Circular 181

Benchmark Sediment Monitoring Program for Illinois Streams: Program Summary and Site Descriptions

by Richard L. Allgire and Misganaw Demissie

Illinois State Water Survey
A Division of the Illinois Department of Natural Resources

1995

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INTRODUCTION

Erosion and sedimentation have been important issues in Illinois for a very long time. Initially, the concern was primarily the loss of soil productivity for agricultural crops, with less emphasis on off-site environmental impacts. In recent years, however, most of the concern about erosion and sedimentation has focused on their impact on environmental quality. The Illinois Water Quality Management Plan, developed by the Illinois Environmental Protection Agency (IEPA) after extensive research and public review, stated that "the most severe agricultural-related water quality problem is soil erosion and sedimentation" (IEPA, 1982). Similarly, the Illinois State Water Plan, developed after three years of public review and discussion of all water resources issues in the state, identified erosion and sediment control as the number-one water resources issue. The 1984 plan stated that "excessive soil erosion on 9.6 million acres of Illinois farmland is threatening their productive capacity, degrading water quality, accelerating eutrophication of reservoirs, silting streams, and degrading fish and wildlife habitat" (Illinois State Water Plan Task Force, 1984).

More recently, discussions of the erosion and sedimentation issue have focused on the impact of continuing sedimentation on the Illinois River valley. The nature of the sedimentation problem in the Illinois River valley and its impacts have been documented in several reports by the Illinois State Water Survey and Illinois Natural History Survey (Demissie, Keefer, and Xia, 1992; Bhowmik et al., 1986; Bellrose et al., 1983; Bhowmik and Demissie, 1989).

Several conferences have been organized in recent years to discuss the issue. After the first Illinois River Conference in 1987, the Governor requested that the Illinois State Water Plan Task Force review the conference proceedings, *Management of the Illinois River System: The 1990s and Beyond* (WRC, 1987), and recommend actions that could be implemented. Consequently, the Task Force prepared the *Illinois River Action Plan* (1987), which ranked "soil erosion and siltation" as the top priority problem for the Illinois River and stated that "sedimentation, today's major pollutant of our nation's agricultural waterways, is the primary obstacle in preserving some semblance of the historic Illinois River for future generations."

After the first Governor's Conference on the Management of the Illinois River System in 1987, Bill Mathis and Glenn Stout summarized the discussions: "Most of the problems uppermost on the minds of the participants included significant problems with soil erosion and siltation. All groups recognized that soil erosion and siltation from land-use practices threatened the Illinois River, its backwater lakes, and associated biota" (Mathis and Stout, 1987).

Based on the review of the concerns and assessment of natural resources and environmental agencies in the state, soil erosion and sedimentation are unquestionably important natural resources and environmental issues in Illinois. It is generally agreed that the erosion rate is above the tolerable limit and that the off-site impacts of the eroded soil must be addressed by the agricultural and environmental communities of the state (Demissie and Akanbi, 1994).

A program initiated by the Illinois State Water Survey (ISWS) in 1981 helps address these issues. The goal of the Benchmark Sediment Monitoring Program is to develop a comprehensive long-term database of suspended sediment transport in Illinois waterways. This database can then be used to:

- Identify watersheds with high erosion rates.
- Evaluate the effectiveness of erosion control and agricultural soil protection programs.
- Identify areas of potential degradation of surface water supplies.
- Estimate sediment loads in nearby unmeasured streams.
- Estimate sedimentation rates of lakes and reservoirs for use in future designs of water supply and recreation reservoirs.
- Determine long-term trends in sediment transport.

A long-term sediment transport database of sufficient length to address these questions is invaluable in water resource planning. Often, databases used to answer the technical and scientific questions of environmental program and policymaking are only a few years in duration and cannot be used to analyze the larger scope of the interrelationships between the physical environment over time and varying hydrologic conditions. Long-term databases are invaluable for assisting in making these decisions of policy, programs, and design.

Acknowledgments

This report was prepared as part of the authors' regular duties at the Illinois State Water Survey. Eva Kingston edited the report, Linda Hascall prepared the illustrations, and Becky Howard typed the camera-ready copy.

SEDIMENT MONITORING PROGRAM

History

When the Illinois Benchmark Instream Suspended Sediment Monitoring Program was initiated in 1981, there were 50 monitoring stations throughout Illinois. Program budget reductions in 1982 necessitated a reduction in the number of stations monitored to 31 stations. Subsequent budget reductions resulted in additional stations being dropped from the network over the years. Figure 1 indicates the number of sampling stations monitored each year from 1981 to the present. New monitoring stations were occasionally added to research sediment transport within selected drainage areas and watersheds. Table 1 lists all of the sediment monitoring stations that have been part of the monitoring network since 1981 and includes the ISWS identification number, station name, U.S. Geological Survey (USGS) identification number, drainage area and water years during which sampling occurred for each station. Figure 2 shows the location of each station listed in table 1. Some stations listed in table 1 and shown in figure 3 as active stations have only been monitored for less than a year.

A station may have only a partial data set for various reasons. These include a station added or dropped from the network in the middle of a water year, damage to sampling equipment at the site by vandals, interruption of the sampling routine by the Illinois Department of Transportation bridge replacement, or a data gap when an observer leaves and has not yet been replaced. A complete listing of the stations monitored each year and the accompanying data analysis for Water Years 1981 to 1986 can be found in water year reportsfor each of those years (Bonini et al., 1983;Davie, 1988, 1989, 1990).

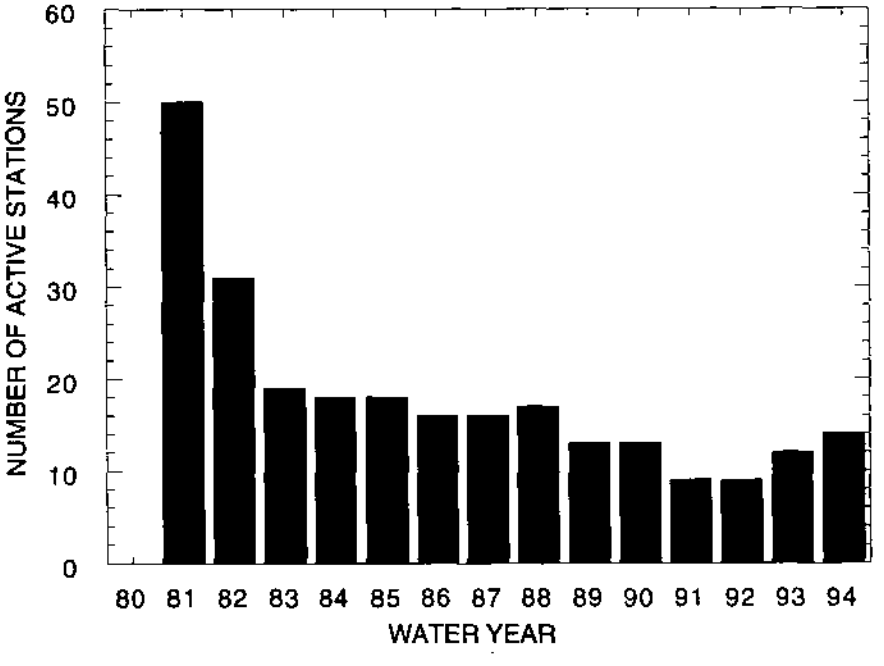

Figure 1. Number of active Benchmark Sediment Monitoring stations by water year

Table 1. All Instream Suspended Sediment Monitoring Sites, Water Years 1981-1994

ISWS number	*Station name*	*USGS number*	*Drainage area (sq mi)*	*Period of record (water years)*
101	Apple River near Elizabeth	5418950	207	1981-1982
102	Pecatonica River at Freeport	5435500	1326	1981-Present
103	Rock River at Rockton	5437500	6363	1981-Present
104	Kishwaukee River near Belvidere	5435800	538	1981-1982
105	Kishwaukee River near Perryville	5440000	1099	1983-1990
106	S. Br. Kishwaukee River near Fairdale	5439500	387	1981-1982
107	Fox River at Algonquin	5550000	1403	1981
108	Des Plaines River at Des Plaines	5529000	360	1981
110	Ferson Creek near St. Charles	5551200	51.7	1981-1982
112	Elkhorn Creek near Penrose	5444000	146	1981
113	Rock River near Joslin	5446500	9549	1983
114	Fox River at Montgomery	5551540	1732	1981-1982
115	Hickory Creek at Joliet	5539000	107	1981
116	Dupage River at Shorewood	5540500	324	1981
117	Fox River at Dayton	5552500	2642	1981
118	Big Bureau Creek at Princeton	5556500	196	1981-1990
119	Green River near Geneseo	5447500	1003	1983
121	Edwards River near Orion	5466000	155	1981-1982
122	Vermilion River near Leonore	5555300	1251	1984-Present
123	Mazon River near Coal City	5542000	455	1981-Present
124	Kankakee River near Wilmington	5527500	5150	1983-Present
125	Kankakee River at Momence	5520500	2294	1982-1985,1988-1990, 1993-Present
127	Pope Creek near Keithsburg	5467000	183	1981
228	Henderson Creek near Oquawka	5469000	432	1883-1988
229	Spoon River at London Mills	5569500	1062	1981-1988, 1994-Present
230	E. Branch Panther Creek at El Paso	5566500	30.5	1981
231	Vermillion River at McDowell	5554490	551	1981
232	Iroquois River near Chebanse	5526000	2091	1982
233	Iroquois River at Iroquois	5525000	686	1981-1982
234	Sugar Creek at Milford	5525500	446	1981
235	Money Creek near Towanda	5564400	49	1981
236	Mackinaw River near Congerville	5567510	767	1981
237	Mackinaw River below Green Valley	5568005	1092	1981
242	LaMoine River at Colmar	5584500	655	1981-1988, 1993-Present
243	Bear Creek near Marcelline	5495500	349	1981
245	LaMoine River at Ripley	5585000	1293	1983-1990, 1993-Present
247	Salt Creek near Greenview	5582000	1804	1981-1982
248	Salt Creek near Rowell	5578500	355	1981-1982
249	Sangamon River at Monticello	5572000	550	1981-Present
250	Salt Fork River near St. Joseph	3336900	134	1981-1982
251	Vermillion River near Danville	3339000	1290	1981

Table 1. Concluded

ISWS number	*Station name*	*USGS number*	*Drainage area (sq mi)*	*Period of record (water years)*
252	Sangamon River at Riverton	5576500	2618	1981-1982
254	S. Fork Sangamon River below Rochester	5576022	870	1981-1982
357	Embarras River near Diona	3344000	919	1981-1982
358	Kaskaskia River near Cowden	5592100	1330	1981
359	Macoupin Creek near Kane	5587000	868	1981
360	Hurricane Creek near Mulberry Grove	5592800	152	1981
361	Kaskaskia River at Vandalia	5592500	1904	1981-Present
362	Embarras River at St. Marie	3345500	1516	1981-1988
363	N. Fork Embarras River near Oblong	3346000	318	1981-1982
365	Crooked Creek near Hoffman	5593520	254	1981
366	Shoal Creek near Breese	5594000	735	1981-1982
367	Silver Creek near Freeburg	5594800	464	1981-Present
368	Skillet Fork River at Wayne City	3380500	464	1981
369	Little Wabash River at Blood	3379600	1387	1981-1982
370	Little Wabash River at Carmi	3381500	3102	1981-1985, 1994-Present
371	Big Muddy River at Plumfield	5597000	794	1981-1982
374	Crab Orchard Creek near Marion	5597500	31.7	1981
378	Cache River at Forman	3612000	244	1981-Present

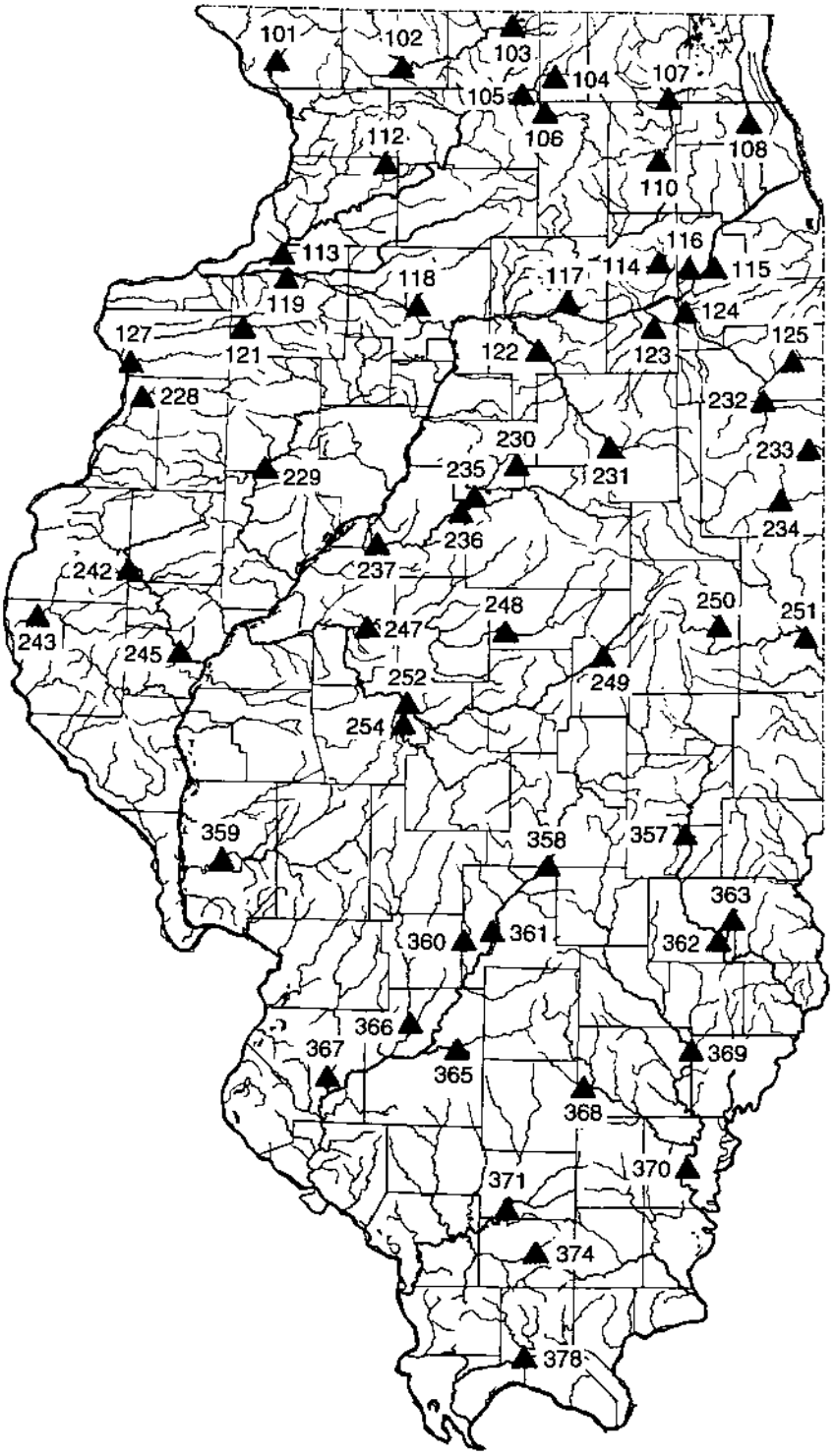

Figure 2. Sediment monitoring stations for the Benchmark Sediment Monitoring Program for Illinois streams since 1981

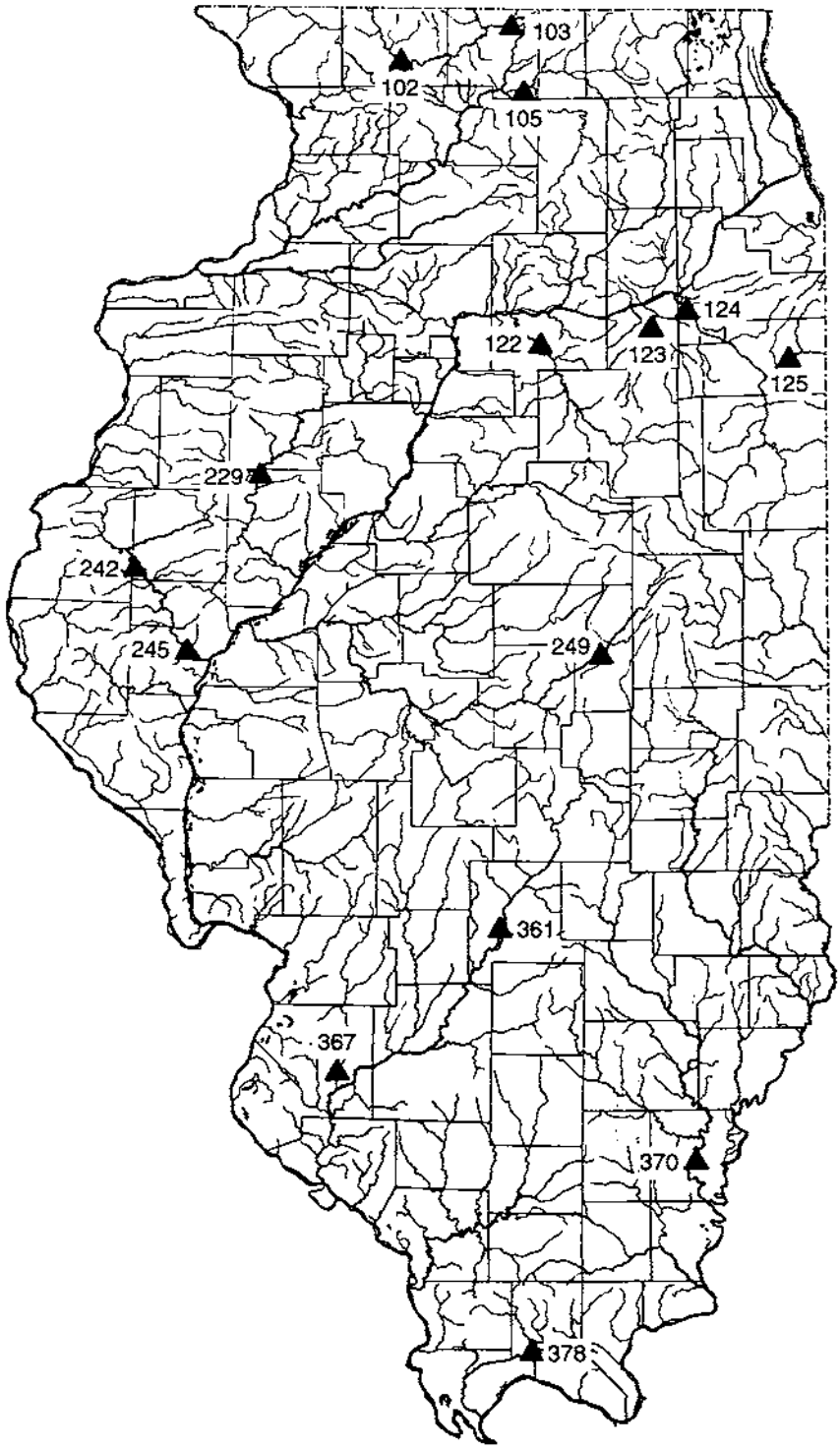

Figure 3. Locations of active suspended sediment monitoring stations

Current Status

The Benchmark Sediment Monitoring Program is presently part of the larger ISWS Water and Atmospheric Resource Monitoring (WARM) Network. The sediment monitoring program currently consists of 14 active sampling stations and one inactive station, #105 Kishwaukee River near Perry ville. Equipment installed at that sampling location was damaged in 1990 and replaced recently, but sampling has not yet been reinstated.

Table 2 lists the 15 stations that currently comprise the sediment monitoring program. A description of each of the 15 sampling sites listed is located in appendix A. The information includes site location, drainage area, period of record, observer sampling location, crop reporting district, topographic map location, and photographic views upstream and downstream from each sampling location.

Table 2. Illinois Benchmark Sediment Monitoring Stations, 1994

ISWS number	*Station name*	*Period of record*
102	Pecatonica River at Freeport	1981 -Present
103	Rock River at Rockton	1981-Present
105*	Kishwaukee River near Penyville	1983-1990
122	Vermilion River near Leonore	1984-Present
123	Mazon River near Coal City	1981 -Present
124	Kankakee River near Wilmington	1983-Present
125	Kankakee River at Momence	1982-1985, 1988-1990, 1993-Present
229	Spoon River at London Mills	1981-1988, 1994-Present
242	Lamoine River at Colmar	1981-1988, 1993-Present
245	Lamoine River at Ripley	1983-1990, 1993-Present
249	Sangamon River at Monticello	1981-Present
361	Kaskaskia River at Vandalia	1981-Present
367	Silver Creek near Freeburg	1981 -Present
370	Little Wabash River at Carmi	1981-1985, 1994-Present
378	Cache River at Forman	1981-Present

**Note: ***Inactive Station

DATA COLLECTION AND ANALYSIS

Collection Techniques

The Illinois Benchmark Sediment Monitoring Program uses techniques based upon and similar to the sediment data collection techniques used by the USGS. Detailed descriptions of these and other techniques can be found in the U.S. Department of the Interior series *Techniques of Water-Resources Investigations of the United States Geological Survey* (Guy 1969; Guy and Norman, 1970; Porterfield, 1972).

All of the Illinois Benchmark Sediment Monitoring stations are located at USGS continuous recording streamgaging stations so that the observers can read the river gage height when the samples are collected. The USGS furnishes copies of the discharge rating tables each water year for all of the monitoring stations in the sediment monitoring program. When combined with the suspended sediment sample concentration, the discharge value for a particular station yields the instantaneous suspended sediment load transported by the river past that gaging station at that particular moment (Porterfield, 1972).

The suspended sediment monitoring program consists of three types of sampling: 1) weekly samples, 2) cross section calibration samples, and 3) particle size cross section calibration. A weekly sample is taken at each sampling station at a fixed location or vertical referred to as a box site, which is usually located near the center of the main channel and has a set of sampling equipment installed on the bridge. Sampling equipment consists of a California style sediment box that houses a cable reel and a sampler. Most of the samplers used for the network are DH 59 depth-integrated brass samplers that weigh approximately 24 pounds. Figure 4 shows the typical sampling equipment installed at the sampling stations.

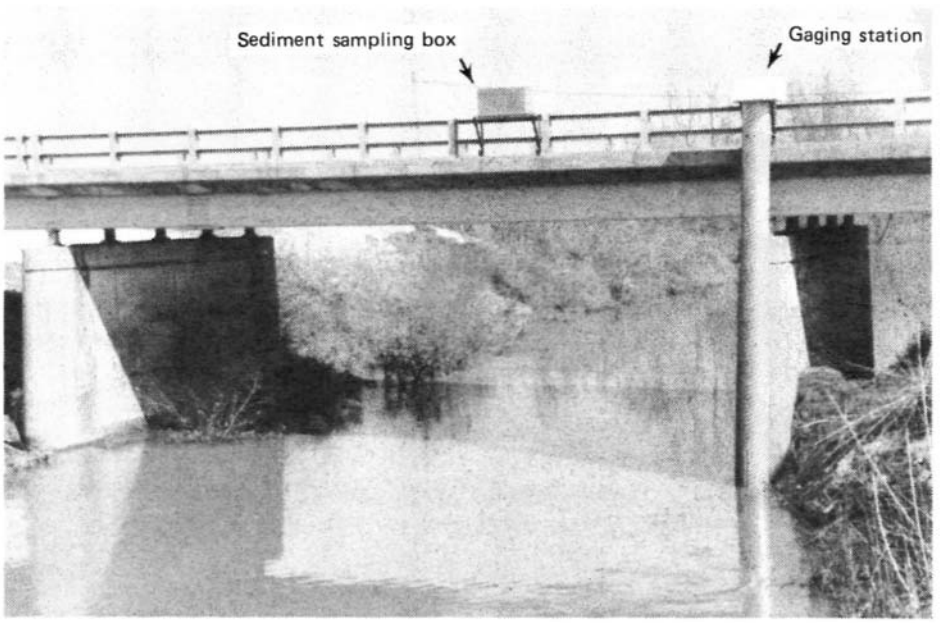

Figure 4. Main ditch at Route 45 gaging and sediment sampling station

A depth-integrated sampler continuously collects a water-sediment mixture from the moment the sampler is submerged until it is raised above the water surface. Figure 5 depicts the sampling zones of a DH 59 sampler. Proper depth-integration sampling involves lowering the sampler to the riverbed at a constant speed or transit rate. When the sampler comes in contact with the riverbed, the sampler's direction is immediately reversed and the sampler is raised at the same rate of transit until it clears the water surface.

The second type of sampling is cross section calibration sampling, which is used to calibrate the box samples by comparing the ratio of the box sample concentration and the average concentration of the entire river channel cross section. This ratio can then be used to adjust the box site concentration to reflect the actual suspended sediment concentrations in the stream. This calibration can also be used to relocate the box site in the cross section to obtain a more representative sample.

Cross section sampling involves collecting suspended sediment samples at several verticals across the entire river channel cross section using equal-width-increment and equal-transit rate (ETR) methods. These two methods entail collecting samples at equally spaced verticals across the entire length of the channel cross section using the same transit rate for all of the samples. This sampling technique yields samples that are each proportional to the total streamflow and sediment load (Guy and Norman, 1970).

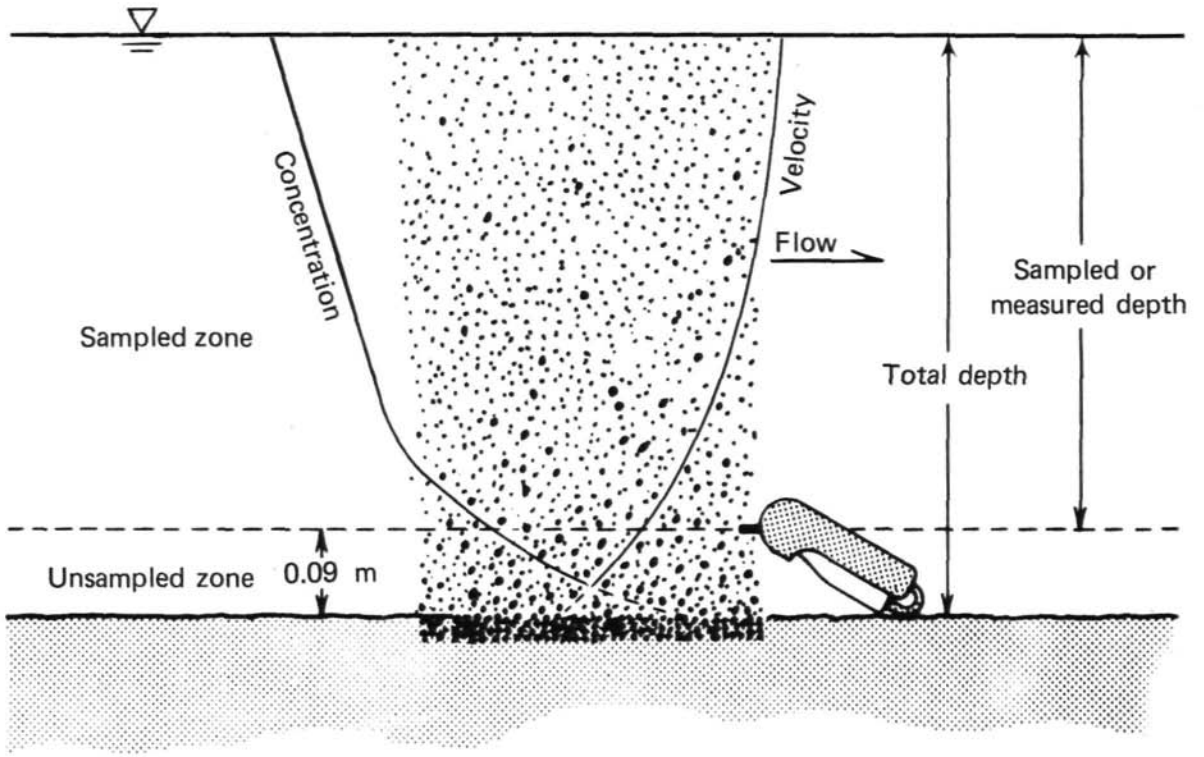

Figure 5. Measured and unmeasured sampling zones in a stream sampling vertical with respect to velocity of flow and sediment concentration (from Guy and Norman, 1970)

The number of verticals required for an ETR sediment discharge measurement depends on the streamflow and sediment characteristics at the time of sampling. Spacing between the verticals is determined by dividing the stream width by the number of verticals selected (Bhowmik, 1985). The Benchmark Sediment Monitoring Program uses a general guideline of 10 to 20 verticals per cross section, and all cross sections for the network are collected using this method.

The third sampling scheme is particle size cross section calibration. This is essentially the same as cross section calibration sampling; however, in addition to the average cross section concentration, the samples are composited by the laboratory and analyzed for particle size. Particle size is reported as a sand/fine split analysis with a percent of the suspended sediment sample reported as finer than 62.5 microns.

Collection Schedule

The weekly box site samples for the Illinois Benchmark Sediment Monitoring Program are collected by contracting with private citizens living near the sampling stations. Each observer is paid a small fee each week to collect a sample and complete the necessary paperwork. This procedure has been determined to be the most time- and cost-efficient method to collect a single weekly sample from a large area network. Water Survey personnel train the observers to use proper sampling procedures.

The duties of an observer are to collect a weekly sample as near to the same day each week as is practical. The observer then records onto the sample bottle cap the date, the time the sample was collected, the gage height from the USGS gage, and the water temperature of the sample. This information is also logged onto a field sheet that the observer keeps with the case of sample bottles. The field sheet is an important cross check of the sample information in the event that some of the information on the sample bottle becomes unreadable after collection and before delivery of the sample to the laboratory for analysis. Observer samples are collected every 15 to 20 weeks by Water Survey personnel responsible for that sampling station. The observer is resupplied with clean sample bottles and an invoice for payment of samples collected. Samples are then transported to the Water Survey Laboratory in Champaign for analysis.

The cross section samples are part of the quality assurance necessary to verify that representative suspended sediment concentrations are reported. The sampling schedule for the sediment monitoring program attempts to collect cross section samples approximately every six weeks. Every other cross section is analyzed for particle size. However, due to individual sampling site characteristics and personnel time constraints, some cross section samples are collected less frequently.

Laboratory Analysis

The suspended sediment samples are transported to the ISWS Sediment Laboratory in Champaign and analyzed by the filtration method or the evaporation dish method. Analysis results are reported as milligrams of sediment per liter (mg/L).

Particle size samples are analyzed by the pipet/sieve method to determine the percent of sand and fine material or a sand/fine split. The division grain size is 63 microns and is reported as a "percent finer than" percentage. Guy (1969) describes the procedures for these methods in detail.

Data Analysis

After the suspended sediment samples have been analyzed, the sediment concentration values are entered on the computer along with the identification data for the sample. Results are then sent to the sediment program data manager who sorts the data into individual monitoring site files for analysis.

The sample identifying information and the analysis results are cross checked with the original field log sheets to correct any data errors and to identify any samples with unexpectedly high or low concentrations for a particular stream flow. These unexpected concentration values could be real fluctuations within the sediment transport regime of a stream, or they could be artificial values due to errors in sample collection or analysis.

The samples in question are then investigated to determine possible explanations for the unusual concentrations. If a satisfactory explanation can be deduced, then the samples receive clearance for inclusion in the data set with no considerations attached. If no suitable explanation for the suspected sediment concentration deviation can be made, an asterisk is placed in the remarks column of the data set along with an abbreviation for the suspected data component. Data accuracy for an asterisked sample is suspect, and use of that data point requires caution in any further analysis.

Once the sample quality screening process has been completed, data are formatted for several sample collection parameters (date, time, stream stage, water temperature, and corresponding suspended sediment concentration). Discharge rating tables supplied by the USGS for each gaging station provide the instantaneous water discharge in cubic feet per second (cfs) for the stream stage for each sample, which is then incorporated into the data set.

Once this process has been completed, the following equation can calculate the instantaneous suspended sediment load for each sample:

$$Q_s = C_s(Q_w)K$$

where Q is the instantaneous suspended sediment load in tons, C_s is the suspended sediment sample concentration in mg/L, Q_w is the instantaneous water discharge in cfs, and K is a coefficient with a value of 0.0027 (Guy and Norman, 1970).

Once this calculation is complete, the data are compiled into a tabular form. Table 3 is an example of the data analysis in tabular form for the Cache River at Forman for the 1993 Water Year. Sediment data tables such as table 3 are available upon request for each station monitored for each water year 1981-present.

Table 3. Example of Data Analysis for the Cache River at Forman, Water Year 1993

#378 Cache River at Forman, IL (USGS #03612000)
Instantaneous Suspended Sediment Measurements
Water Year October 1992 to September 1993

Date	*Time*	*Gage Ht*	*Temp(C)*	*Cs(Mg/L)*	*Qw(cfs)*	*Qs(t/d)*	*Remarks*
10/02/92	1425	0.82	16	27.29	9.6	0.7	
10/15/92	1410	0.48	16	15.59	2.3	0.0	
10/23/92	1341	0.67	14	17.81	5.5	0.3	
10/27/92	1357	0.49	16	10.30	2.4	0.0	
11/06/92	1248	0.86	8	4.46	11.0	0.1	
11/12/92	1458	9.97	13	1587.82	1325.0	5680.4	
11/18/92	1506	1.83	11	26.08	72.3	5.1	
11/25/92	1316	6.15	10	83.97	596.1	135.1	
12/03/92	1357	1.47	15	16.53	42.8	1.9	
12/09/92	1201	1.13	3	13.58	22.3	0.8	
12/17/92	1431	1.33	5	12.50	33.4	1.1	
12/22/92	1144	1.32	5	13.82	32.8	1.2	
12/30/92	1221	1.77	6	21.04	66.7	3.8	
01/05/93	1430	13.96	6	412.37	2311.0	2573.1	
01/12/93	1218	6.26	-	46.56	613.8	77.2	
01/20/93	1354	1.86	-	14.02	75.1	2.8	
01/21/93	1447	9.88	6	454.55	1305.0	1601.6	
01/28/93	1235	5.01	8	38.82	424.8	44.5	
02/03/93	1145	2.98	6	18.33	179.9	8.9	
02/17/93	1100	3.99	1	21.72	291.6	17.1	
02/24/93	1105	8.19	4	110.41	957.1	285.3	
03/04/93	1545	11.22	5	132.74	1610.0	577.0	
03/09/93	1152	6.51	-	48.79	654.9	86.3	
03/11/93	1600	4.55	9	33.04	362.3	32.3	
03/22/93	1615	3.33	10	38.43	216.3	22.4	
03/29/93	1510	4.00	18	33.21	292.8	26.3	
04/05/93	1750	4.16	10	22.33	312.4	18.8	
04/13/93	1550	8.92	17	88.79	1102.0	264.2	
04/19/93	1515	8.03	17	55.73	926.4	139.4	
04/26/93	1705	2.65	18	33.17	146.3	13.1	
05/03/93	1440	12.07	16	400.97	1817.0	1967.1	
05/07/93	1204	9.05	21	79.69	1129.0	242.9	
05/09/93	1050	5.14	23	53.13	443.2	63.6	
05/17/93	1750	1.75	20	29.90	64.9	5.2	
05/24/93	1600	1.35	20	28.22	34.7	2.6	
05/31/93	1600	1.13	20	31.67	22.3	1.9	
06/07/93	1625	2.92	22	115.41	173.5	54.1	
06/14/93	1807	2.67	27	57.41	148.2	23.0	
06/21/93	1600	1.19	27	35.37	25.4	2.4	
06/24/93	1145	1.01	27	28.92	16.9	1.3	
06/29/93	1600	3.22	28	141.25	204.6	78.0	
07/05/93	1330	1.10	30	33.42	20.9	1.9	
07/12/93	1545	0.69	-	25.57	6.0	0.4	
07/19/93	1515	0.58	32	17.47	3.7	0.2	
07/26/93	1520	0.81	31	39.59	9.3	1.0	
08/02/93	1155	0.53	28	30.08	2.9	0.2	
08/09/93	1610	0.47	28	18.38	2.2	0.1	
08/16/93	1555	0.73	29	24.83	7.0	0.5	
08/23/93	1510	0.68	29	48.66	5.7	0.8	
08/30/93	1807	0.49	28	35.09	2.4	0.2	
09/06/93	1950	1.98	23	39.55	86.2	9.2	
09/13/93	1805	0.52	23	22.09	2.8	0.2	
09/20/93	1845	0.64	20	38.56	4.8	0.5	
09/22/93	1313	0.55	22	32.79	3.2	0.3	
09/27/93	1440	.5.73	19	138.54	530.3	198.4	

Additionally, the sediment concentration data and/or the instantaneous sediment load data can be plotted over time to show long-term trends in sediment transport. Plots of the entire concentration data record for each sampling site showing these long-term trends are compiled in appendix B. Water year data for 1994 are not included because the data analysis was still incomplete when this report was being written.

SUMMARY

The Illinois State Water Task Force identified that sediment transported by Illinois streams and the resulting sedimentation are major water resource problems. Sediment clogs waterways, degrades the biological aquatic environment, and affects the quality and quantity of domestic water supplies. Reliable data were needed to quantify and document the long-term sediment transport characteristics of Illinois waterways.

A program initiated by the Illinois State Water Survey addresses this need. The Benchmark Sediment Monitoring Program began with 50 monitoring stations distributed throughout the state. However, program budget reductions had reduced the monitoring network to 15 stations by 1994.

Using local private citizens as observer samplers, weekly suspended sediment samples are collected for the monitoring program. Calibration samples and particle size data collected by Water Survey personnel supplement the weekly data. The data analysis reports the instantaneous sediment loads for the samples collected at the monitoring sites.

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APPENDIX A: MONITORING SITE DESCRIPTIONS, MAP LOCATIONS, AND PHOTOGRAPHIC VIEWS

#102 - Pecatonica River at Freeport, IL (USGS #05435500)

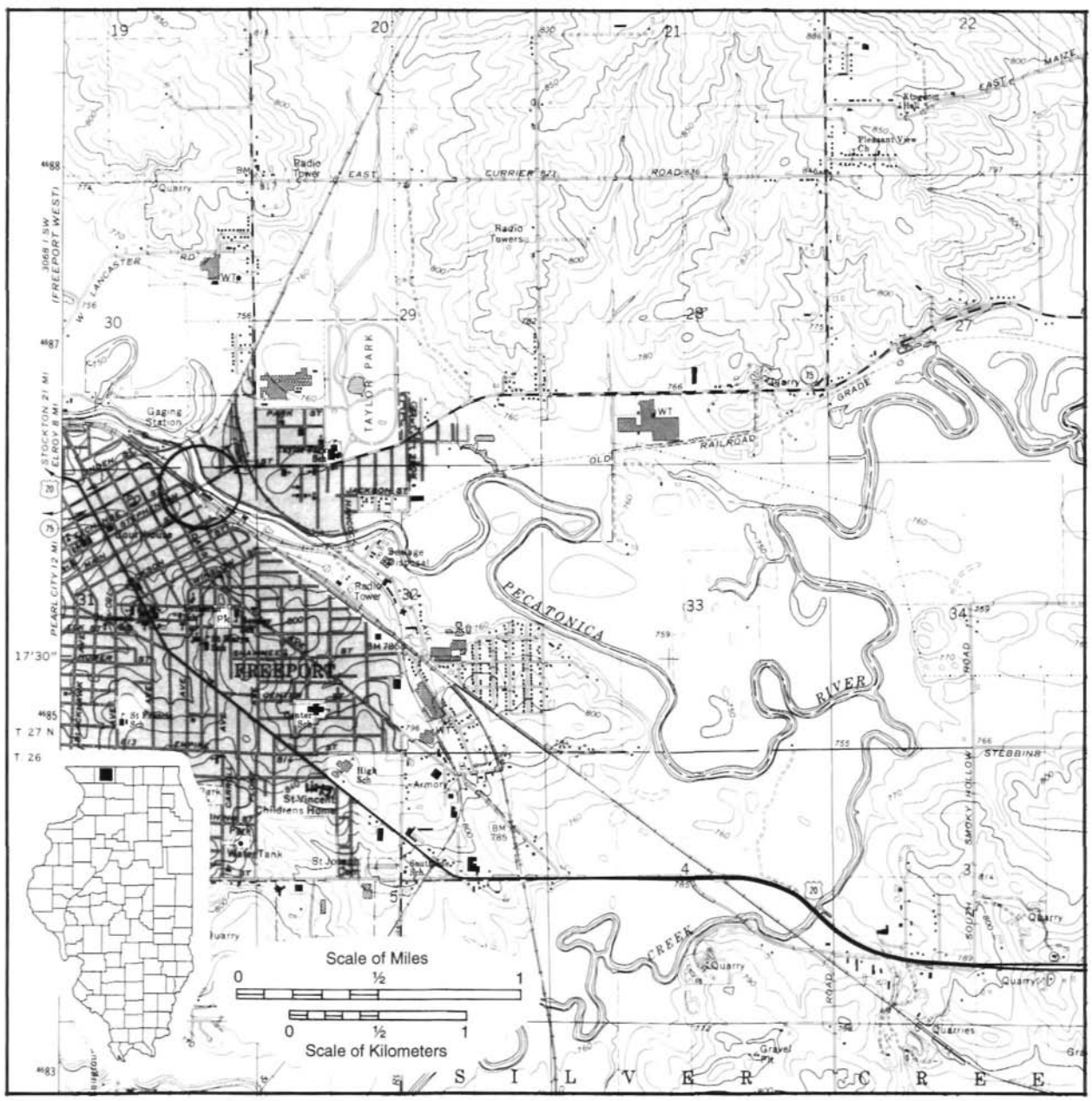
Location: Latitude 42°18'03", Longitude 89°36'43", in NE 1/4, Section 31, T. 27N., R. 8E., Stephenson County, Hydrologic Unit 07090003, on Stephenson Street Bridge, and at mile 61.6

Drainage Area: 1,326 sq mi.

Period of Record: Water Year 1981 to Present

Observer Sampling Location: Downstream side of the bridge, 125 ft. from the left edge

Climate/Crop Reporting District: Northwest



Looking upstream from gaging station

Looking downstream from gaging station

#103 - Rock River at Rockton, IL (USGS #05437500)

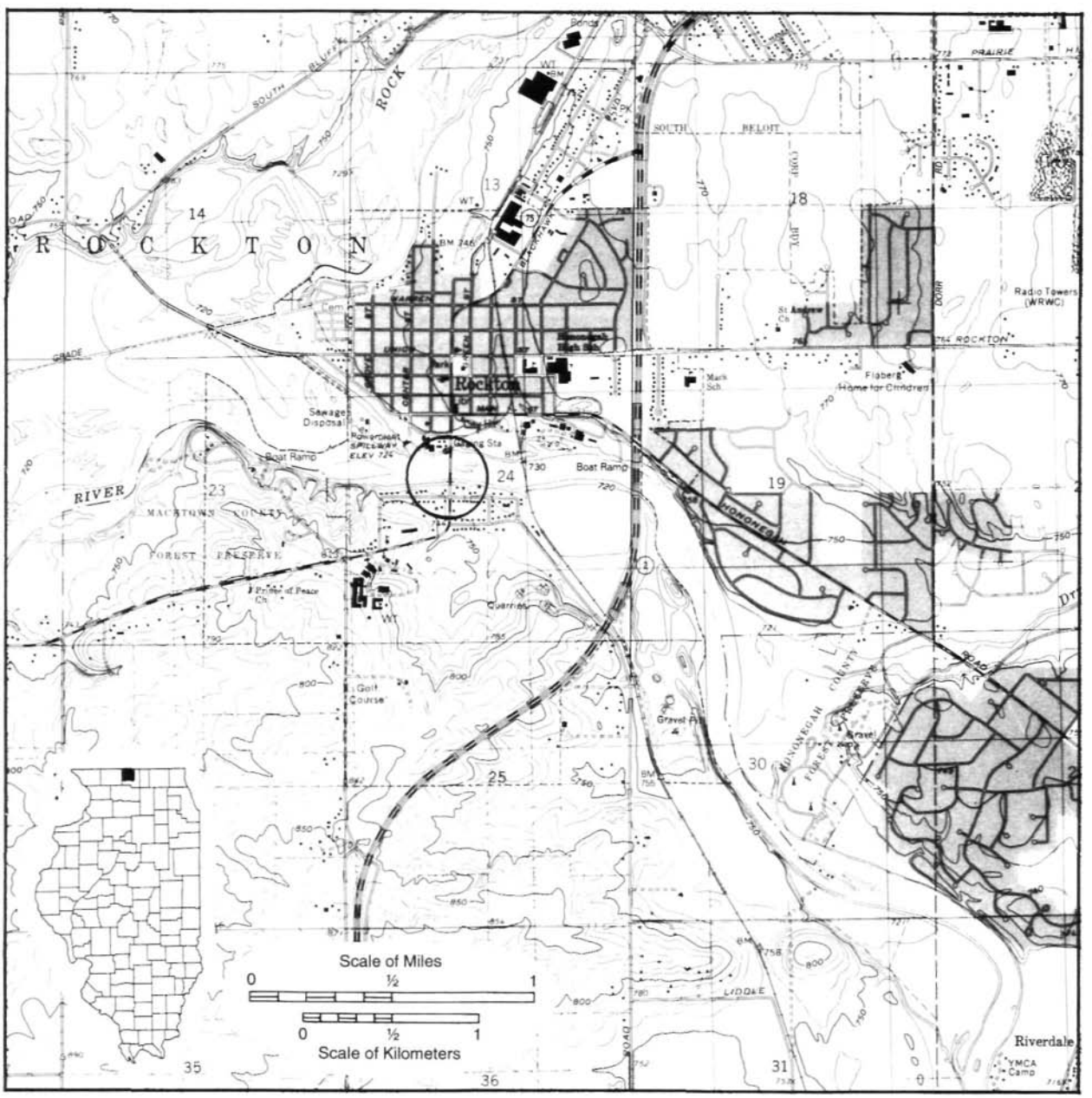
Location: Latitude 42°26'55", Longitude 89°04'09", in SW 1/4, NE 1/4, Section 24, T.46N., R.1E., Winnebago County, Hydrologic Unit 07090005, on State Highway 75 in Rockton, at mile 156.2

Drainage Area: 6,363 sq. mi.

Period of Record: Water Year 1981 to Present

Observer Sampling Location: Upstream side of the bridge, 240 ft. from the left edge

Climate/Crop Reporting District: Northwest



Looking upstream from gaging station

Looking downstream from gaging station

#105 - Kishwaukee River near Perryville, IL (USGS #05440000)

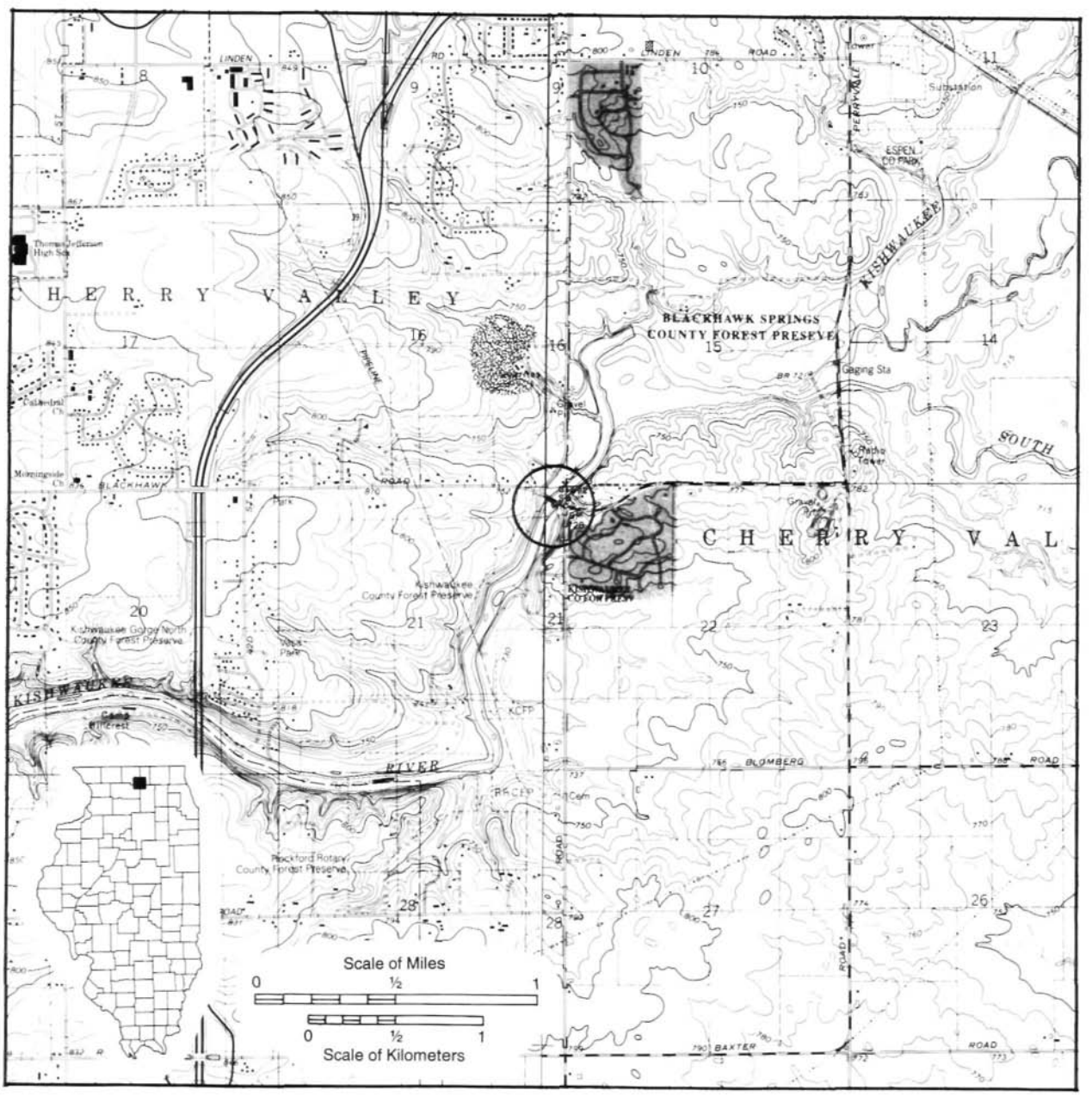
Location: Latitude 42°11'45", Longitude 88°59'55", in NE 1/4, NE 1/4, Section 21, T.43N., R. 2E., Winnebago County, Hydrologic Unit 07090006, on bridge on Blackhawk Road, 2 miles southwest of Perryville, at mile 9.6

Drainage Area: 1,099 sq. mi.

Period of Record: Water Year 1983 to Water Year 1990

Observer Sampling Location: Upstream side of the bridge, 52 ft. from the left edge

Climate/Crop Reporting District: Northwest



Looking upstream from gaging station

Looking downstream from gaging station

#122 - Vermilion River near Leonore, IL (USGS #05555300)

Location: Latitude 41°12'30", Longitude 88°55'51", in SW 1/4, SW 1/4, Section 30, T. 32N., R. 3E., La Salle County, Hydrologic Unit 07130002, bridge on County Highway 57, 3 mile northeast of Leonore, 8 mile northwest of Streator, at mile 17.2

Drainage Area: 1,251 sq. mi.

Period of Record: Water Year 1984 to Present

Observer Sampling Location: Downstream side of the bridge, 152 ft. from the left edge

Climate/Crop Reporting District: Northeast

Looking upstream from gaging station

Looking downstream from gaging station

#123 - Mazon River near Coal City, IL (USGS #05542000)

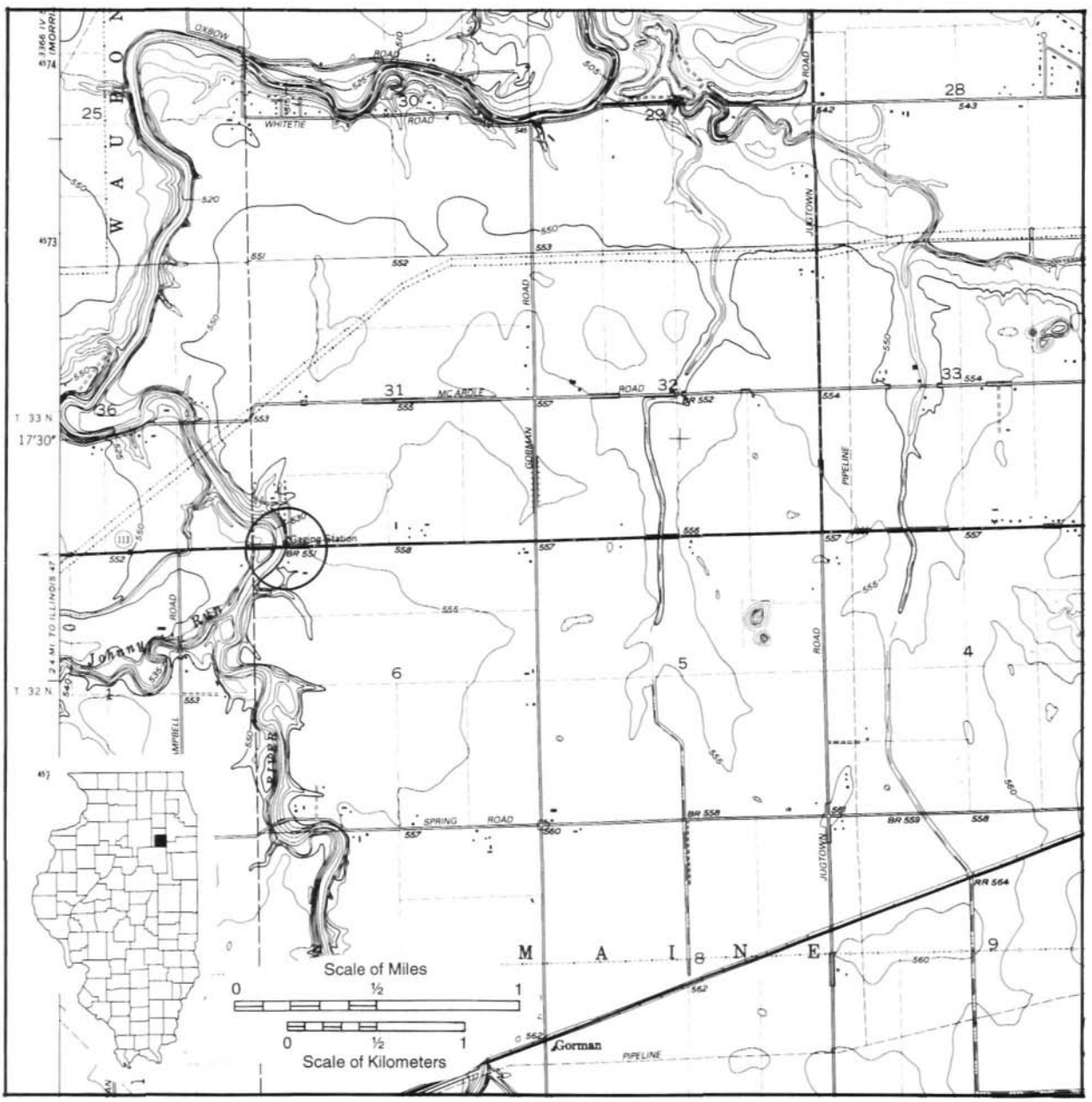
Location: Latitude 41°17'10", Longitude 88°21'35", in SW 1/4, SW 1/4, Section 31, T.33N., R. 8E., Grundy County, Hydrologic Unit 07120005, bridge on State Highway 113, 3 miles west of Coal City, at mile 15.0

Drainage Area: 455 sq. mi.

Period of Record: Water Year 1981 to Present

Observer Sampling Location: Downstream side of the bridge, 154 ft. from the left edge

Climate/Crop Reporting District: Northeast



Looking upstream from gaging station

Looking downstream from gaging station

#124 - Kankakee River near Wilmington, IL (USGS #05527500)

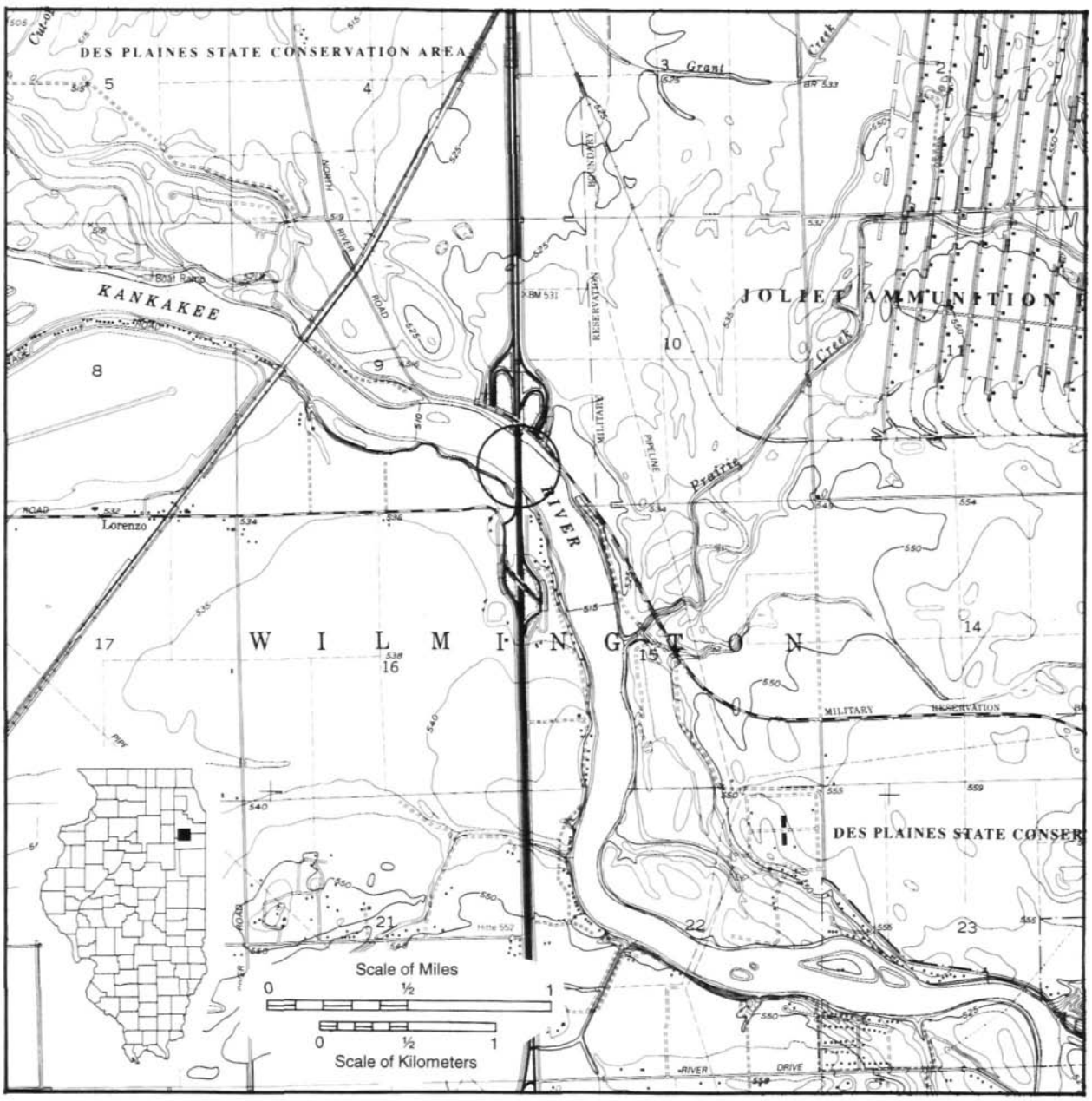
Location: Latitude 41°21'06", Longitude 88°11'32", in SW 1/4, SW 1/4, Section 10, T. 33N., R. 9E., Will County, Hydrologic Unit 07120001, bridge on Interstate 55, at mile 5.2

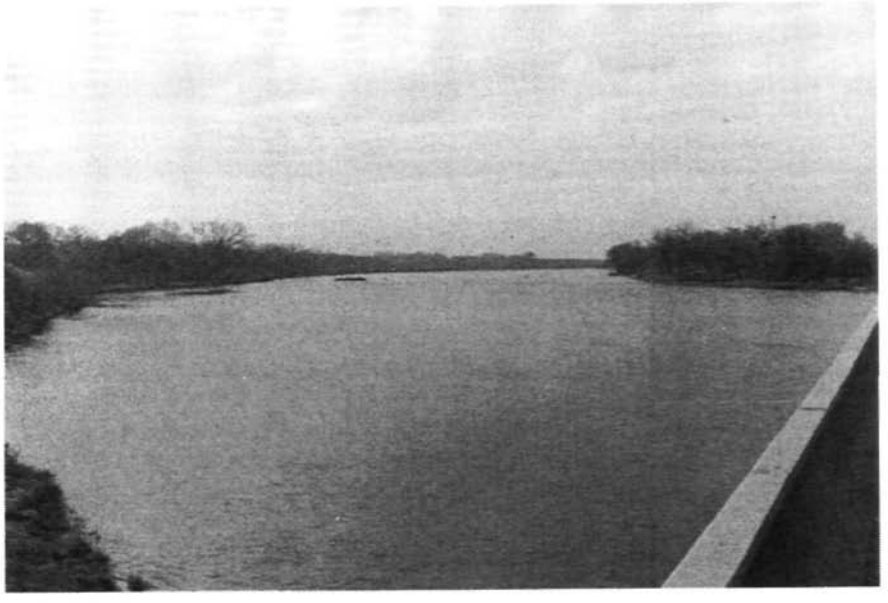
Drainage Area: 5,150 sq. mi.

Period of Record: Water Year 1983 to Present

Observer Sampling Location: Upstream side of the bridge, 788 ft. from the left edge

Climate/Crop Reporting District: Northeast





Looking upstream from gaging station

Looking downstream from gaging station

#125 - Kankakee River at Momence, IL (USGS #05520500)

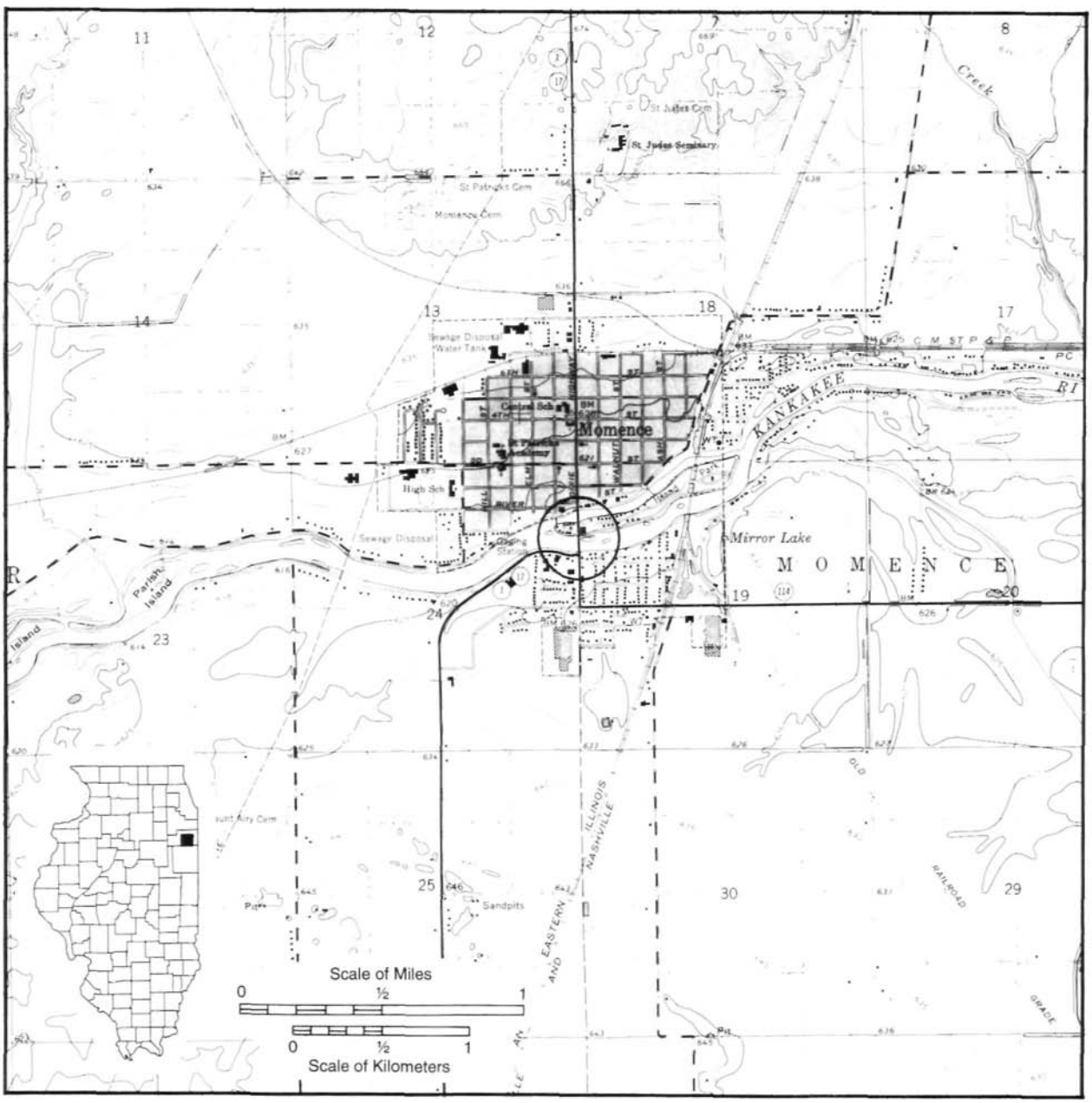
Location: Latitude 41°09'36", Longitude 87°40'28", in E 1/2, NE 1/4, Section 24, T.31N., R. 13E., Kankakee County, Hydrologic Unit 07120001, bridge on State Highways 1 and 17, at mile 48.1

Drainage Area: 2,294 sq. mi.

Period of Record: Water Years 1982 to 1985, Water Years 1988 to 1990, and Water Years 1993 to Present

Observer Sampling Location: Upstream side of the bridge, 125 ft. from the left edge

Climate/Crop Reporting District: East



Looking upstream from gaging station

Looking downstream from gaging station

#229 - Spoon River at London Mills, IL (USGS #05569500)

