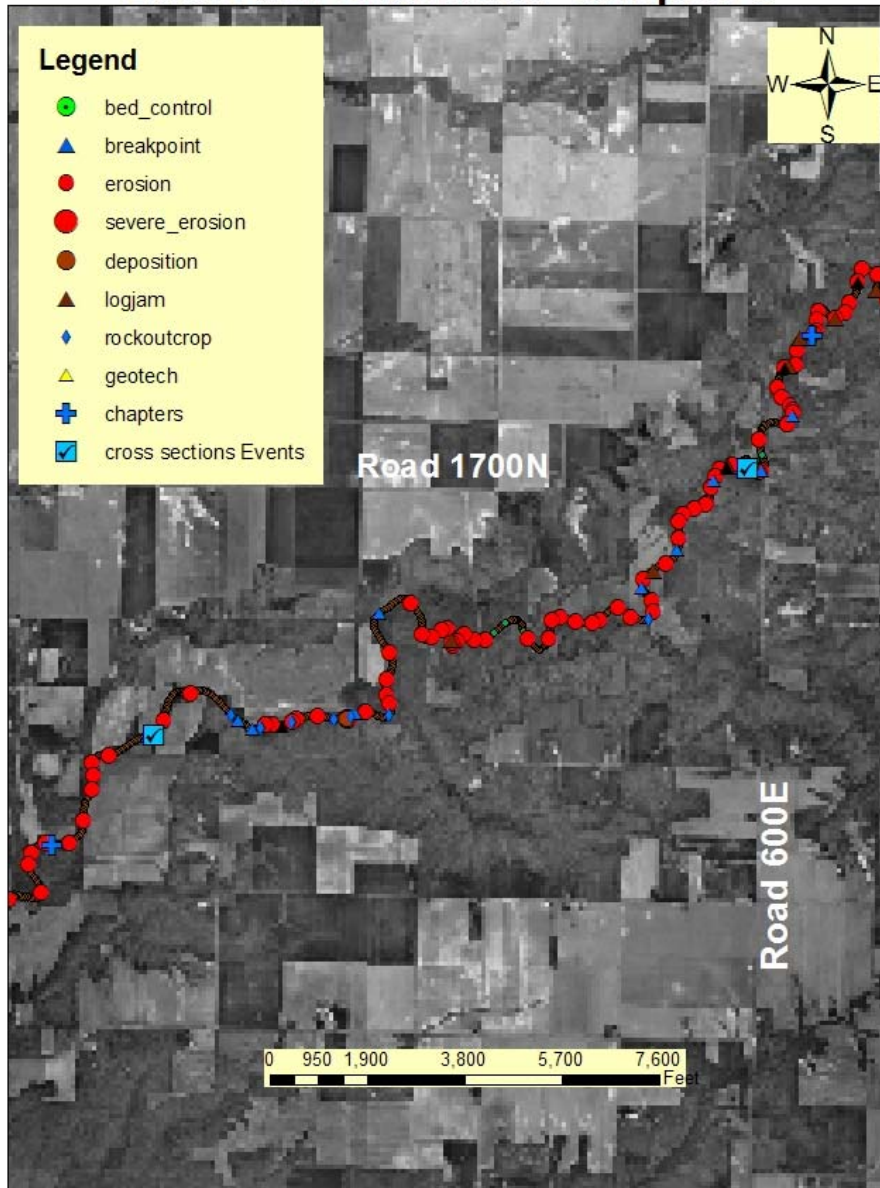


Fig. 11 Chapter 6

## East Fork Kaskaskia--Chapter 7

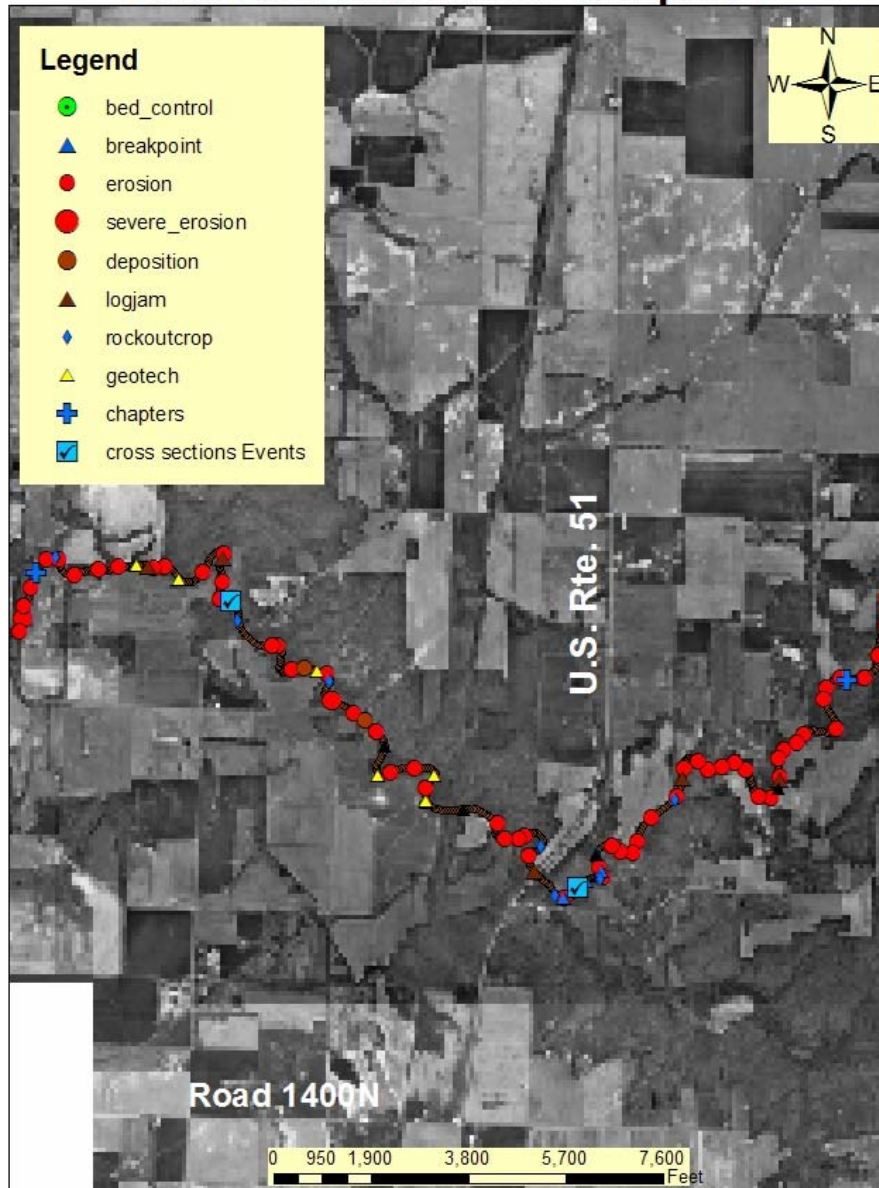


Figure 12 Chapter 7

# East Fork Kaskaskia--Chapter 8

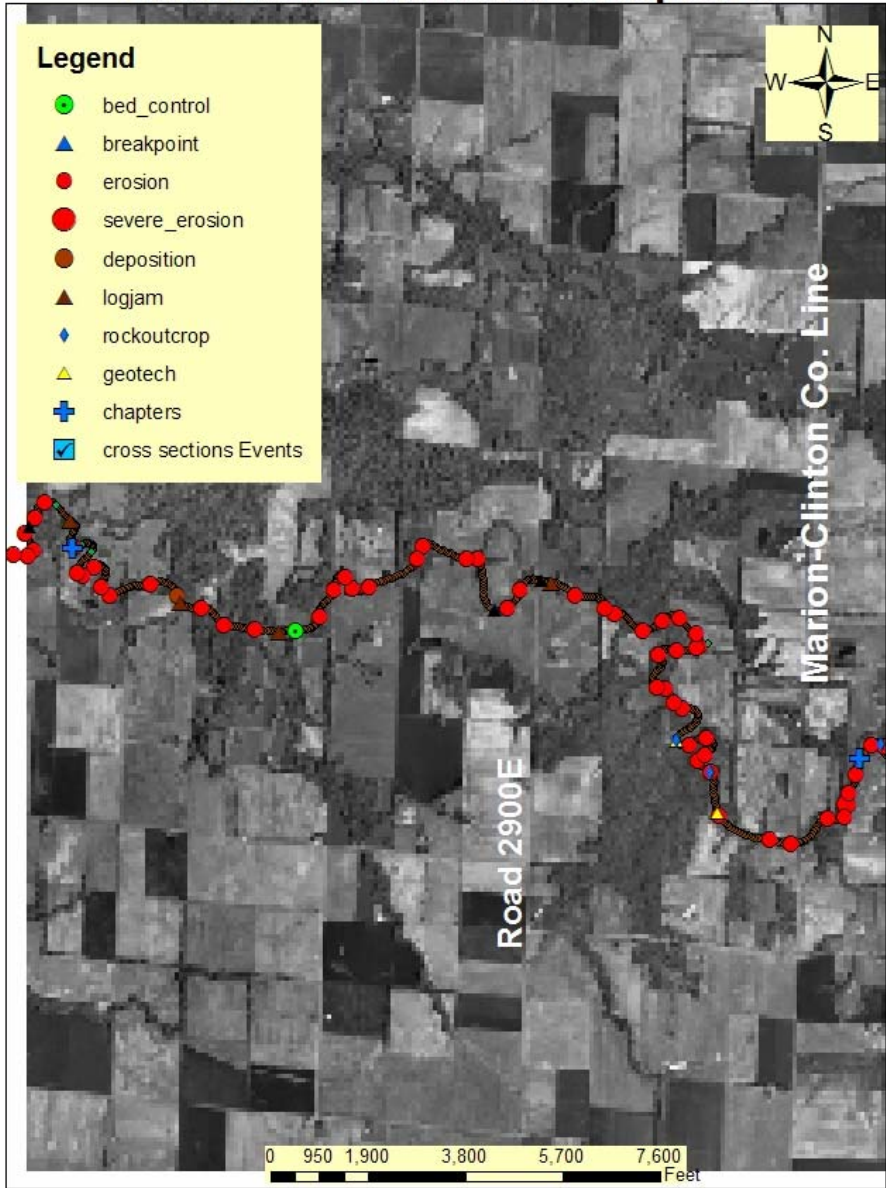


Fig. 13 Chapter 8

## Recommended Treatment: Chapter 9

This segment is approximately 1.75 miles long and is immediately above Carlyle Lake. Much of this reach has backwater effects from lake levels in Carlyle Lake and installation of Rock Riffles to improve DO levels would be very difficult to achieve. There are 11 erosion sites in this reach that can be treated with Stone Toe Protection or Stream Barbs. The recommendation is to install Stream Barbs at these sites due to the varying heights of backwater from Carlyle Lake and the potential to increase DO by providing additional turbulence to enhance re-aeration.

Table 6 provides an estimate of treatment needs for this reach.

<b>TREATMENT CHAPTER 9</b>					
<b>Lateral Bank Treatment with Stream Barbs</b>					
<b>Chapter</b>	<b>Erosion Sites</b>	<b>Average Length</b>	<b>Total Length</b>	<b>Average Cost/foot</b>	<b>Total Cost</b>
9	11	400	4400	\$40.00	\$176,000

Table 6. Treatment Recommendation Chapter 9



# East Fork Kaskaskia--Chapter 9

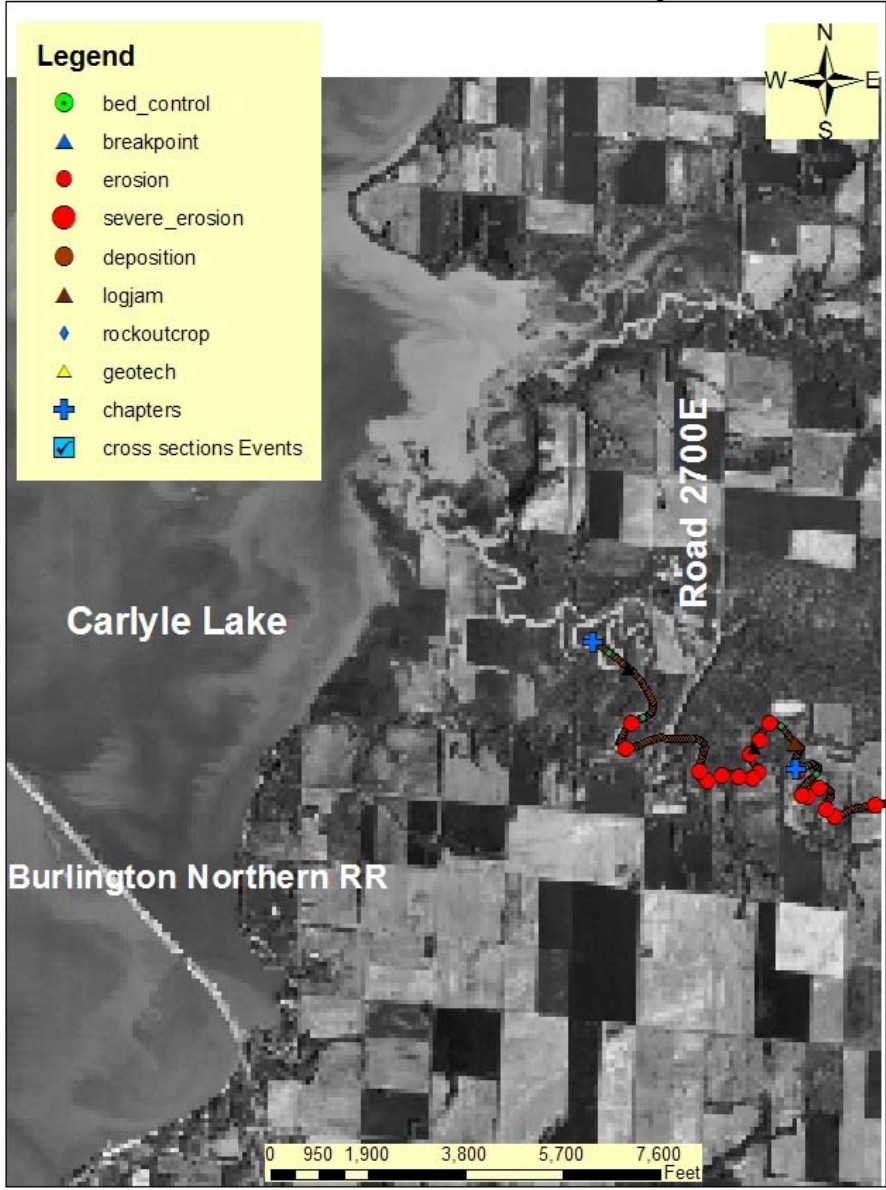


Fig. 14 Chapter 9

**APPENDIX A**

**CROSS SECTION DATA**

# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County Marion T. R. Sec.

Date 9/13/2005 By Wayne Kinney

Stream Name East Fork Kaskaskia UTM Coord. E341363 N4296613

Landowner Name Xsec 1

Drainage Area 19.29 sq. mi. Clear Cells

**Regional Curve Predictions:**  
 Bankfull dimensions Width 47 ft. Cross Sectional Area 167 sq. ft.  
 Depth 3.5 ft.

**Reference Stream Gage:**  
 Skillet Fork near Iuka Station No. 03380350 Gage Q<sub>2</sub> 5000 cfs  
 Drainage Area 208 sq.mi Regression 3850 cfs  
 Marion County, IL REFERENCE STREAM DATA ONLY

**USGS Flood-Peak Discharge Predictions:**  
 Valley Slope: 7.3 ft./mi. (user-entered) Regression Q<sub>2</sub> 1009 cfs  
 ft./mi (from worksheet) Rainfall 3.40 in (2 yr, 24 hr) Adjusted Q<sub>2</sub> 1310 cfs  
 0.0014 ft./ft. Regional Factor 1.057 Typical Range for Bankfull Discharge: 520 to 1050 cfs

**Local Stream Morphology:**

**Channel Description:** (c) Clean, winding, some pools and shoals  
 Manning's "n" 0.04  
 Stream Length ft.  
 Valley Length ft.  
 Contour Interval feet  
 Estimated Sinuosity  
**Basic Field Data:**  
 Bankfull Width 47 ft.  
 Mean Bankfull Depth 3.83 ft.  
 Width/Depth Ratio 12.27  
 Max. Bankfull Depth 5.2 ft.  
 Width at twice max. depth 1000 ft. (10.4 ft.)  
 Entrenchment Ratio 21.28  
 Channel Slope:  
 Surveyed: 0.00113 ft./ft.  
 Estimated: ft./ft.  
 Bankfull Q from:  
 Cross-Section 528 cfs  
 Basic field data 552 cfs  
 Selected Q 540 cfs  
 Radius of Curvature (Rc) ft.  
 Rc/Bankfull width: 0.00

**Bankfull Velocity Check:** (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)  
 Bedload: D<sub>90</sub> 1 in. Velocity required to move D<sub>90</sub>: 2.1 ft./sec.  
 D<sub>50</sub> in. Velocity from Cross-Section data: 2.94 ft./sec.  
 GOAL: Develop confidence by matching velocities from different sources. Velocity from basic field data: 3.07 ft./sec.  
 Velocity from selected Q: 3.0 ft./sec.

Channel Evolution Stage III Stream Type (Rosgen)

**Notes**

28.0 cfs/sq. mi.



# Natural Open Channel Flow

Project: Xsec 1  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (S): 0.001130 ft/ft  
 Manning's n: 0.040  
 Flow Depth: 5.0 ft

$$Q = \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

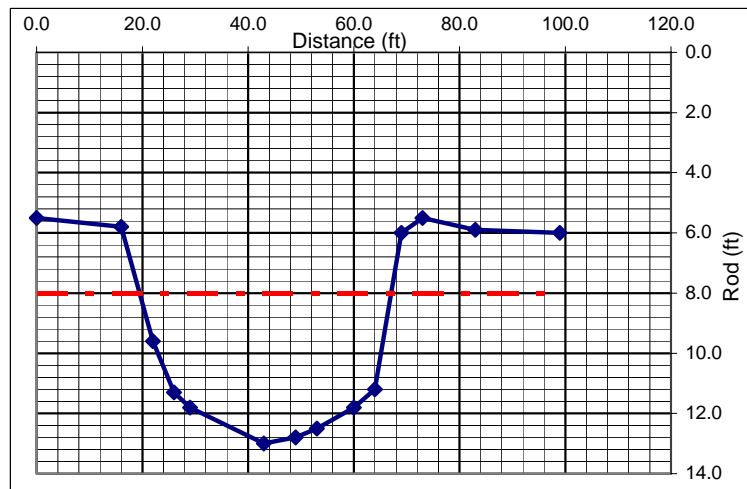
[back to I&E form](#)

Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
5.5	0.0
5.8	16.0
9.6	22.0
11.3	26.0
11.8	29.0
13.0	43.0
12.8	49.0
12.5	53.0
11.8	60.0
11.20	64
6.00	69
5.50	73
5.90	83
6.00	99

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	5.0 ft	7.0
Channel Flow (Q):	528.5 cfs	1,018.7
Channel Velocity:	2.9 ft/sec	3.6
Cross-Sectional Area (A):	180.0 sq.ft.	280.3
Hydraulic Radius (R):	3.6 ft	5.0



COMMENTS:

# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

**County** Marion  T.  R.  Sec.   
 Date 9/13/2005 By Wayne Kinney  
 Stream Name East Fork Kaskaskia UTM Coord. E339661 N4296929  
 Landowner Name Xsec 2  
 Drainage Area 22.39 sq. mi.

**Regional Curve Predictions:**

Bankfull dimensions	Width	<u>50</u> ft.	Cross Sectional Area	<u>185</u> sq. ft.
	Depth	<u>3.7</u> ft.		

**Reference Stream Gage:**

Skillet Fork near Iuka	Station No.	<u>03380350</u>	Gage Q <sub>2</sub>	<u>5000</u> cfs
Marion County, IL	Drainage Area	<u>208</u> sq.mi	Regression Coefficient	<u>3850</u> cfs

**REFERENCE STREAM DATA ONLY**

**USGS Flood-Peak Discharge Predictions:**

<u>Valley Slope:</u>	<u>5.0</u> ft./mi. (user-entered)	Regression Q <sub>2</sub>	<u>952</u> cfs
	<u>        </u> ft/mi (from worksheet)	Adjusted Q <sub>2</sub>	<u>1236</u> cfs
	<u>0.0010</u> ft./ft.	Rainfall	<u>3.40</u> in (2 yr, 24 hr)
	Regional Factor	<u>1.057</u>	Typical Range for Bankfull Discharge:
			<u>490</u> to <u>990</u> cfs

**Local Stream Morphology:**

**Channel Description:** (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

<b>Basic Field Data:</b>	Stream Length	<input type="text"/> ft.
Bankfull Width	Valley Length	<input type="text"/> ft.
Mean Bankfull Depth	Contour Interval	<input type="text"/> feet <input type="text"/>
Width/Depth Ratio	Estimated Sinuosity	<input type="text"/>
Max. Bankfull Depth	Channel Slope:	
Width at twice max. depth	Surveyed:	<u>0.00063</u> ft./ft.
(16.2 ft.)	Estimated:	<input type="text"/> ft./ft.
Entrenchment Ratio	Bankfull Q from:	
<u>30.30</u>	Cross-Section	<u>493</u> cfs
	Basic field data	<u>557</u> cfs
	Selected Q	<u>525</u> cfs
	Radius of Curvature (Rc)	<input type="text"/> ft.
	Rc/Bankfull width:	<u>0.00</u>

**Bankfull Velocity Check:** (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)

Bedload: D <sub>90</sub>	<u>1</u> in.	Velocity required to move D <sub>90</sub> :	<u>2.1</u> ft./sec.
D <sub>50</sub>	<input type="text"/> in.	Velocity from Cross-Section data:	<u>2.63</u> ft./sec.
GOAL: Develop confidence by matching velocities from different sources.		Velocity from basic field data:	<u>2.97</u> ft./sec.
		Velocity from selected Q:	<u>2.8</u> ft./sec.

**Channel Evolution Stage** III  Stream Type (Rosgen)

**Notes**

23.4 cfs/sq. mi.

# Natural Open Channel Flow

Project: Xsec 2  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (**S**): 0.000630 ft/ft  
 Manning's **n**: 0.040  
 Flow Depth: 8.1 ft

$$Q \xi = \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

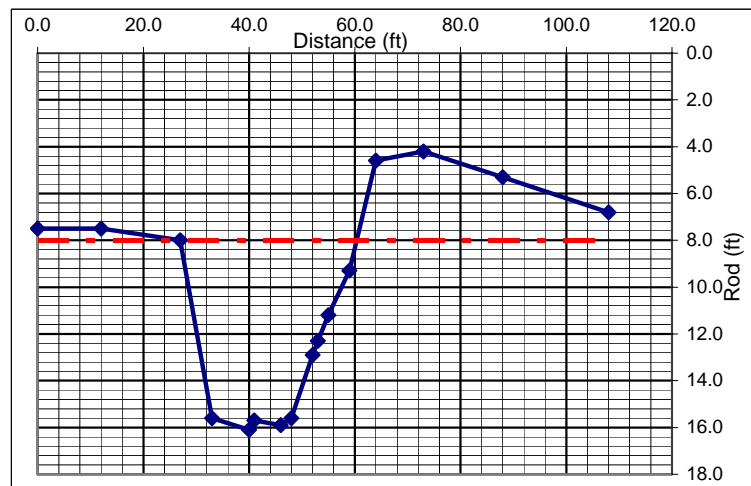
[back to I&E form](#)

Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
7.5	0.0
7.5	12.0
8.0	27.0
15.6	33.0
16.1	40.0
15.7	41.0
15.9	46.0
15.6	48.0
12.9	52.0
12.30	53
11.20	55
9.30	59
4.60	64
4.20	73
5.30	88
6.8	108

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	8.1 ft	8.6
Channel Flow ( <b>Q</b> ):	493.1 cfs	411.2
Channel Velocity:	2.6 ft/sec	2.0
Cross-Sectional Area ( <b>A</b> ):	187.1 sq.ft.	207.7
Hydraulic Radius ( <b>R</b> ):	4.7 ft	3.1



COMMENTS:

# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

County Marion T. R. Sec.

Date 9/13/2005 By Wayne Kinney

Stream Name East Fork Kaskaskia UTM Coord. E337838 N4296149

Landowner Name Xsec 3

Drainage Area 41.93 sq. mi. Clear Cells

**Regional Curve Predictions:**  
 Bankfull dimensions Width 64 ft. Cross Sectional Area 283 sq. ft.  
 Depth 4.4 ft.

**Reference Stream Gage:**  
 Skillet Fork near Iuka Station No. 03380350 Gage Q<sub>2</sub> 5000 cfs  
 Drainage Area 208 sq.mi Regression 3850 cfs  
 Marion County, IL REFERENCE STREAM DATA ONLY

**USGS Flood-Peak Discharge Predictions:**  
Valley Slope: 5.0 ft./mi. (user-entered) Regression Q<sub>2</sub> 1552 cfs  
 ft./mi (from worksheet) Rainfall 3.40 in (2 yr, 24 hr) Adjusted Q<sub>2</sub> 2015 cfs  
 0.0009 ft./ft. Regional Factor 1.057 Typical Range for Bankfull Discharge: 800 to 1620 cfs

**Local Stream Morphology:**

**Channel Description:** (c) Clean, winding, some pools and shoals  
 Manning's "n" 0.04  
 Stream Length ft.  
 Valley Length ft.  
 Contour Interval feet  
 Estimated Sinuosity  
**Basic Field Data:**  
 Bankfull Width 53 ft.  
 Mean Bankfull Depth 5.53 ft.  
 Width/Depth Ratio 9.58  
 Max. Bankfull Depth 8 ft.  
 Width at twice max. depth 800 ft.  
 (16.0 ft.)  
 Entrenchment Ratio 15.09  
 Channel Slope:  
 Surveyed: 0.000734 ft./ft. Bankfull Q from:  
 Estimated: ft./ft. Cross-Section 885 cfs  
 Basic field data 925 cfs  
 Selected Q 905 cfs  
 Radius of Curvature (Rc) ft.  
 Rc/Bankfull width: 0.00

**Bankfull Velocity Check:** (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)  
 Bedload: D<sub>90</sub> 1 in. Velocity required to move D<sub>90</sub>: 2.1 ft./sec.  
 D<sub>50</sub> in. Velocity from Cross-Section data: 3.02 ft./sec.  
 GOAL: Develop confidence by matching velocities from different sources. Velocity from basic field data: 3.16 ft./sec.  
 Velocity from selected Q: 3.1 ft./sec.

**Channel Evolution Stage** III Stream Type (Rosgen)

**Notes**

21.6 cfs/ sq. mi.



# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

**County** Marion  T.  R.  Sec.   
 Date 9/13/2005 By Wayne Kinney  
 Stream Name East Fork Kaskaskia UTM Coord. E336750 N4294502  
 Landowner Name Xsec 4  
 Drainage Area 46.45 sq. mi.

*Regional Curve Predictions:*

Bankfull dimensions	Width	<u>67</u> ft.	Cross Sectional Area	<u>304</u> sq. ft.
	Depth	<u>4.6</u> ft.		

*Reference Stream Gage:*

Skillet Fork near Iuka	Station No.	<u>03380350</u>	Gage Q <sub>2</sub>	<u>5000</u> cfs
Marion County, IL	Drainage Area	<u>208</u> sq.mi	Regression Coefficient	<u>3850</u> cfs

**REFERENCE STREAM DATA ONLY**

*USGS Flood-Peak Discharge Predictions:*

<u>4.8</u> ft./mi. (user-entered)	Regression Q <sub>2</sub>	<u>1651</u> cfs
<u>0.0009</u> ft./ft.	Adjusted Q <sub>2</sub>	<u>2144</u> cfs
Rainfall <u>3.40</u> in (2 yr, 24 hr)	Typical Range for Bankfull Discharge:	<u>850</u> to <u>1720</u> cfs
Regional Factor <u>1.057</u>		

*Local Stream Morphology:*

**Channel Description:** (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

<i>Basic Field Data:</i>	Stream Length	<input type="text"/> ft.
Bankfull Width <u>68</u> ft.	Valley Length	<input type="text"/> ft.
Mean Bankfull Depth <u>4.53</u> ft.	Contour Interval	<input type="text"/> feet <input type="text"/>
Width/Depth Ratio <u>15.01</u>	Estimated Sinuosity	<input type="text"/>
Max. Bankfull Depth <u>7.9</u> ft.	<i>Channel Slope:</i>	Bankfull Q from:
Width at twice max. depth <u>1000</u> ft. (15.8 ft.)	Surveyed: <u>0.00072</u> ft./ft.	<u>Cross-Section</u> <u>819</u> cfs
Entrenchment Ratio <u>14.71</u>	Estimated: <input type="text"/> ft./ft.	Basic field data <u>843</u> cfs
	Radius of Curvature (Rc) <input type="text"/> ft.	Selected Q <u>831</u> cfs
	Rc/Bankfull width: <u>0.00</u>	

*Bankfull Velocity Check: (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload: D <sub>90</sub> <u>1</u> in.	Velocity required to move D <sub>90</sub> :	<u>2.1</u> ft./sec.
D <sub>50</sub> <input type="text"/> in.	Velocity from Cross-Section data:	<u>2.66</u> ft./sec.
GOAL: Develop confidence by matching velocities from different sources.	Velocity from basic field data:	<u>2.74</u> ft./sec.
	Velocity from selected Q:	<u>2.7</u> ft./sec.

Channel Evolution Stage  Stream Type (Rosgen)

**Notes**

17.9 cfs/sq. mi.

# Natural Open Channel Flow

Project: Xsec 4  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (S): 0.000720 ft/ft  
 Manning's n: 0.040  
 Flow Depth: 7.9 ft

$$Q \xi = \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

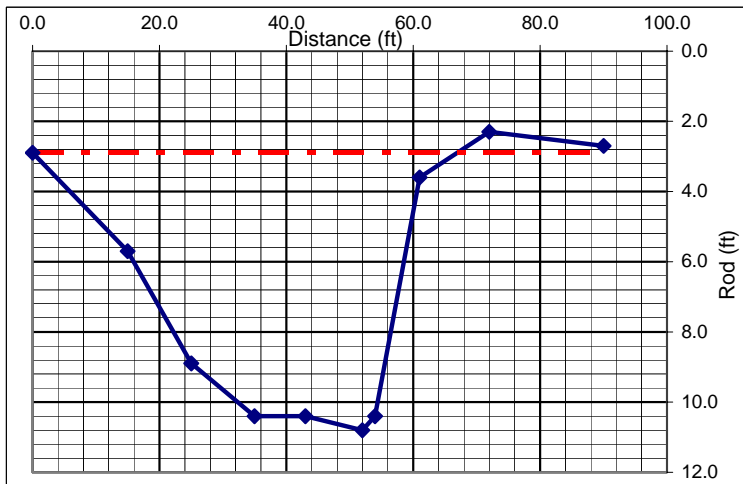
[back to I&E form](#)

Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
2.9	0.0
5.7	15.0
8.9	25.0
10.4	35.0
10.4	43.0
10.8	52.0
10.4	54.0
3.6	61.0
2.3	72.0
2.70	90

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	7.9 ft	7.9
Channel Flow (Q):	819.3 cfs	819.3
Channel Velocity:	2.7 ft/sec	2.7
Cross-Sectional Area (A):	308.0 sq.ft.	308.0
Hydraulic Radius (R):	4.4 ft	4.4



COMMENTS:

# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

**County** Marion  T.  R.  Sec.   
**Date** 9/13/2005 **By** Wayne Kinney  
**Stream Name** East Fork Kaskaskia **UTM Coord.** E333679 N4292966  
**Landowner Name** Xsec 5  
**Drainage Area** 56.62 sq. mi.

*Regional Curve Predictions:*

Bankfull dimensions	Width	72 ft.	Cross Sectional Area	347 sq. ft.
	Depth	4.8 ft.		

*Reference Stream Gage:*

Skillet Fork near Iuka	Station No.	03380350	Gage Q <sub>2</sub>	5000 cfs
Marion County, IL	Drainage Area	208 sq.mi	Regression Coefficient	3850 cfs

**REFERENCE STREAM DATA ONLY**

*USGS Flood-Peak Discharge Predictions:*

<b>Valley Slope:</b> 4.4 ft./mi. (user-entered)	Regression Q <sub>2</sub>	1855 cfs
<input type="text"/> ft/mi (from worksheet)	Adjusted Q <sub>2</sub>	2409 cfs
Rainfall 3.40 in (2 yr, 24 hr)	Typical Range for Bankfull Discharge:	960 to 1930 cfs
Regional Factor 1.057		

*Local Stream Morphology:*

**Channel Description:** (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

<i>Basic Field Data:</i>	Stream Length	<input type="text"/> ft.
Bankfull Width 54 ft.	Valley Length	<input type="text"/> ft.
Mean Bankfull Depth 5.71 ft.	Contour Interval	<input type="text"/> feet <input type="text"/>
Width/Depth Ratio 9.46	Estimated Sinuosity	<input type="text"/>
Max. Bankfull Depth 8.9 ft.	<i>Channel Slope:</i>	Bankfull Q from:
Width at twice max. depth 800 ft. (17.8 ft.)	Surveyed: 0.00048 ft./ft.	Cross-Section 759 cfs
Entrenchment Ratio 14.81	Estimated: <input type="text"/> ft./ft.	Basic field data 804 cfs
	Radius of Curvature (Rc) <input type="text"/> ft.	Selected Q 782 cfs
	Rc/Bankfull width: 0.00	

*Bankfull Velocity Check: (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload: D <sub>90</sub> 1 <input type="text"/> in.	Velocity required to move D <sub>90</sub> :	2.1 ft./sec.
D <sub>50</sub> <input type="text"/> in.	Velocity from Cross-Section data:	2.46 ft./sec.
GOAL: Develop confidence by matching velocities from different sources.	Velocity from basic field data:	2.61 ft./sec.
	Velocity from selected Q:	2.5 ft./sec.

**Channel Evolution Stage** 1  **Stream Type (Rosgen)**

**Notes**

13.8 cfs/sq. mi.





# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

**County** Marion  T.  R.  Sec.   
**Date** 9/13/2005 **By** Wayne Kinney  
**Stream Name** East Fork Kaskaskia **UTM Coord.** E329960 N4291748  
**Landowner Name** Xsec 6  
**Drainage Area** 65.39 sq. mi.

**Regional Curve Predictions:**

Bankfull dimensions	Width	76 ft.	Cross Sectional Area	383 sq. ft.
	Depth	5.0 ft.		

**Reference Stream Gage:**

Skillet Fork near Iuka	Station No.	03380350	Gage Q <sub>2</sub>	5000 cfs
Marion County, IL	Drainage Area	208 sq.mi	Regression Q <sub>2</sub>	3850 cfs

**REFERENCE STREAM DATA ONLY**

**USGS Flood-Peak Discharge Predictions:**

<b>Valley Slope:</b> 3.8 ft./mi. (user-entered)	Regression Q <sub>2</sub>	1946 cfs
ft./mi (from worksheet)	Adjusted Q <sub>2</sub>	2528 cfs
0.0007 ft./ft.	Typical Range for Bankfull Discharge:	1010 to 2030 cfs
Rainfall: 3.40 in (2 yr, 24 hr)		
Regional Factor: 1.057		

**Local Stream Morphology:**

**Channel Description:** (c) Clean, winding, some pools and shoals

**Manning's "n"** 0.04

<b>Basic Field Data:</b>	Stream Length	ft.
Bankfull Width: 76 ft.	Valley Length	ft.
Mean Bankfull Depth: 4.39 ft.	Contour Interval	feet
Width/Depth Ratio: 17.31	Estimated Sinuosity	
Max. Bankfull Depth: 8.2 ft.	Channel Slope:	
Width at twice max. depth (16.4 ft.): 800 ft.	Surveyed: 0.00058 ft./ft.	Bankfull Q from:
Entrenchment Ratio: 10.53	Estimated: ft./ft.	Cross-Section: 767 cfs
	Radius of Curvature (Rc): ft.	Basic field data: 803 cfs
	Rc/Bankfull width: 0.00	Selected Q: 785 cfs

**Bankfull Velocity Check:** (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)

Bedload: D <sub>90</sub> 1 in.	Velocity required to move D <sub>90</sub> :	2.1 ft./sec.
D <sub>50</sub> in.	Velocity from Cross-Section data:	2.30 ft./sec.
GOAL: Develop confidence by matching velocities from different sources.	Velocity from basic field data:	2.41 ft./sec.
	Velocity from selected Q:	2.4 ft./sec.

**Channel Evolution Stage** I  **Stream Type (Rosgen)**

**Notes**

12.0 cfs/sq. mi

# Natural Open Channel Flow

Project: Xsec 6  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (S): 0.000580 ft/ft  
 Manning's n: 0.040  
 Flow Depth: 8.2 ft

$$Q = \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

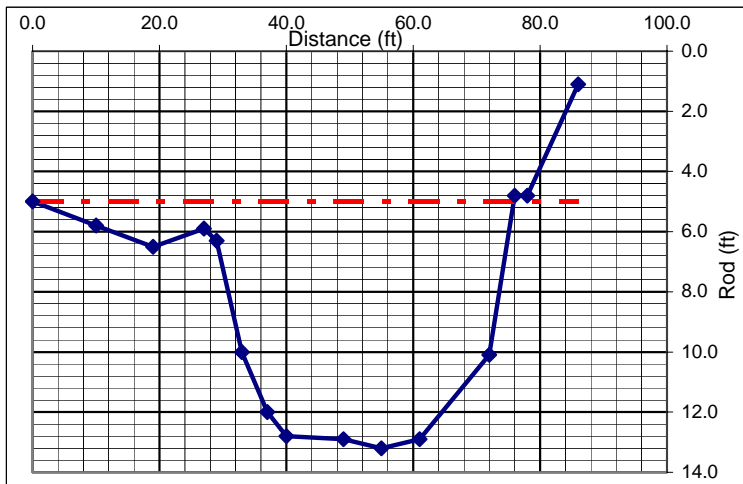
[back to I&E form](#)

Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
5.0	0.0
5.8	10.0
6.5	19.0
5.9	27.0
6.3	29.0
10.0	33.0
12.0	37.0
12.8	40.0
12.9	49.0
13.20	55
12.90	61
10.10	72
4.80	76
4.80	78
1.10	86

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	8.2 ft	8.2
Channel Flow (Q):	767.2 cfs	767.2
Channel Velocity:	2.3 ft/sec	2.3
Cross-Sectional Area (A):	333.5 sq.ft.	333.5
Hydraulic Radius (R):	4.1 ft	4.1



COMMENTS:

# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

**County** Marion  T.  R.  Sec.   
**Date** 9/13/2005 **By** Wayne Kinney  
**Stream Name** East Fork Kaskaskia **UTM Coord.** E325042 N4289279  
**Landowner Name** Xsec 7  
**Drainage Area** 73.66 sq. mi.

**Regional Curve Predictions:**

Bankfull dimensions	Width	80 ft.	Cross Sectional Area	415 sq. ft.
	Depth	5.2 ft.		

**Reference Stream Gage:**

Skillet Fork near Iuka	Station No.	03380350	Gage Q <sub>2</sub>	5000 cfs
Marion County, IL	Drainage Area	208 sq.mi	Regression Coefficient	3850 cfs

**REFERENCE STREAM DATA ONLY**

**USGS Flood-Peak Discharge Predictions:**

<b>Valley Slope:</b> 3.4 ft./mi. (user-entered)	Regression Q <sub>2</sub>	2019 cfs
ft./mi (from worksheet)	Adjusted Q <sub>2</sub>	2623 cfs
0.0006 ft./ft.	Typical Range for Bankfull Discharge:	1040 to 2100 cfs
Rainfall: 3.40 in (2 yr, 24 hr)		
Regional Factor: 1.057		

**Local Stream Morphology:**

**Channel Description:** (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

<b>Basic Field Data:</b>	Stream Length	ft.
Bankfull Width	Valley Length	ft.
Mean Bankfull Depth	Contour Interval	feet
Width/Depth Ratio	Estimated Sinuosity	
Max. Bankfull Depth	Channel Slope:	
Width at twice max. depth (16.2 ft.)	Surveyed:	0.00047 ft./ft.
Entrenchment Ratio	Estimated:	ft./ft.
	Radius of Curvature (Rc)	ft.
	Rc/Bankfull width:	0.00

**Bankfull Q from:**

Cross-Section	770 cfs
Basic field data	816 cfs
Selected Q	793 cfs

**Bankfull Velocity Check:** (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)

Bedload: D <sub>90</sub> 2 in.	Velocity required to move D <sub>90</sub> :	2.9 ft./sec.
D <sub>50</sub> in.	Velocity from Cross-Section data:	2.54 ft./sec.
GOAL: Develop confidence by matching velocities from different sources.	Velocity from basic field data:	2.69 ft./sec.
	Velocity from selected Q:	2.6 ft./sec.

**Channel Evolution Stage** III  **Stream Type (Rosgen)**

**Notes**

10.8 cfs/sq. mi.

# Natural Open Channel Flow

Project: Xsec 7  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (S): 0.000470 ft/ft  
 Manning's n: 0.040  
 Flow Depth: 8.1 ft

$$Q = \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

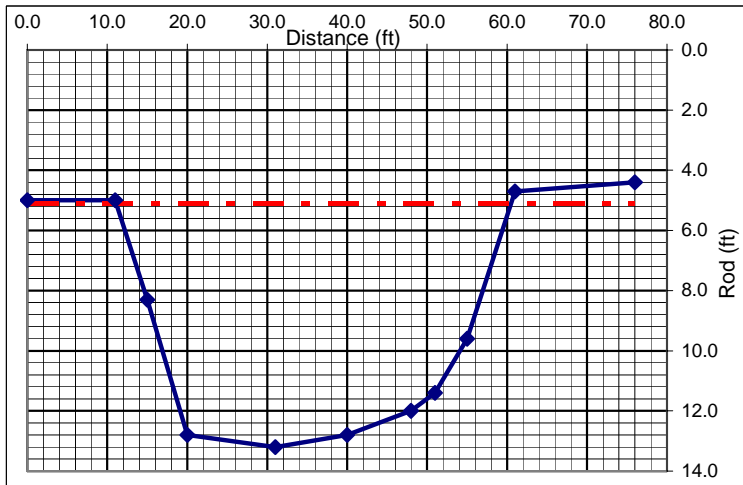
[back to I&E form](#)

Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
5.0	0.0
5.0	11.0
8.3	15.0
12.8	20.0
13.2	31.0
12.8	40.0
12.0	48.0
11.4	51.0
9.6	55.0
4.70	61
4.40	76

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	8.1 ft	
Channel Flow (Q):	769.8 cfs	
Channel Velocity:	2.5 ft/sec	
Cross-Sectional Area (A):	303.7 sq.ft.	
Hydraulic Radius (R):	5.6 ft	



COMMENTS:

# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

**County** Marion  T.  R.  Sec.   
**Date** 9/13/2005 **By** Wayne Kinney  
**Stream Name** East Fork Kaskaskia **UTM Coord.** E323321 N4287973  
**Landowner Name** Xsec 8  
**Drainage Area** 75.91 sq. mi.

*Regional Curve Predictions:*

Bankfull dimensions	Width	81 ft.	Cross Sectional Area	424 sq. ft.
	Depth	5.3 ft.		

*Reference Stream Gage:*

Skillet Fork near Iuka	Station No.	03380350	Gage Q <sub>2</sub>	5000 cfs
Marion County, IL	Drainage Area	208 sq.mi	Regression Coefficient	3850 cfs

**REFERENCE STREAM DATA ONLY**

*USGS Flood-Peak Discharge Predictions:*

<b>Valley Slope:</b> 2.8 ft./mi. (user-entered)	Regression Q <sub>2</sub>	1890 cfs
<input type="text"/> ft/mi (from worksheet)	Adjusted Q <sub>2</sub>	2455 cfs
Rainfall 3.40 in (2 yr, 24 hr)	Typical Range for Bankfull Discharge:	980 to 1970 cfs
Regional Factor 1.057		

*Local Stream Morphology:*

**Channel Description:** (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

<i>Basic Field Data:</i>	Stream Length	<input type="text"/> ft.
Bankfull Width	Valley Length	<input type="text"/> ft.
Mean Bankfull Depth	Contour Interval	<input type="text"/> feet <input type="text"/>
Width/Depth Ratio	Estimated Sinuosity	<input type="text"/>
Max. Bankfull Depth	<i>Channel Slope:</i>	Bankfull Q from:
Width at twice max. depth (13.4 ft.)	Surveyed: 0.00077 ft./ft.	Cross-Section 853 cfs
Entrenchment Ratio 18.18	Estimated: <input type="text"/> ft./ft.	Basic field data 899 cfs
Radius of Curvature (Rc)		Selected Q 876 cfs
Rc/Bankfull width: 0.00		

*Bankfull Velocity Check: (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload: D <sub>90</sub> 1 <input type="text"/> in.	Velocity required to move D <sub>90</sub> :	2.1 ft./sec.
D <sub>50</sub> <input type="text"/> in.	Velocity from Cross-Section data:	2.96 ft./sec.
GOAL: Develop confidence by matching velocities from different sources.	Velocity from basic field data:	3.12 ft./sec.
	Velocity from selected Q:	3.0 ft./sec.

**Channel Evolution Stage** III  **Stream Type (Rosgen)**

**Notes**

# Natural Open Channel Flow

Project: Xsec 8  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (S): 0.000770 ft/ft  
 Manning's n: 0.040  
 Flow Depth: 6.7 ft

$$Q = \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

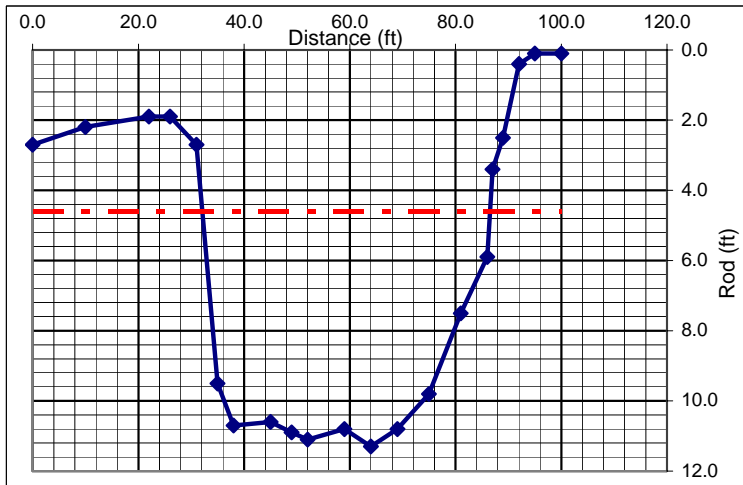
[back to I&E form](#)

Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
2.7	0.0
2.2	10.0
1.9	22.0
1.9	26.0
2.7	31.0
9.5	35.0
10.7	38.0
10.6	45.0
10.9	49.0
11.10	52
10.80	59
11.30	64
10.80	69
9.80	75
7.50	81
5.9	86
3.4	87
2.5	89
0.4	92
0.1	95
0.1	100

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	6.7 ft	8.6
Channel Flow (Q):	852.9 cfs	1,357.0
Channel Velocity:	3.0 ft/sec	3.4
Cross-Sectional Area (A):	288.0 sq.ft.	393.6
Hydraulic Radius (R):	4.9 ft	6.1



COMMENTS:


# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

**County** Marion  T.  R.  Sec.   
**Date** 9/13/2005  By Wayne Kinney  
**Stream Name** East Fork Kaskaskia  **UTM Coord.** E319797 N4286392  
**Landowner Name** Xsec 9   
**Drainage Area** 91.45 sq. mi.

*Regional Curve Predictions:*

Bankfull dimensions	Width	87 ft.	Cross Sectional Area	481 sq. ft.
	Depth	5.5 ft.		

*Reference Stream Gage:*

Skillet Fork near Iuka <input type="text"/>	Station No.	03380350	Gage Q <sub>2</sub>	5000 cfs
	Drainage Area	208 sq.mi	Regression	3850 cfs

Marion County, IL **REFERENCE STREAM DATA ONLY**

*USGS Flood-Peak Discharge Predictions:*

<u>Valley Slope:</u>	2.9 ft./mi. (user-entered)	Regression Q <sub>2</sub>	2219 cfs
	ft/mi (from worksheet)	Adjusted Q <sub>2</sub>	2882 cfs
	0.0005 ft./ft.	Typical Range for Bankfull Discharge:	1150 to 2310 cfs
	Rainfall	3.40 in (2 yr, 24 hr)	
	Regional Factor	1.057	

*Local Stream Morphology:*

**Channel Description:** (c) Clean, winding, some pools and shoals

Manning's "n" 0.04

<i>Basic Field Data:</i>	Stream Length	<input type="text"/> ft.
Bankfull Width	Valley Length	<input type="text"/> ft.
Mean Bankfull Depth	Contour Interval	<input type="text"/> feet <input type="text"/>
Width/Depth Ratio	Estimated Sinuosity	<input type="text"/>
58 ft.		
6.44 ft.		
9.01		

*Channel Slope:*

Max. Bankfull Depth	Surveyed:	0.00044 ft./ft.	Bankfull Q from:
Width at twice max. depth	Estimated:	<input type="text"/> ft./ft.	Cross-Section
(17.0 ft.)			947 cfs
Entrenchment Ratio	Radius of Curvature (Rc)	<input type="text"/> ft.	Basic field data
17.24	Rc/Bankfull width:	0.00	1011 cfs
			Selected Q
			979 cfs

*Bankfull Velocity Check: (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)*

Bedload: D <sub>90</sub>	1 <input type="text"/> in.	Velocity required to move D <sub>90</sub> :	2.1 ft./sec.
D <sub>50</sub>	<input type="text"/> in.	Velocity from Cross-Section data:	2.54 ft./sec.
GOAL: Develop confidence by matching velocities from different sources.		Velocity from basic field data:	2.71 ft./sec.
		Velocity from selected Q:	2.6 ft./sec.

**Channel Evolution Stage** III  **Stream Type (Rosgen)**

**Notes**





# Stream Stabilization I & E Form

ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book

<b>County</b>	Marion	T.	R.	Sec.
Date	9/13/2005	By	Wayne Kinney	
Stream Name	East Fork Kaskaskia	UTM Coord.	E317592 N4284508	
Landowner Name	Xsec 10			
Drainage Area	94.4 sq. mi.	Clear Cells		

**Regional Curve Predictions:**

Bankfull dimensions	Width	88 ft.	Cross Sectional Area	491 sq. ft.
	Depth	5.6 ft.		

**Reference Stream Gage:**

Skillet Fork near Iuka	Station No.	03380350	Gage Q <sub>2</sub>	5000 cfs
	Drainage Area	208 sq.mi	Regression	3850 cfs
Marion County, IL	<b>REFERENCE STREAM DATA ONLY</b>			

**USGS Flood-Peak Discharge Predictions:**

<b>Valley Slope:</b>	2.9 ft./mi. (user-entered)	Regression Q <sub>2</sub>	2276 cfs
	ft/mi (from worksheet)	Adjusted Q <sub>2</sub>	2955 cfs
	0.0005 ft./ft.	Typical Range for Bankfull Discharge:	1180 to 2370 cfs
	Rainfall	3.40 in (2 yr, 24 hr)	
	Regional Factor	1.057	

**Local Stream Morphology:**

**Channel Description:** (c) Clean, winding, some pools and shoals

Manning's "n"	0.04	Stream Length	ft.
<b>Basic Field Data:</b>		Valley Length	ft.
Bankfull Width	66 ft.	Contour Interval	feet
Mean Bankfull Depth	6.15 ft.	Estimated Sinuosity	
Width/Depth Ratio	10.73		
Max. Bankfull Depth	ft.	<b>Channel Slope:</b>	
Width at twice max. depth	ft.	Surveyed:	0.00041 ft./ft.
Entrenchment Ratio	0.00	Estimated:	ft./ft.
		Bankfull Q from:	
		Cross-Section	976 cfs
		Basic field data	1028 cfs
		Selected Q	1002 cfs
		Radius of Curvature (Rc)	ft.
		Rc/Bankfull width:	0.00

**Bankfull Velocity Check:** (typical Illinois streams will have average bankfull velocity between 3 and 5 ft/sec.)

Bedload: D <sub>90</sub>	1 in.	Velocity required to move D <sub>90</sub> :	2.1 ft./sec.
D <sub>50</sub>	in.	Velocity from Cross-Section data:	2.40 ft./sec.
<b>GOAL:</b> Develop confidence by matching velocities from different sources.		Velocity from basic field data:	2.53 ft./sec.
		Velocity from selected Q:	2.5 ft./sec.

**Channel Evolution Stage** III Stream Type (Rosgen)

**Notes**

10.6 cfs/sq. mi.

# Natural Open Channel Flow

Project: Xsec 10  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (S): 0.000410 ft/ft  
 Manning's n: 0.040  
 Flow Depth: 8.3 ft

$$Q \pi \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

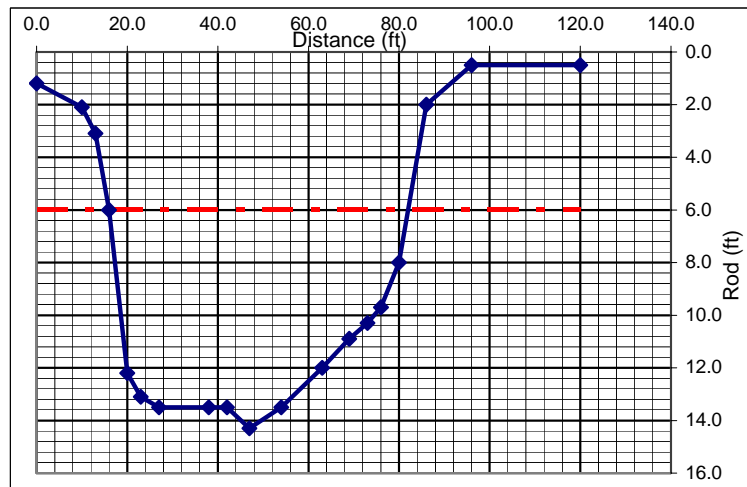
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Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
1.2	0.0
2.1	10.0
3.1	13.0
6.0	16.0
12.2	20.0
13.1	23.0
13.5	27.0
13.5	38.0
13.5	42.0
14.30	47
13.50	54
12.00	63
10.90	69
10.30	73
9.70	76
8.0	80
2.0	86
0.5	96
0.5	120

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	8.3 ft	13.1
Channel Flow (Q):	975.7 cfs	2,192.0
Channel Velocity:	2.4 ft/sec	2.9
Cross-Sectional Area (A):	406.1 sq.ft.	755.0
Hydraulic Radius (R):	5.7 ft	7.6



COMMENTS:

Stream Stabilization I & E Form		ILLINOIS NRCS - Version 2.05- modified 9/12/04 R.Book	
<b>County</b>	Marion <input type="button" value="v"/>	T. <input type="text"/>	R. <input type="text"/> Sec. <input type="text"/>
Date	9/13/2005	By	Wayne Kinney
Stream Name	East Fork Kaskaskia	UTM Coord.	E315539 N4286209
Landowner Name	Xsec 11		
Drainage Area	115.58 sq. mi.	<input type="button" value="Clear Cells"/>	
<i>Regional Curve Predictions:</i>			
Bankfull dimensions	Width 95 ft.	Cross Sectional Area	563 sq. ft.
	Depth 5.9 ft.		
<i>Reference Stream Gage:</i>			
Skillet Fork near Iuka <input type="button" value="v"/>	Station No.	03380350	Gage Q <sub>2</sub> 5000 cfs
	Drainage Area	208 sq.mi	Regression <input type="text"/> 3850 cfs
Marion County, IL	<b>REFERENCE STREAM DATA ONLY</b>		
<i>USGS Flood-Peak Discharge Predictions:</i>			
<a href="#">Valley Slope:</a>	2.8 ft./mi. (user-entered)	Regression Q <sub>2</sub>	2626 cfs
	<input type="text"/> ft/mi (from worksheet)	Adjusted Q <sub>2</sub>	3410 cfs
	0.0005 ft./ft.	Rainfall	3.40 in (2 yr, 24 hr)
		Regional Factor	1.057
		Typical Range for Bankfull Discharge: 1360 to 2730 cfs	
<i>Local Stream Morphology:</i>			
<b>Channel Description:</b>	(c) Clean, winding, some pools and shoals <input type="button" value="v"/>		
Manning's "n"	0.04	Stream Length	<input type="text"/> ft.
<i>Basic Field Data:</i>		Valley Length	<input type="text"/> ft.
Bankfull Width	61 ft.	Contour Interval	<input type="text"/> feet <input type="button" value="v"/>
Mean Bankfull Depth	6.85 ft.	Estimated Sinuosity	<input type="text"/>
Width/Depth Ratio	8.91	<i>Channel Slope:</i>	
Max. Bankfull Depth	9.5 ft.	Surveyed:	0.00045 ft./ft.
Width at twice max. depth	1000 ft.	Estimated:	<input type="text"/> ft./ft.
(19.0 ft.)		Bankfull Q from:	
Entrenchment Ratio	16.39	Cross-Section	1139 cfs
		Basic field data	1192 cfs
		Selected Q	1166 cfs
		Radius of Curvature (Rc)	<input type="text"/> ft.
		Rc/Bankfull width:	0.00
<i>Bankfull Velocity Check: (typical Illinois streams will have average bankfull velocity between 3 and 5 ft./sec.)</i>			
Bedload:	D <sub>90</sub> 1 <input type="button" value="v"/> in.	Velocity required to move D <sub>90</sub> :	2.1 ft./sec.
	D <sub>50</sub> <input type="text"/> in.	Velocity from Cross-Section data:	2.73 ft./sec.
GOAL: Develop confidence by matching velocities from different sources.		Velocity from basic field data:	2.85 ft./sec.
		Velocity from selected Q:	2.8 ft./sec.
<a href="#">Channel Evolution Stage</a>	III <input type="button" value="v"/>	Stream Type (Rosgen)	<input type="text"/>
<b>Notes</b>			
10.08 cfs/sq. mi.			

# Natural Open Channel Flow

Project: Xsec 11  
 Assisted by: Wayne Kinney  
 Date: 9/13/2005  
 Channel Slope (S): 0.000450 ft/ft  
 Manning's n: 0.040  
 Flow Depth: 9.5 ft

$$Q \leq \frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

assuming uniform, steady flow

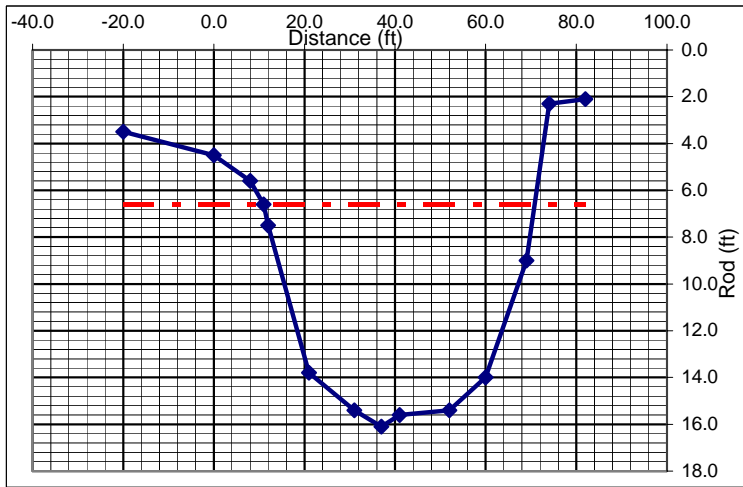
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Clear Cells

**Survey Data:**

Rod (ft)	Distance (ft)
3.5	-20.0
4.5	0.0
5.6	8.0
6.6	11.0
7.5	12.0
13.8	21.0
15.4	31.0
16.1	37.0
15.6	41.0
15.40	52
14.00	60
9.00	69
2.30	74
2.10	82

	Trial Depth 2	Trial Depth 3
Selected Flow Depth:	9.5 ft	12.6
Channel Flow (Q):	1,138.7 cfs	1,723.7
Channel Velocity:	2.7 ft/sec	2.7
Cross-Sectional Area (A):	417.7 sq.ft.	636.9
Hydraulic Radius (R):	6.4 ft	6.4



COMMENTS: