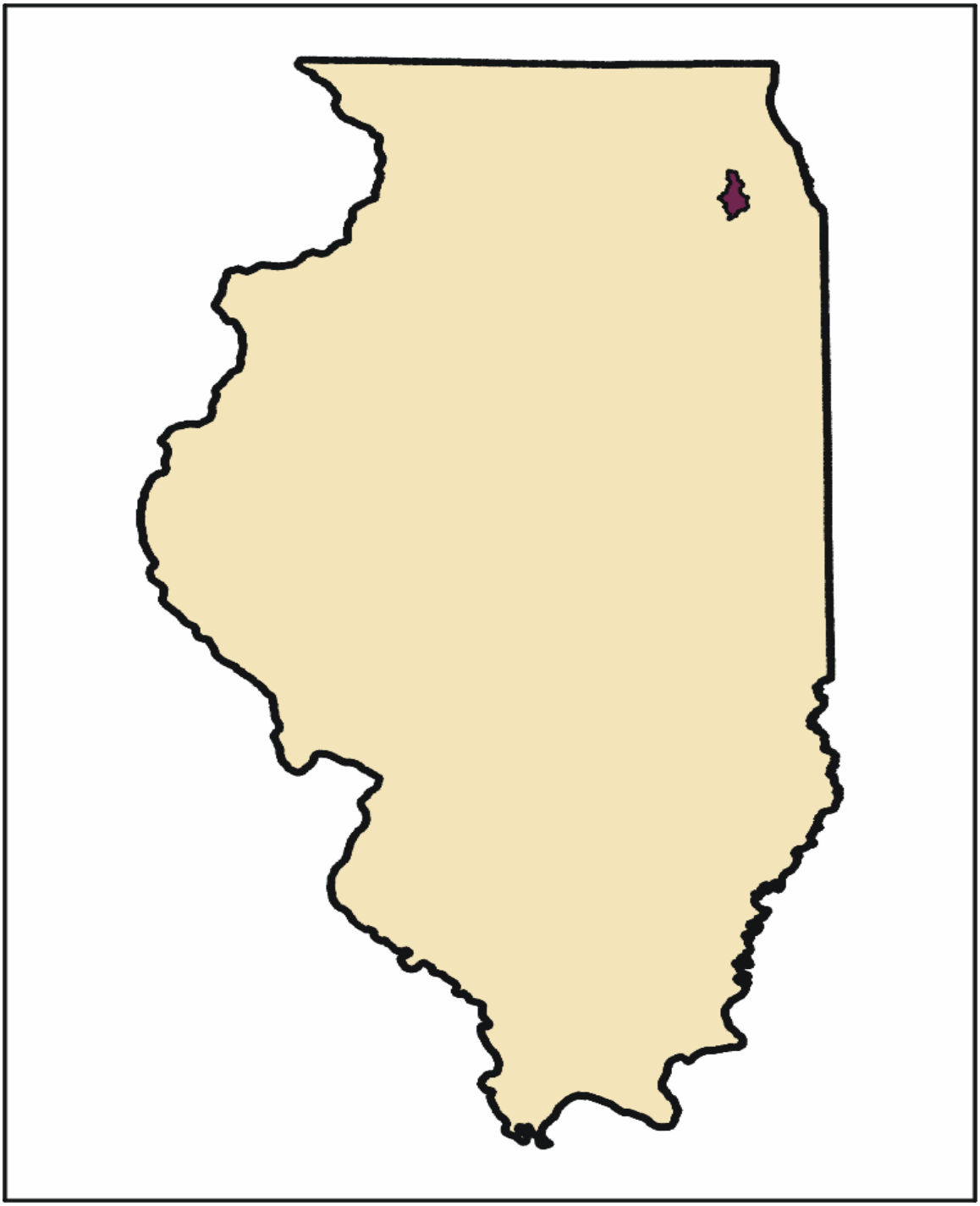


AERIAL ASSESSMENT REPORT FOR East Branch DuPage River

DuPage County

November 2005

Prepared by Wayne Kinney for IL. Dept. of Agriculture

The final TMDL report for the East Branch of the DuPage River found three impaired segments. The segments GBL 05, GBL 10 and GBL 08 are all impaired by dissolved oxygen (DO). GBL 10 and GBL 05 are also impaired by Chloride and GBL 05 has the additional impairment of total dissolved solids (TDS).
Potential sources of the impairments are urban runoff/storm sewers, contaminated sediments, waterfowl and municipal point sources. This aerial assessment of the main stem of the East Branch of the DuPage will address potential contaminated sediment from streambank erosion and increased DO through reaeration of stream flow.

Assessment Procedure

Low level geo-referenced video was taken of the East Branch of the DuPage 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 near Army Trail Road above North Avenue and continued downstream to the confluence with the West Branch of the DuPage River near Bolingbrook. Aerial video of tributaries was not part of the project, regardless of the stream size or vegetation.

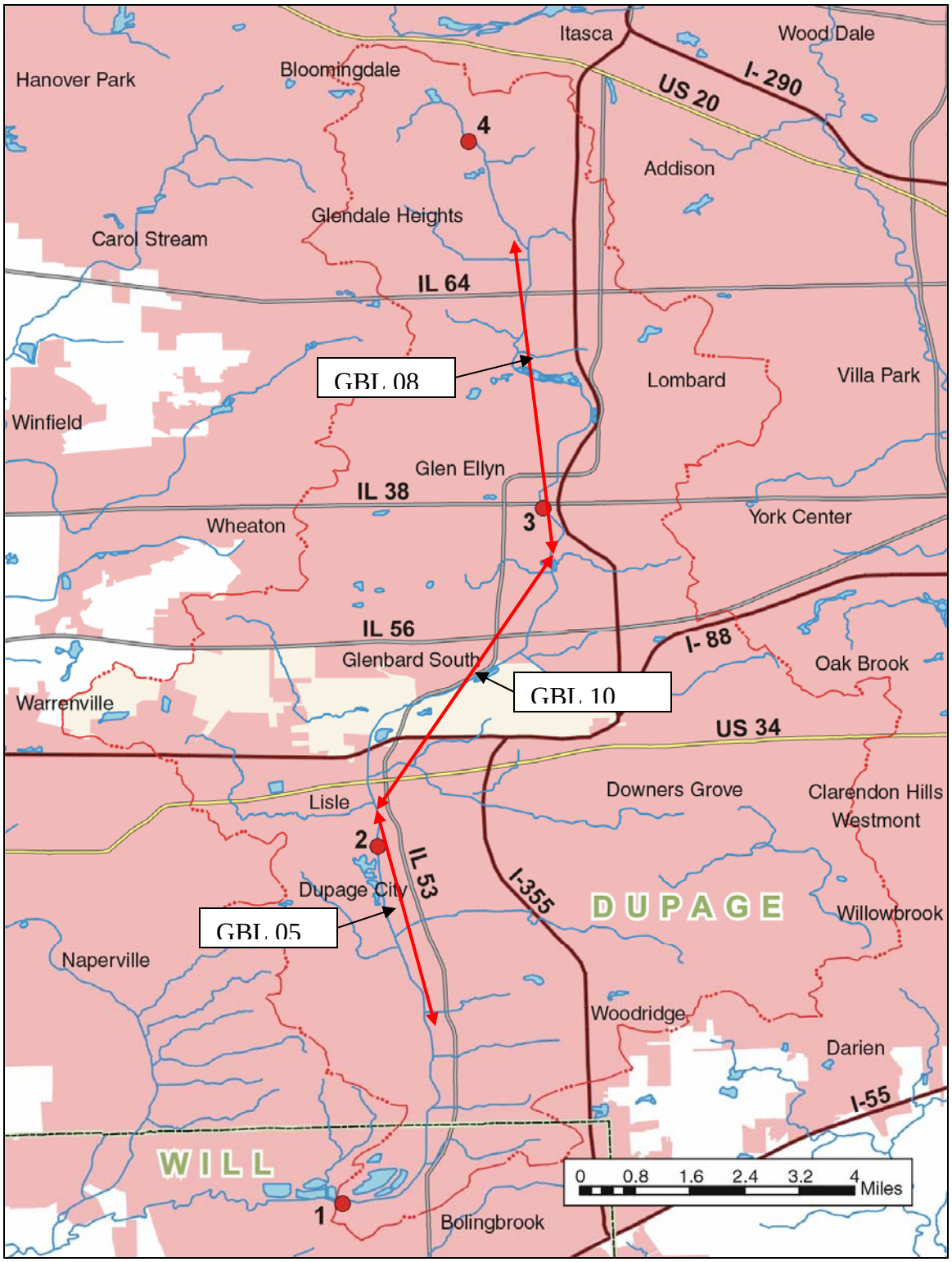


Fig. 1 Aerial Assessment Map of the East Branch of the DuPage River with DVD Chapters and Impaired Segments

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.

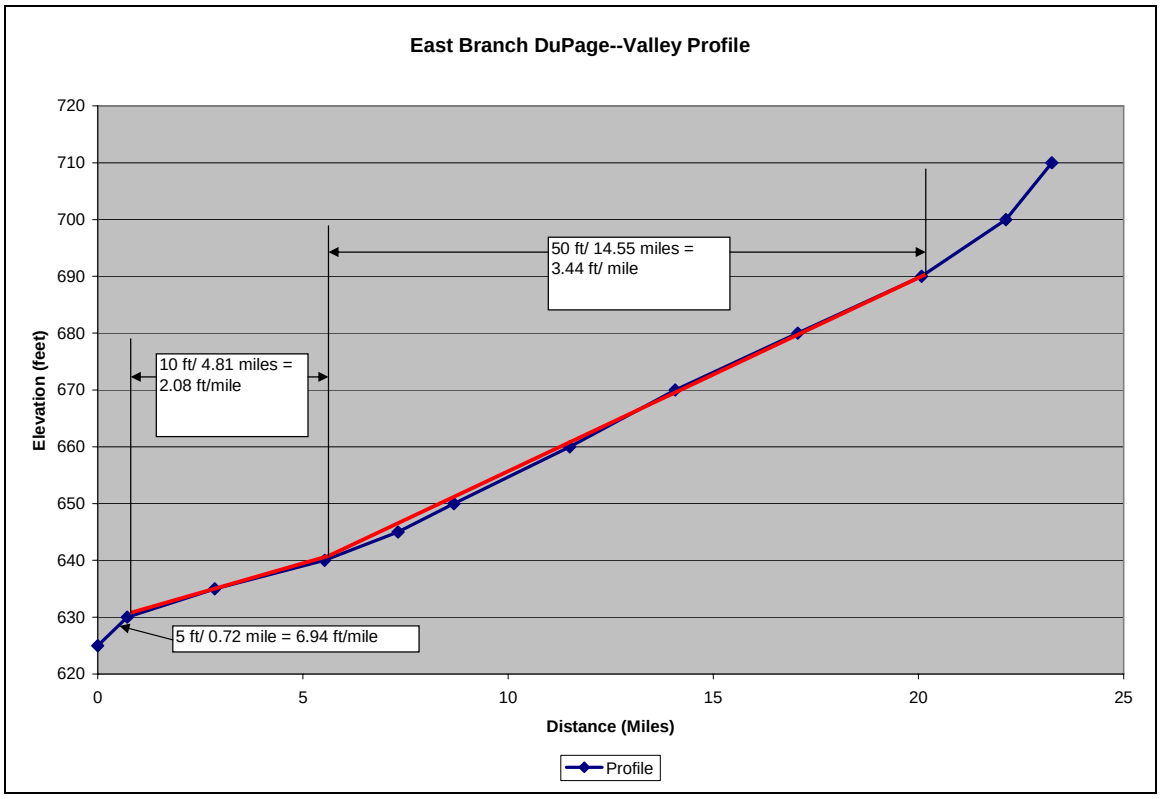


Fig. 2 Channel Profile East Branch of the DuPage River

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	5:00	1	1,2,3
1	3	10:00	2	4,5,6
1	4	15:00:00	3	7,8
1	5	20:00:00	4	

Note: Flight path is from upstream to downstream

Table 1 DVD Chapters and Report Guide

The DVD has been divided into "chapters" of approximately five 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".

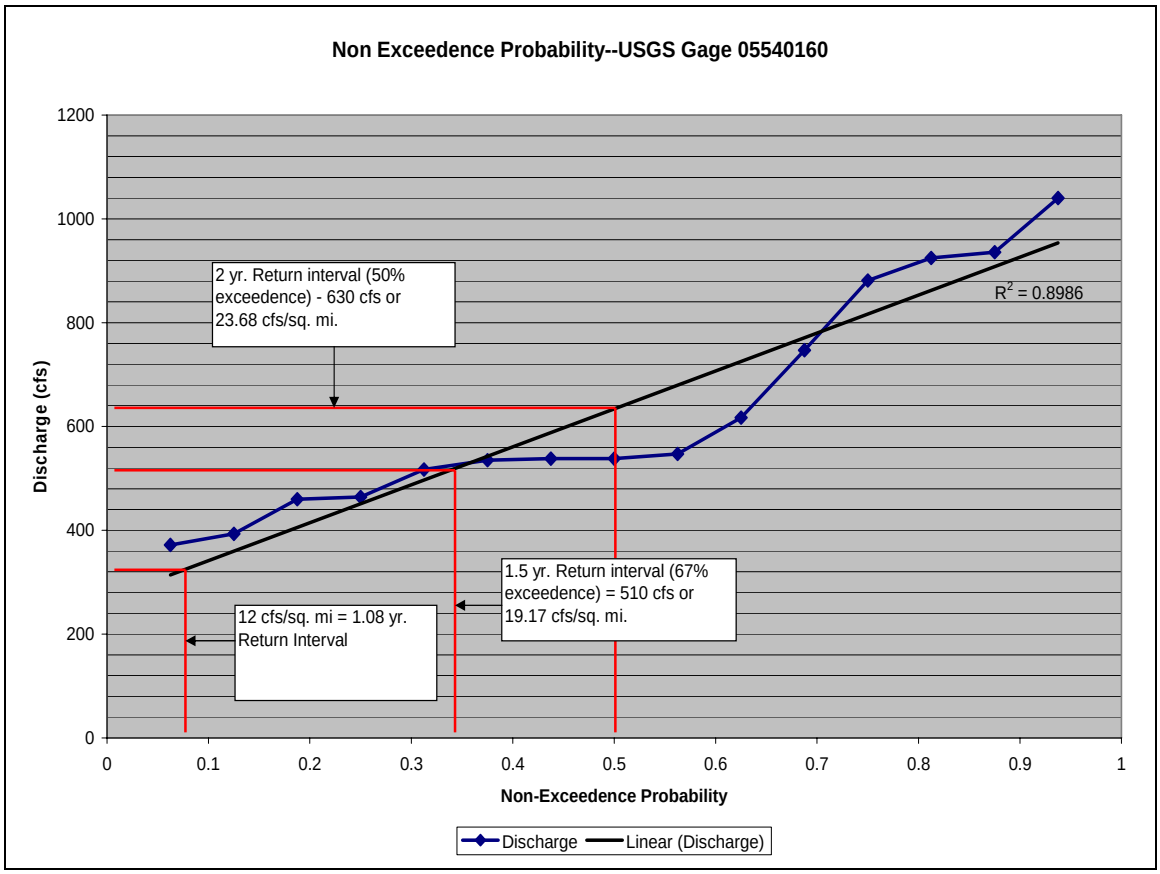


Fig. 3 Annual Peak Discharge Probability at USGS Gage 05540160 on East Branch DuPage near Downers Grove.

FEATURES IDENTIFIED BY CHAPTER							
East Branch DuPage River							
CHAPTER	BED STRUCTURE	LOGJAM	DEPOSITION	BED CONTROL	BANK CONTROL	BREAK POINT	EROSION
1	0	2	5	3	0	3	18
2	2	3	2	4	0	5	9
3	0	1	2	2	0	8	21
4	0	7	2	0	2	0	32
TOTALS	2	13	11	9	2	16	80

Table 2 Features by Chapter Identified with Aerial Assessment

Eight cross sections were taken at selected locations on East Branch of the DuPage 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 3 and the approximate location of each cross section along the channel profile is found in Fig. 4. Aerial views of cross sections locations are shown in Figs. 4 thru 6. Exact locations as Eastings and Northings and more detail can be found in Appendix A.

Cross Section Summary --East Branch Dupage River												
X-Sec	Easting	Northing	ADA	Valley Slope ft/m	BKF CFS	Width	Depth	W/D Ratio	Vel. FPS	Bedload Dia.	CEM Stage	CFS per Sq. Mi.
1	412778	4641202	4.87	8.9	105	24	2.28	10.526	1.9	1	5	21.97
2	413563	4635972	14.1	4.8	73	21	2.21	9.5023	1.6	1	6	5.17
3	413548	4635576	14.92	4.8	153	30	2.71	11.07	1.9	1	5	10.25
4	412401	4630871	34	3.7	262	45	3.01	14.95	1.8	1	5	7.7
5	410228	4629162	39.87	3.7	180	42	2.57	16.342	1.7	1	6	4.51
6	410207	4627939	45.14	3.7	348	46	3.52	13.068	2.1	1	4	7.71
7	410412	4625777	49.46	3.7	415	56	3.46	16.185	2.1	1	5	8.39
8	411109	4621084	63.91	3.5	491	61	3.65	16.712	2.2	1	5	7.68

Table 3 Cross Section Summary

The geomorphic bankfull determined from the cross section data and field observations predict channel forming flow to be 7 or 8 cfs/sq. mi. at cross sections 4,6,7 and 8. Sections 2 and 5 are significantly lower and aggrading with very low channel capacity. The bankfull discharge of 7 to 8 cfs/sq. mi. is equal to less than a 1.1 yr Return Interval rate based on peakflow data from USGS Gage 05540160 (Fig. 3)

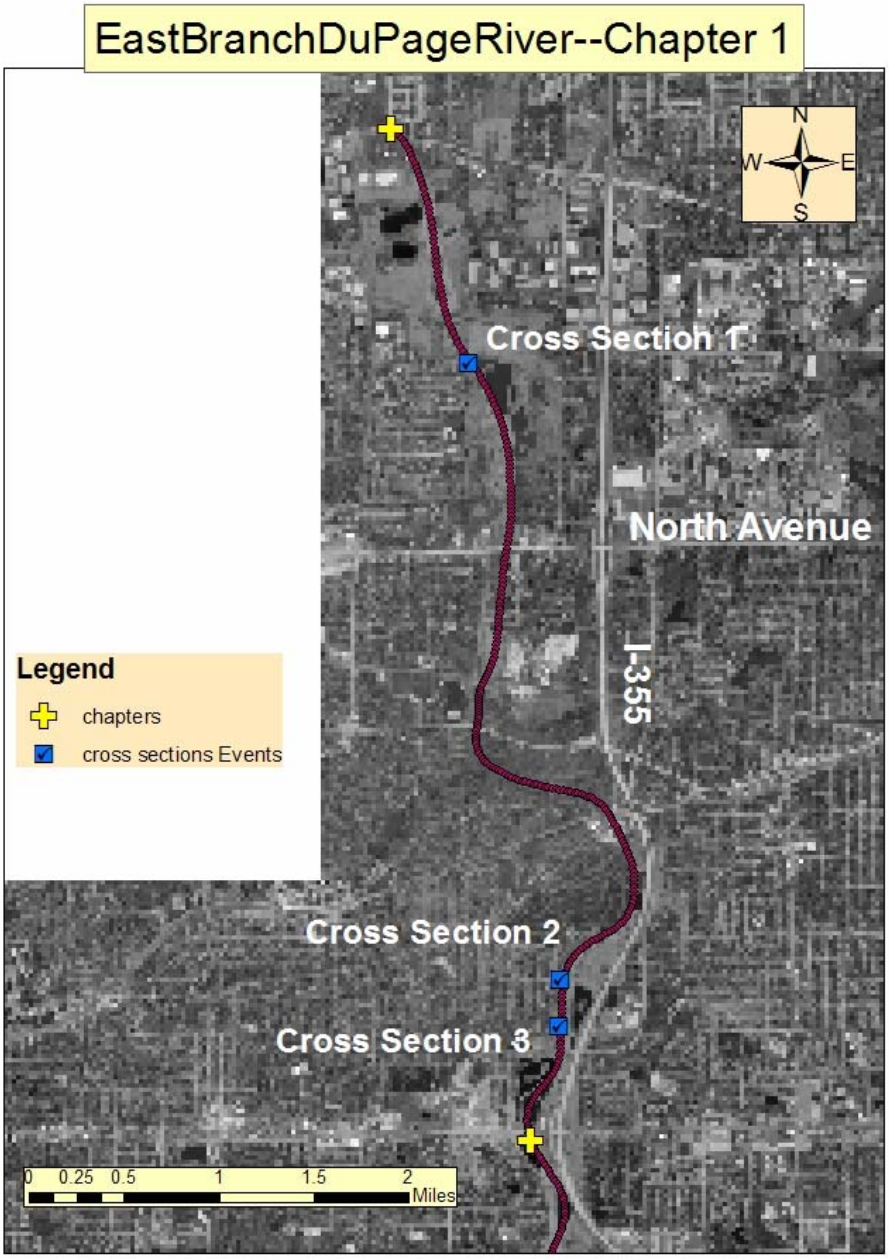


Fig. 4 Chapter Divisions and Cross Section Locations --- Chapter 1

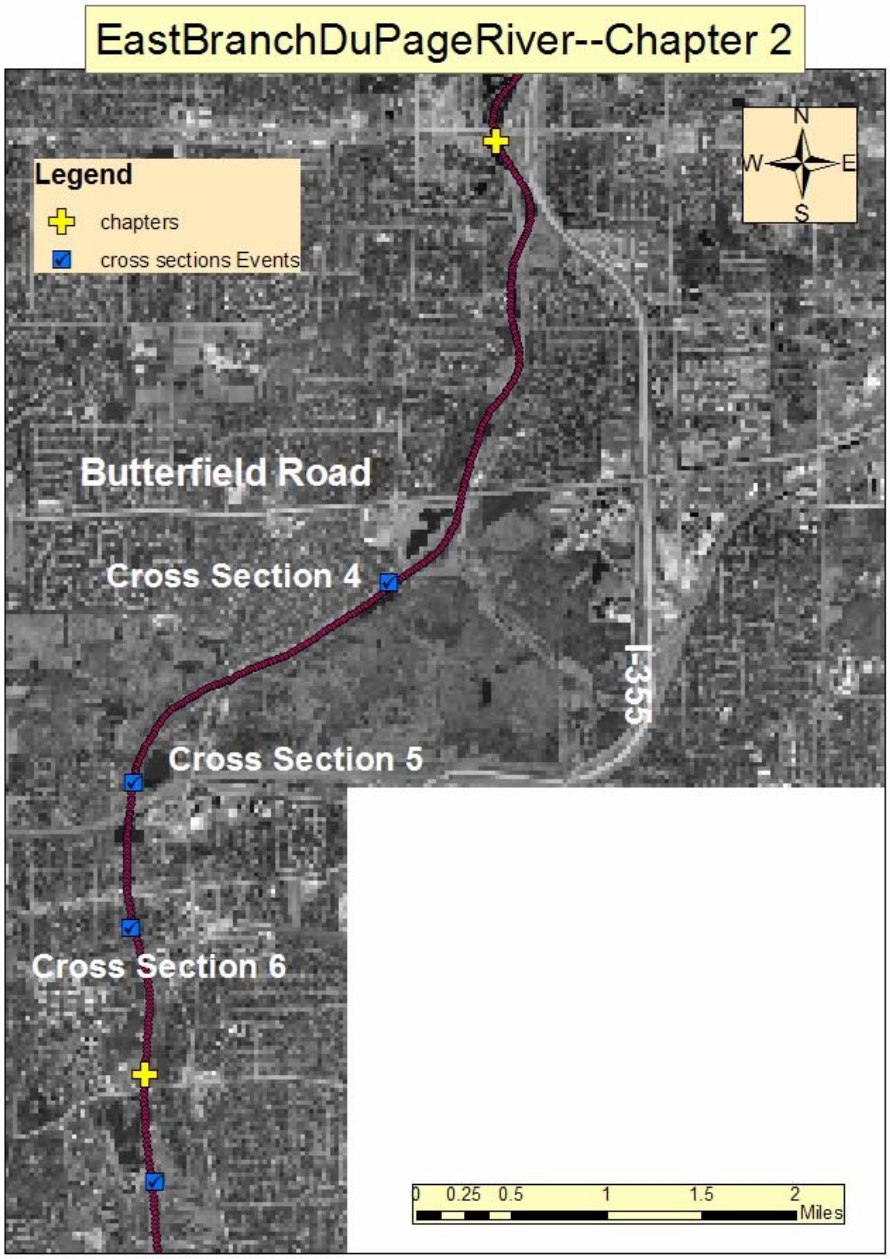


Fig. 5 Chapter Divisions and Cross Section Locations --- Chapter 2

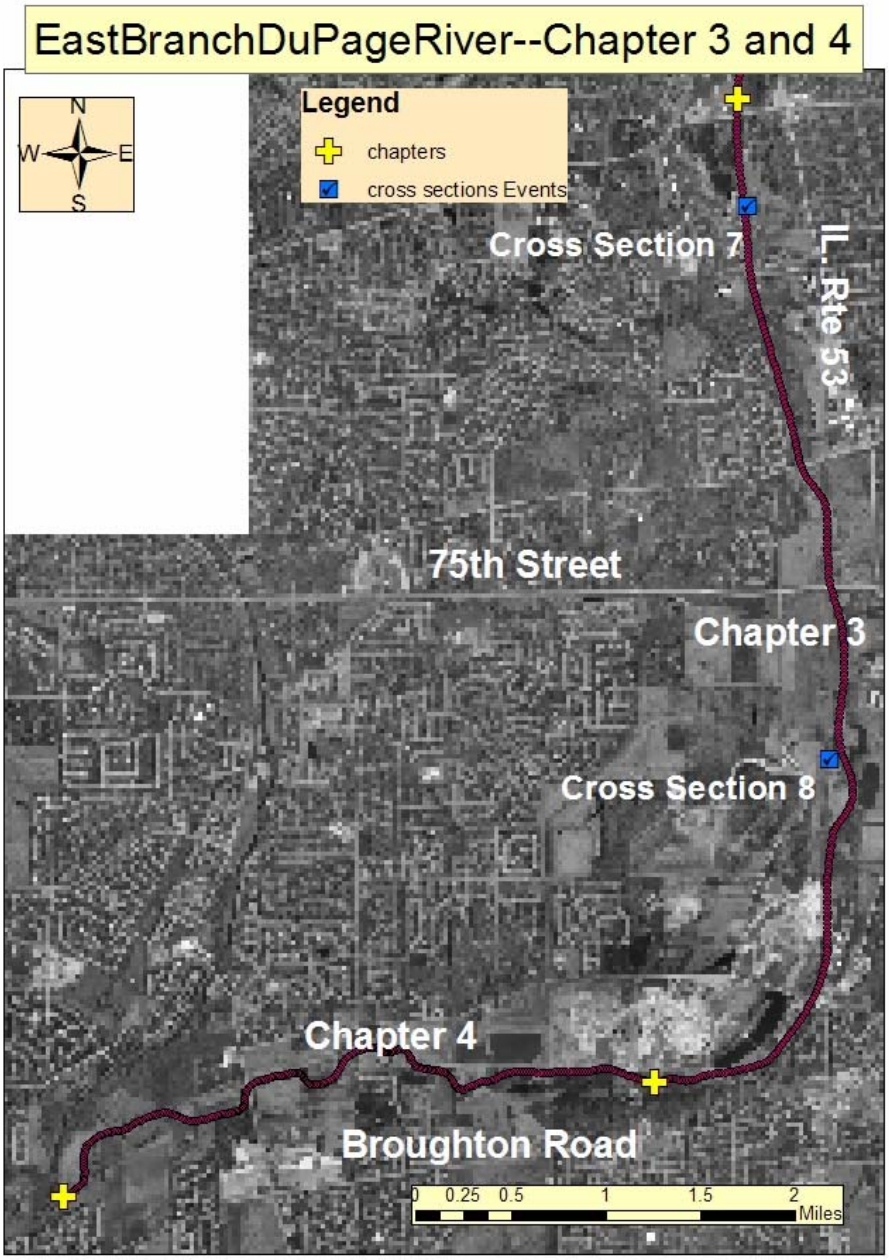


Fig. 6 Chapter Divisions and Cross Section Locations --- Chapter 3 and 4

The major factors indicating channel conditions identified from the aerial assessment have been totaled by DVD chapter in Table 2 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.

General Observations

1. East Branch DuPage River appears to be a CEM stage 5 and 6 channel. Only cross section 6 where large levees on both banks prevent access to the floodplain is the CEM found to be less stable.
2. With velocities near 2 ft. /sec. or lower the East Branch does not transport material courser than 1 inch in diameter.
3. In three locations near IL. Rte. 38 there appears to be situations where the East Branch has breached levees separating the East Branch from nearby lakes or detention ponds. (Fig. 7 though 10) In each case large sediment plumes can be observed where the decrease in velocity has caused the East Fork to drop its sediment load. In Fig. 10 below Rt. 38 it appears that a breach occurred quite some time ago and the adjacent lake is now quite heavily laden with sediment.
4. East Branch has a nearly uniform gradient throughout the aerial assessment reach at approximately 3.4 ft/mile until it flattens to about 2.1 ft/mi for 5 miles above the West Branch confluence. This reach, in chapter 4, appears to be aggrading with depositional areas and logjams forming.
5. To assist in improving the impairment parameters identified in East Branch work within the stream can concentrate on reaeration to improve DO and bank stabilization to reduce contamination from sediment.
6. Rock Riffle Grade controls are effective reaeration practices, however they are not recommended in DuPage at this time since there appears to be no need for bed stabilization. Instead reaeration will be improved by using Streambarbs with J-hooks to increase turbulence.

Fig. 7 East Branch breach of adjacent lake above IL. Rte. 38. Note the "old channel" completely filled with sediment and the sediment plume in lake.

Fig. 8 Exit breach back into "old channel"

Fig. 9 Lake below IL. Rte. 38 where East Branch has again breached levee with similar results.

Fig. 10 An apparent "old breach" below Butterfield Road where the adjacent lake has become very much laden with silt.

Fig. 11 Typical site for installation of Stream Barbs for lateral bank migration.

Recommendations Chapters 1 through 4

The entire reach of the East Branch of the DuPage can be treated for lateral bank migration producing sediments by installing Streambarbs in the eroding bank regions. The streambarbs will be enhanced by adding a "J-hook" at the tips to increase turbulence to aid in the reaeration needed to increase DO. As stated in the "general observations" use of Rock Riffles is not widely recommended although there may be selected areas where Rock Riffle would be appropriate, although this report will not include them due to lack of data to identify specific locations where they may be feasible.
Table 4 will provide the estimated quantities and cost to treat the sites identified in the aerial assessment.

` TREATMENT --CHAPTERS 1 THRU 4					
Lateral Bank Protection with Stream Barbs and "J-Hooks"					
Chapter	Erosion Sites	Average Length(ft)	Total Length	Average Cost/foot	Total Cost
1	18	150	2700	$75.00	$202,500.00
2	9	225	2025	$75.00	$151,875.00
3	21	250	5250	$75.00	$393,750.00
4	32	300	9600	$75.00	$720,000.00
Total	80		19575		$1,468,125.00

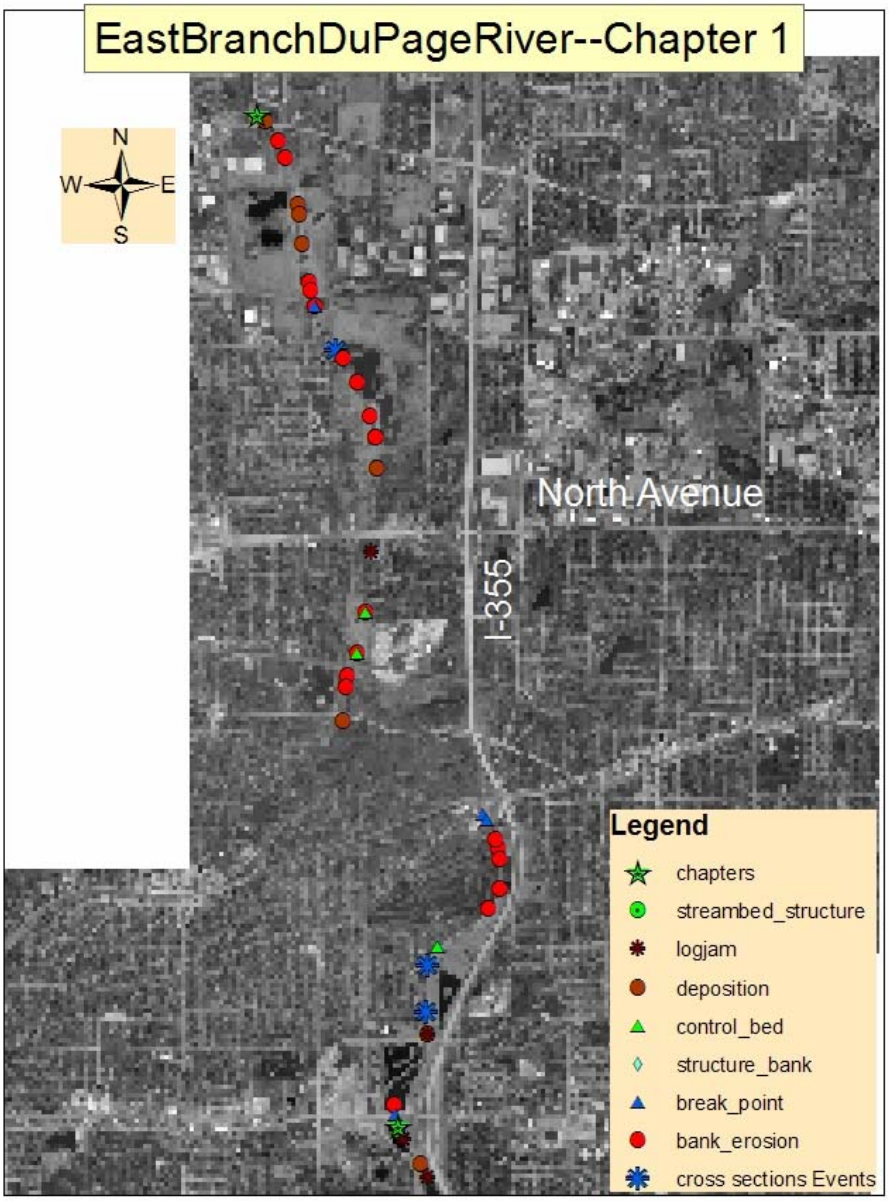


Fig. 12 Chapter 1

Fig. 13 East Branch with levees on both sides at Cross Section 6

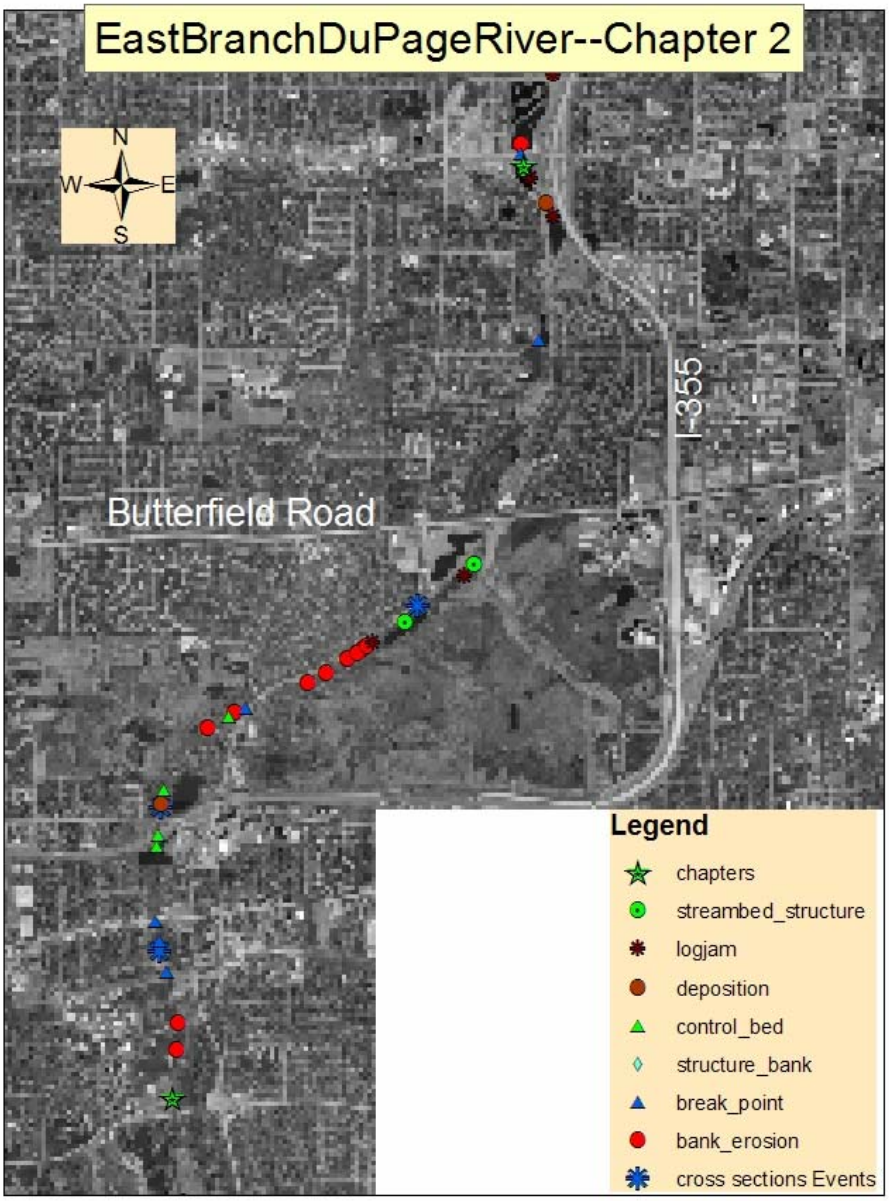


Fig. 14 Chapter 2

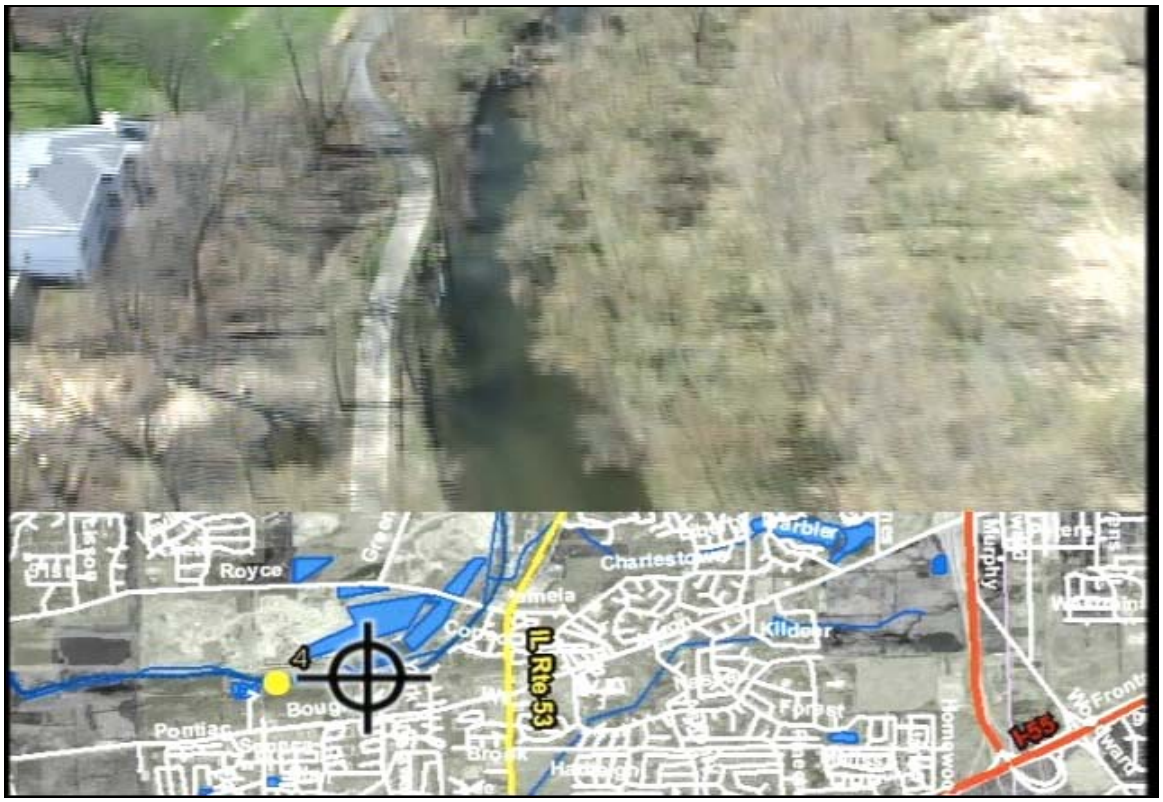


Fig. 15 Lateral bank erosion near local infrastructure.

Fig. 16 Typical "stable" reach in CEM stage 5 or 6 near Cross Section 8

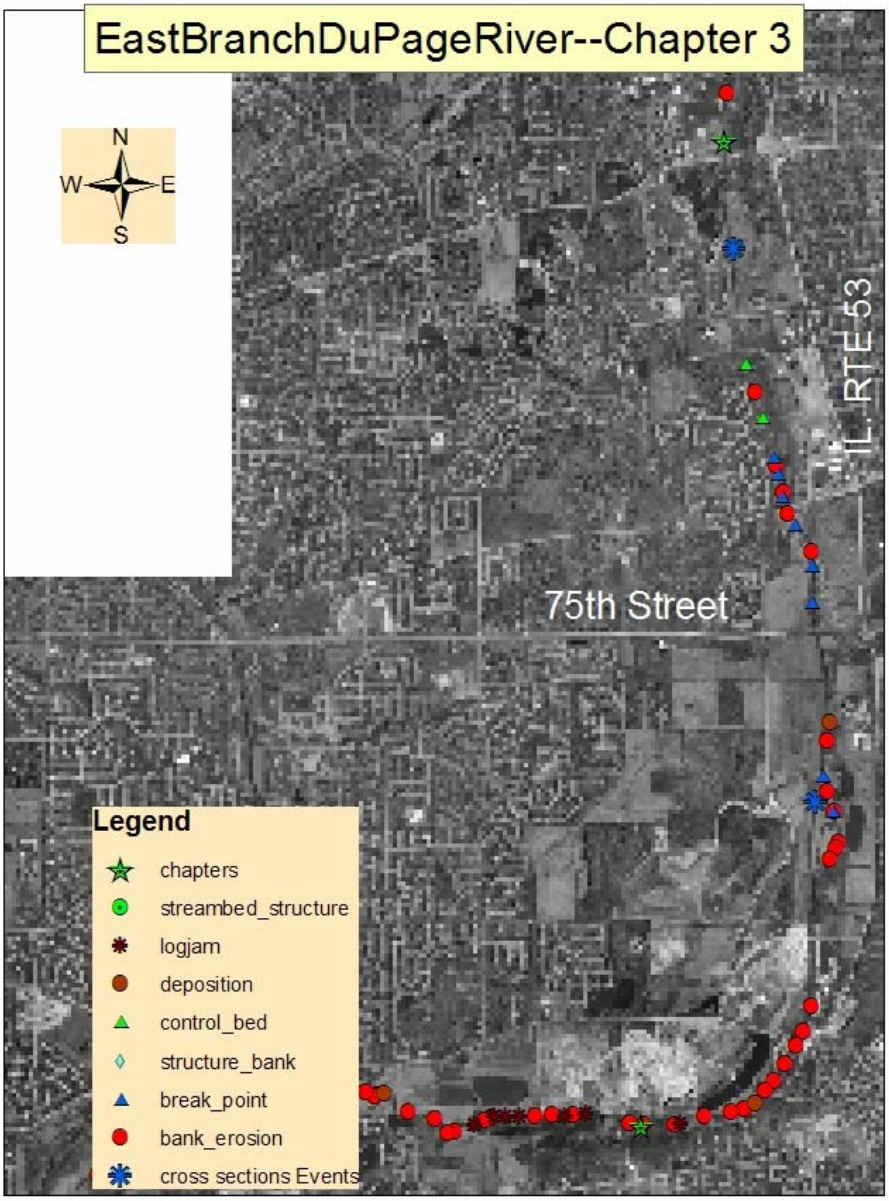


Fig. 17 Chapter 3

Fig. 18 Logjam, lateral bank erosion and sediment deposition in Chapter 4

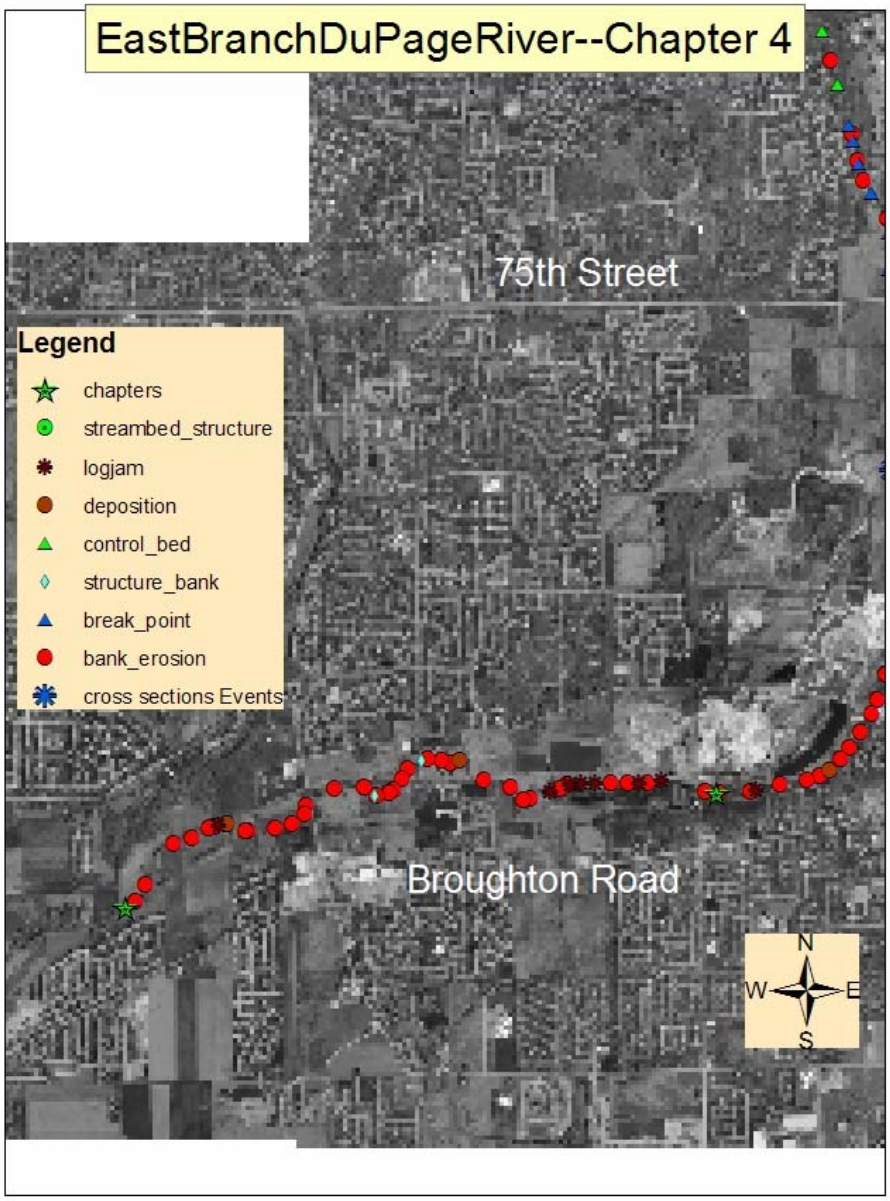


Fig. 19 Chapter 4

APPENDIX A

CROSS SECTION DATA

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E412778 N4641202

Landowner Name Xsec 1

Drainage Area 4.87 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions Width 28 ft. Cross Sectional Area 66 sq. ft.

Depth 2.4 ft.

Reference Stream Gage:

East Branch Du Page River at Glen Ellyn Station No. 05540150 Gage Q_2 242 cfs

Drainage Area - Regression (-

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

USGS Flood-Peak Discharge Predictions:

Valley Slope: 8.9 *ft./mi. (user-entered)* Regression Q_2 87 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0017 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

30 to 70 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Stream Length *ft.*

Basic Field Data: Valley Length *ft.*

Bankfull Width 24 *ft.* Contour Interval feet

Mean Bankfull Depth 2.28 *ft.* Estimated Sinuosity

Width/Depth Ratio 10.53

Channel Slope: Bankfull Q from:

Max. Bankfull Depth 3 *ft.* Surveyed: 0.000924 *ft./ft.* Cross-Section 102 *cfs*

Width at twice max. depth 800 *ft.* Estimated: *ft./ft.* Basic field data 107 *cfs*

(6.0 ft.) Selected Q 105 *cfs*

Entrenchment Ratio 33.33 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_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* Velocity from Cross-Section data: 1.86 *ft./sec.*

GOAL: Develop confidence by matching Velocity from basic field data: 1.96 *ft./sec.*

velocities from different sources. Velocity from selected Q: 1.9 *ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

21.97 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec 1	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (***S***):	0.000924	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	3.0	*ft*

$$Q\left(\frac{1.486}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}\right)$$

assuming uniform, steady flow

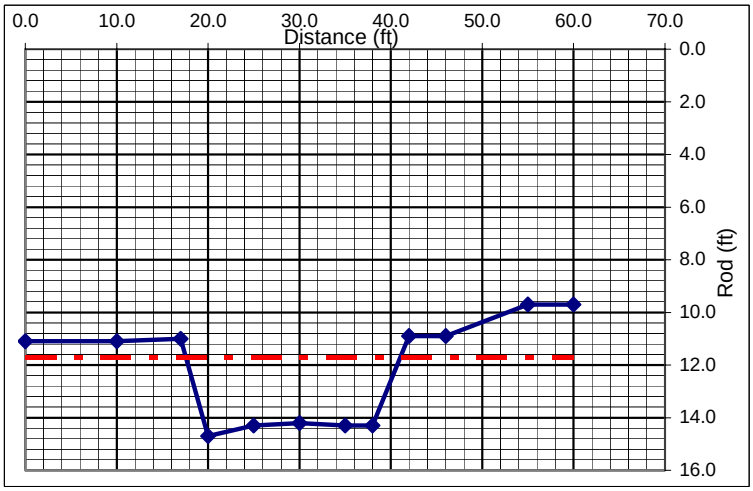
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	3.0 *ft*	3.7	
Channel Flow (***Q***):	102.4 *cfs*	114.6	
Channel Velocity:	1.9 *ft/sec*	1.6	
Cross-Sectional Area (***A***):	54.9 *sq.ft.*	73.2	
Hydraulic Radius (***R***):	2.1 *ft*	1.6	

Survey Data:

Rod *(ft)*	Distance *(ft)*
11.1	0.0
11.1	10.0
11.0	17.0
14.7	20.0
14.3	25.0
14.2	30.0
14.3	35.0
14.3	38.0
10.9	42.0
10.90	46
9.70	55
9.70	60



COMMENTS:

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E413563 N4635972

Landowner Name xsec2

Drainage Area 14.1 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions Width 42 ft. Cross Sectional Area 135 sq. ft.

Depth 3.2 ft.

Reference Stream Gage:

East Branch Du Page River at Glen Ellyn Station No. 05540150 Gage Q_2 242 cfs

Drainage Area - Regression (-

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

USGS Flood-Peak Discharge Predictions:

Valley Slope: 4.8 *ft./mi. (user-entered)* Regression Q_2 150 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0009 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

60 to 130 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Stream Length *ft.*

Basic Field Data: Valley Length *ft.*

Bankfull Width 21 *ft.* Contour Interval feet

Mean Bankfull Depth 2.21 *ft.* Estimated Sinuosity

Width/Depth Ratio 9.50

Channel Slope: Bankfull Q from:

Max. Bankfull Depth 2.7 *ft.* Surveyed: 0.00065 *ft./ft.* Cross-Section 71 *cfs*

Width at twice max. depth 700 *ft.* Estimated: *ft./ft.* Basic field data 75 *cfs*

(5.4 ft.) Selected Q 73 *cfs*

Entrenchment Ratio 33.33 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_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* Velocity from Cross-Section data: 1.53 *ft./sec.*

GOAL: Develop confidence by matching Velocity from basic field data: 1.61 *ft./sec.*

velocities from different sources. Velocity from selected Q: 1.6 *ft./sec.*

Channel Evolution Stage VI Stream Type (Rosgen)

Notes

5.17 cfs/sq. mi.

Natural Open Channel Flow

Project:	xsec2	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (***S***):	0.000650	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	2.7	*ft*

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

assuming uniform, steady flow

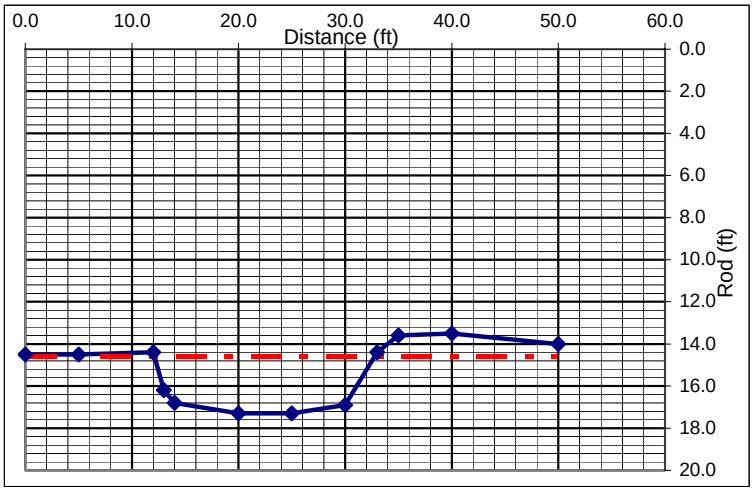
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	2.7 *ft*	2.9	
Channel Flow (***Q***):	71.2 *cfs*	62.9	
Channel Velocity:	1.5 *ft/sec*	1.2	
Cross-Sectional Area (***A***):	46.5 *sq.ft.*	51.5	
Hydraulic Radius (***R***):	2.1 *ft*	1.5	

Survey Data:

Rod *(ft)*	Distance *(ft)*
14.5	0.0
14.5	5.0
14.4	12.0
16.2	13.0
16.8	14.0
17.3	20.0
17.3	25.0
16.9	30.0
14.4	33.0
13.60	35
13.50	40
14.00	50



COMMENTS:

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E413548 N4635576

Landowner Name Xsec 3

Drainage Area 14.92 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	43 ft.	Cross Sectional Area	141 sq. ft.
	Depth	3.3 ft.		

Reference Stream Gage:

East Branch Du Page River at Glen Ellyn

DuPage County, IL

Station No. 05540150 Gage Q_2 242 cfs

Drainage Area - Regression (-

REFERENCE STREAM DATA ONLY

USGS Flood-Peak Discharge Predictions:

Valley Slope: 4.8 *ft./mi. (user-entered)* Regression Q_2 157 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0009 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

60 to 130 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Basic Field Data:

Bankfull Width 30 *ft.*

Mean Bankfull Depth 2.71 *ft.*

Width/Depth Ratio 11.07

Max. Bankfull Depth 3.2 *ft.*

Width at twice max. depth 600 *ft.*

(6.4 ft.)

Entrenchment Ratio 20.00

Stream Length *ft.*

Valley Length *ft.*

Contour Interval feet

Estimated Sinuosity

Channel Slope:

Surveyed: 0.00065 *ft./ft.*

Estimated: *ft./ft.*

Radius of Curvature (Rc) ft.

Rc/Bankfull width: 0.00

Bankfull Q from:

Cross-Section 157 *cfs*

Basic field data 150 *cfs*

Selected Q 153 *cfs*

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

Bedload: D_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* Velocity from Cross-Section data: 1.48 *ft./sec.*

GOAL: Develop confidence by matching velocities from different sources.

Velocity from basic field data: 1.85 *ft./sec.*

Velocity from selected Q: 1.9 *ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

10.25 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec 3	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (S):	0.000650	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	3.2	*ft*

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

assuming uniform, steady flow

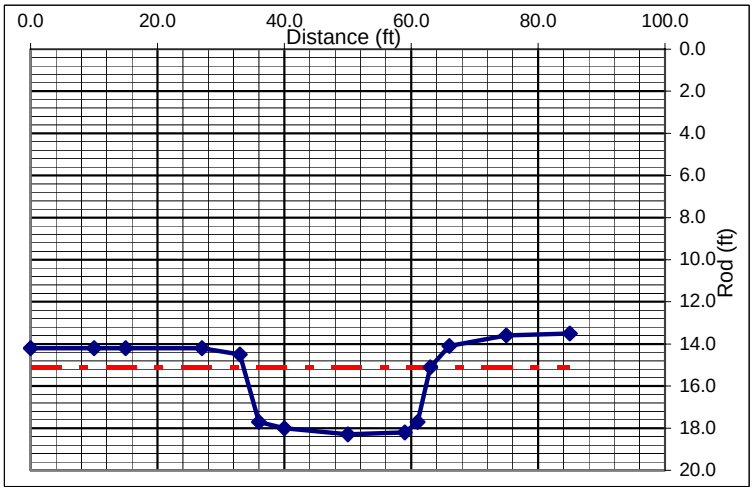
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	3.2 *ft*		
Channel Flow (***Q***):	143.7 *cfs*		
Channel Velocity:	1.8 *ft/sec*		
Cross-Sectional Area (***A***):	81.3 *sq.ft.*		
Hydraulic Radius (***R***):	2.5 *ft*		

Survey Data:

Rod *(ft)*	Distance *(ft)*
14.2	0.0
14.2	10.0
14.2	15.0
14.2	27.0
14.5	33.0
17.7	36.0
18.0	40.0
18.3	50.0
18.2	59.0
17.70	61
15.10	63
14.10	66
13.60	75
13.50	85



COMMENTS:

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E412401 N4630871

Landowner Name Xsec4

Drainage Area 34 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	59 ft.	Cross Sectional Area	246 sq. ft.
	Depth	4.2 ft.		

Reference Stream Gage:

East Branch Du Page River near Downers Grove

DuPage County, IL

Station No. 05540160 Gage Q_2 597 cfs

Drainage Area 27 sq.mi Regression (-

REFERENCE STREAM DATA ONLY

USGS Flood-Peak Discharge Predictions:

Valley Slope: 3.7 *ft./mi. (user-entered)* Regression Q_2 266 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0007 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

100 to 220 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Basic Field Data:

Bankfull Width	45	*ft.*	Stream Length		*ft.*
Mean Bankfull Depth	3.01	*ft.*	Valley Length		*ft.*
Width/Depth Ratio	14.95		Contour Interval		feet
			Estimated Sinuosity		
Max. Bankfull Depth	3.3	*ft.*	*Channel Slope:* Surveyed:	0.00065 *ft./ft.*	Bankfull Q from: Cross-Section 256 *cfs*
Width at twice max. depth	400	*ft.*	Estimated:	*ft./ft.*	Basic field data 268 *cfs*
(6.6 ft.)					Selected Q 249 *cfs*
Entrenchment Ratio	8.89		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_{90}	1 *in.*	Velocity required to move D_{90}:	2.1 *ft./sec.*
	D_{50}	*in.*	Velocity from Cross-Section data:	1.89 *ft./sec.*
GOAL: Develop confidence by matching			Velocity from basic field data:	1.98 *ft./sec.*
velocities from different sources.			Velocity from selected Q:	1.8 *ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

7.70 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec4	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (***S***):	0.000650	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	3.4	*ft*

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

assuming uniform, steady flow

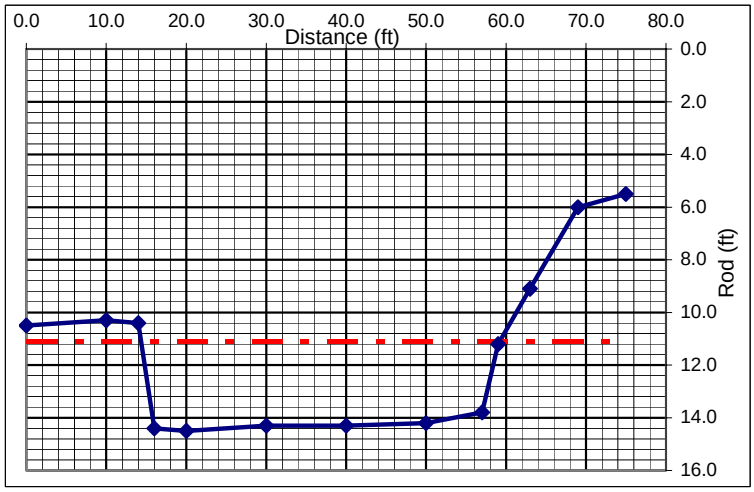
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	3.4 *ft*	4.2	
Channel Flow (***Q***):	256.4 *cfs*	317.4	
Channel Velocity:	1.9 *ft/sec*	1.8	
Cross-Sectional Area (***A***):	135.7 *sq.ft.*	173.6	
Hydraulic Radius (***R***):	2.8 *ft*	2.7	

Survey Data:

Rod *(ft)*	Distance *(ft)*
10.5	0.0
10.3	10.0
10.4	14.0
14.4	16.0
14.5	20.0
14.3	30.0
14.3	40.0
14.2	50.0
13.8	57.0
11.20	59
9.10	63
6.00	69
5.50	75



COMMENTS:

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E410228 N4629162

Landowner Name Xsec5

Drainage Area 39.87 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions Width 63 ft. Cross Sectional Area 274 sq. ft.

Depth 4.4 ft.

Reference Stream Gage:

East Branch Du Page River near Downers Grove Station No. 05540160 Gage Q_2 597 cfs

Drainage Area 27 sq.mi Regression (-

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

USGS Flood-Peak Discharge Predictions:

Valley Slope: 3.7 *ft./mi. (user-entered)* Regression Q_2 301 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0007 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

120 to 250 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Stream Length *ft.*

Basic Field Data: Valley Length *ft.*

Bankfull Width 42 *ft.* Contour Interval feet

Mean Bankfull Depth 2.57 *ft.* Estimated Sinuosity

Width/Depth Ratio 16.34

Channel Slope: Bankfull Q from:

Max. Bankfull Depth 3 *ft.* Surveyed: 0.00065 *ft./ft.* Cross-Section 168 *cfs*

Width at twice max. depth 400 *ft.* Estimated: *ft./ft.* Basic field data 192 *cfs*

(6.0 ft.) Selected Q 180 *cfs*

Entrenchment Ratio 9.52 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_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* Velocity from Cross-Section data: 1.56 *ft./sec.*

GOAL: Develop confidence by matching Velocity from basic field data: 1.78 *ft./sec.*

velocities from different sources. Velocity from selected Q: 1.7 *ft./sec.*

Channel Evolution Stage VI Stream Type (Rosgen)

Notes

4.51 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec5	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (***S***):	0.000650	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	3.0	*ft*

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

assuming uniform, steady flow

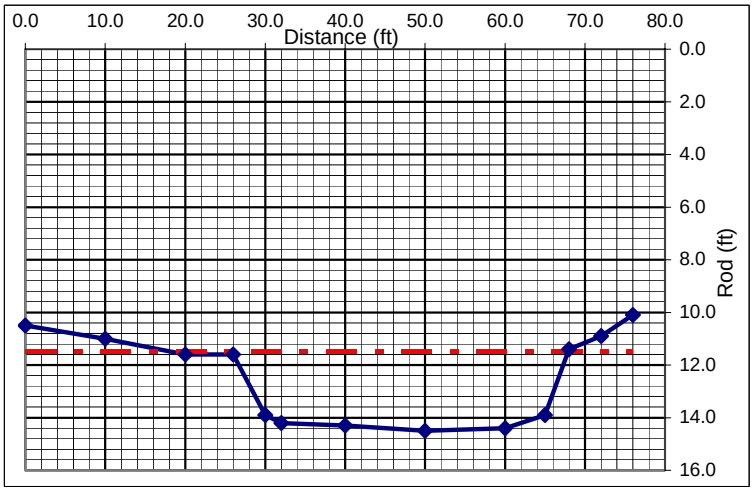
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	3.0 *ft*	4.0	
Channel Flow (***Q***):	168.5 *cfs*	274.6	
Channel Velocity:	1.6 *ft/sec*	1.6	
Cross-Sectional Area (***A***):	108.0 *sq.ft.*	169.4	
Hydraulic Radius (***R***):	2.1 *ft*	2.2	

Survey Data:

Rod *(ft)*	Distance *(ft)*
10.5	0.0
11.0	10.0
11.6	20.0
11.6	26.0
13.9	30.0
14.2	32.0
14.3	40.0
14.5	50.0
14.4	60.0
13.90	65
11.40	68
10.90	72
10.10	76



COMMENTS:

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E410207 N4627939
Landowner Name Xsec6

Drainage Area 45.14 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	66 ft.	Cross Sectional Area	298 sq. ft.
	Depth	4.5 ft.		

Reference Stream Gage:

East Branch Du Page River near Downers Grove
DuPage County, IL

Station No. 05540160 Gage Q_2 597 cfs
Drainage Area 27 sq.mi Regression (-
REFERENCE STREAM DATA ONLY

USGS Flood-Peak Discharge Predictions:

Valley Slope: 3.7 *ft./mi. (user-entered)* Regression Q_2 332 cfs
ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -
0.0007 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:
130 to 270 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Basic Field Data:

Bankfull Width 46 *ft.*
Mean Bankfull Depth 3.52 *ft.*
Width/Depth Ratio 13.07

Max. Bankfull Depth 4.2 *ft.*
Width at twice max. depth 83 *ft.*
(8.4 ft.)
Entrenchment Ratio 1.80

Stream Length *ft.*
Valley Length *ft.*
Contour Interval feet
Estimated Sinuosity

Channel Slope:
Surveyed: 0.00065 *ft./ft.*
Estimated: *ft./ft.*

Radius of Curvature (Rc) ft.
Rc/Bankfull width: 0.00

Bankfull Q from:
Cross-Section 341 *cfs*
Basic field data 356 *cfs*
Selected Q 348 *cfs*

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

Bedload: D_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*
D_{50} *in.* Velocity from Cross-Section data: 2.10 *ft./sec.*
GOAL: Develop confidence by matching Velocity from basic field data: 2.20 *ft./sec.*
velocities from different sources. Velocity from selected Q: 2.1 *ft./sec.*

Channel Evolution Stage IV Stream Type (Rosgen)

Notes

7.71 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec6	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (***S***):	0.000650	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	4.2	*ft*

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

assuming uniform, steady flow

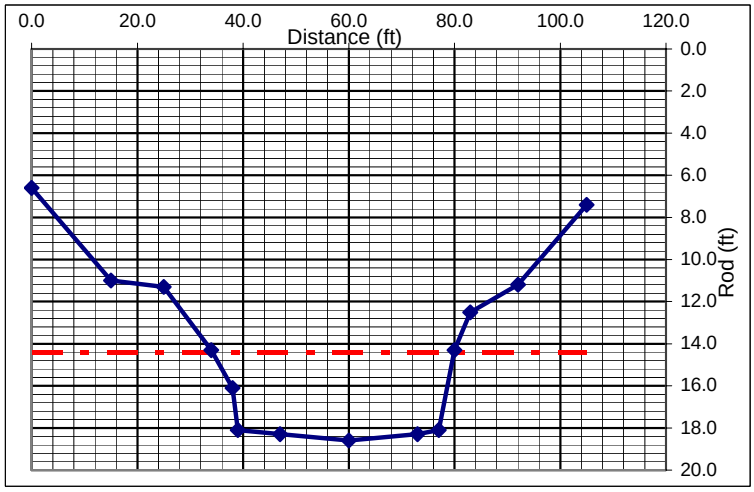
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	4.2 *ft*	11.2	
Channel Flow (***Q***):	340.8 *cfs*	2,171.4	
Channel Velocity:	2.1 *ft/sec*	3.2	
Cross-Sectional Area (***A***):	162.2 *sq.ft.*	675.1	
Hydraulic Radius (***R***):	3.3 *ft*	6.3	

Survey Data:

Rod *(ft)*	Distance *(ft)*
6.6	0.0
11.0	15.0
11.3	25.0
14.3	34.0
16.1	38.0
18.1	39.0
18.3	47.0
18.6	60.0
18.3	73.0
18.10	77
14.30	80
12.50	83
11.20	92
7.40	105



COMMENTS:

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E410412 N4625777

Landowner Name Xsec7

Drainage Area 49.46 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	68 ft.	Cross Sectional Area	317 sq. ft.
	Depth	4.6 ft.		

Reference Stream Gage:

East Branch Du Page River near Downers Grove

DuPage County, IL

Station No. 05540160 Gage Q_2 597 cfs

Drainage Area 27 sq.mi Regression (-

REFERENCE STREAM DATA ONLY

USGS Flood-Peak Discharge Predictions:

Valley Slope: 3.7 *ft./mi. (user-entered)* Regression Q_2 357 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0007 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

140 to 290 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Basic Field Data:

Bankfull Width 56 *ft.*

Mean Bankfull Depth 3.46 *ft.*

Width/Depth Ratio 16.18

Max. Bankfull Depth 4.2 *ft.*

Width at twice max. depth 69 *ft.*

(8.4 ft.)

Entrenchment Ratio 1.23

Stream Length *ft.*

Valley Length *ft.*

Contour Interval feet

Estimated Sinuosity

Channel Slope:

Surveyed: 0.00065 *ft./ft.*

Estimated: *ft./ft.*

Radius of Curvature (Rc) ft.

Rc/Bankfull width: 0.00

Bankfull Q from:

Cross-Section 409 *cfs*

Basic field data 421 *cfs*

Selected Q 415 *cfs*

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

Bedload: D_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* Velocity from Cross-Section data: 2.11 *ft./sec.*

GOAL: Develop confidence by matching velocities from different sources.

Velocity from basic field data: 2.17 *ft./sec.*

Velocity from selected Q: 2.1 *ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

8.39 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec7	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (***S***):	0.000650	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	4.2	*ft*

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

assuming uniform, steady flow

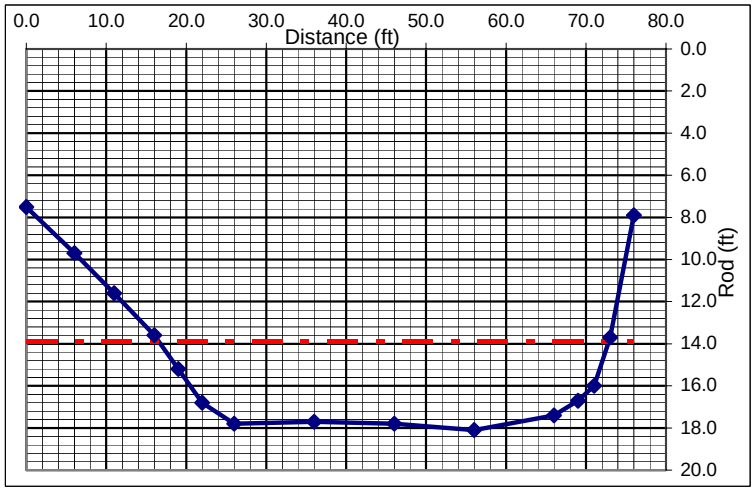
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	4.2 *ft*	10.2	
Channel Flow (***Q***):	408.7 *cfs*	2,064.5	
Channel Velocity:	2.1 *ft/sec*	3.5	
Cross-Sectional Area (***A***):	193.8 *sq.ft.*	586.0	
Hydraulic Radius (***R***):	3.3 *ft*	7.2	

Survey Data:

Rod *(ft)*	Distance *(ft)*
7.5	0.0
9.7	6.0
11.6	11.0
13.6	16.0
15.2	19.0
16.8	22.0
17.8	26.0
17.7	36.0
17.8	46.0
18.10	56
17.40	66
16.70	69
16.00	71
13.70	73
7.90	76



COMMENTS:

Stream Stabilization I & E Form

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

County DuPage T. R. Sec.

Date 11/22/2005 By Wayne Kinney

Stream Name East Fork DuPage UTM Coord. E411109 N4621084

Landowner Name Xsec8

Drainage Area 63.91 sq. mi. Clear Cells

Regional Curve Predictions:

Bankfull dimensions	Width	75 ft.	Cross Sectional Area	377 sq. ft.
	Depth	5.0 ft.		

Reference Stream Gage:

East Branch Du Page River near Downers Grove

DuPage County, IL

Station No. 05540160 Gage Q_2 597 cfs

Drainage Area 27 sq.mi Regression (-

REFERENCE STREAM DATA ONLY

USGS Flood-Peak Discharge Predictions:

Valley Slope: 3.5 *ft./mi. (user-entered)* Regression Q_2 426 cfs

ft/mi (from worksheet) Rainfall 2.75 in *(2 yr, 24 hr)* Adjusted Q_2 -

0.0007 *ft./ft.* Regional Factor 0.578 Typical Range for Bankfull Discharge:

170 to 350 cfs

Local Stream Morphology:

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

Manning's "n" 0.04

Basic Field Data:

Bankfull Width 61 *ft.*

Mean Bankfull Depth 3.65 *ft.*

Width/Depth Ratio 16.71

Max. Bankfull Depth 4.3 *ft.*

Width at twice max. depth 400 *ft.*

(8.6 ft.)

Entrenchment Ratio 6.56

Stream Length *ft.*

Valley Length *ft.*

Contour Interval feet

Estimated Sinuosity

Channel Slope:

Surveyed: 0.00065 *ft./ft.*

Estimated: *ft./ft.*

Radius of Curvature (Rc) ft.

Rc/Bankfull width: 0.00

Bankfull Q from:

Cross-Section 482 *cfs*

Basic field data 501 *cfs*

Selected Q 491 *cfs*

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

Bedload: D_{90} 1 *in.* Velocity required to move D_{90}: 2.1 *ft./sec.*

D_{50} *in.* Velocity from Cross-Section data: 2.16 *ft./sec.*

GOAL: Develop confidence by matching velocities from different sources.

Velocity from basic field data: 2.25 *ft./sec.*

Velocity from selected Q: 2.2 *ft./sec.*

Channel Evolution Stage V Stream Type (Rosgen)

Notes

7.68 cfs/sq. mi.

Natural Open Channel Flow

Project:	Xsec8	
Assisted by:	Wayne Kinney	
Date:	11/22/2005	
Channel Slope (***S***):	0.000650	*ft/ft*
Manning's ***n***:	0.040	
Flow Depth:	4.3	*ft*

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

assuming uniform, steady flow

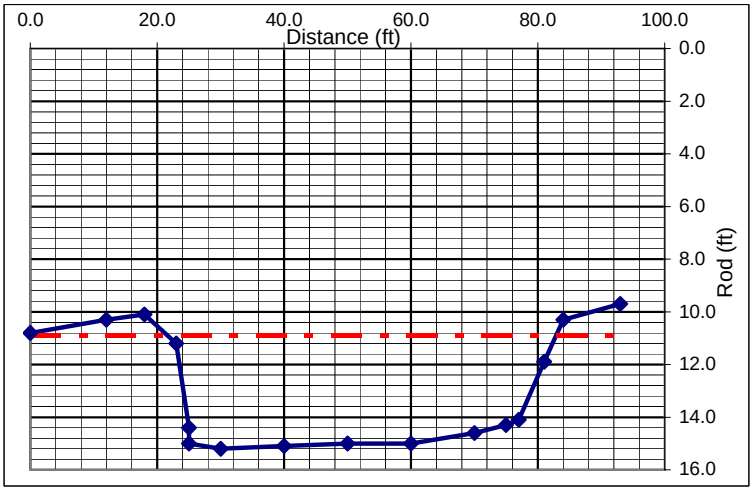
back to I&E form

Clear Cells

		Trial Depth 2	*Trial Depth 3*
Selected Flow Depth:	4.3 *ft*	5.1	
Channel Flow (***Q***):	481.9 *cfs*	563.0	
Channel Velocity:	2.2 *ft/sec*	2.0	
Cross-Sectional Area (***A***):	222.7 *sq.ft.*	280.0	
Hydraulic Radius (***R***):	3.5 *ft*	3.1	

Survey Data:

Rod *(ft)*	Distance *(ft)*
10.8	0.0
10.3	12.0
10.1	18.0
11.2	23.0
14.4	25.0
15.0	25.0
15.2	30.0
15.1	40.0
15.0	50.0
15.00	60
14.60	70
14.30	75
14.10	77
11.90	81
10.30	84
9.7	93



COMMENTS: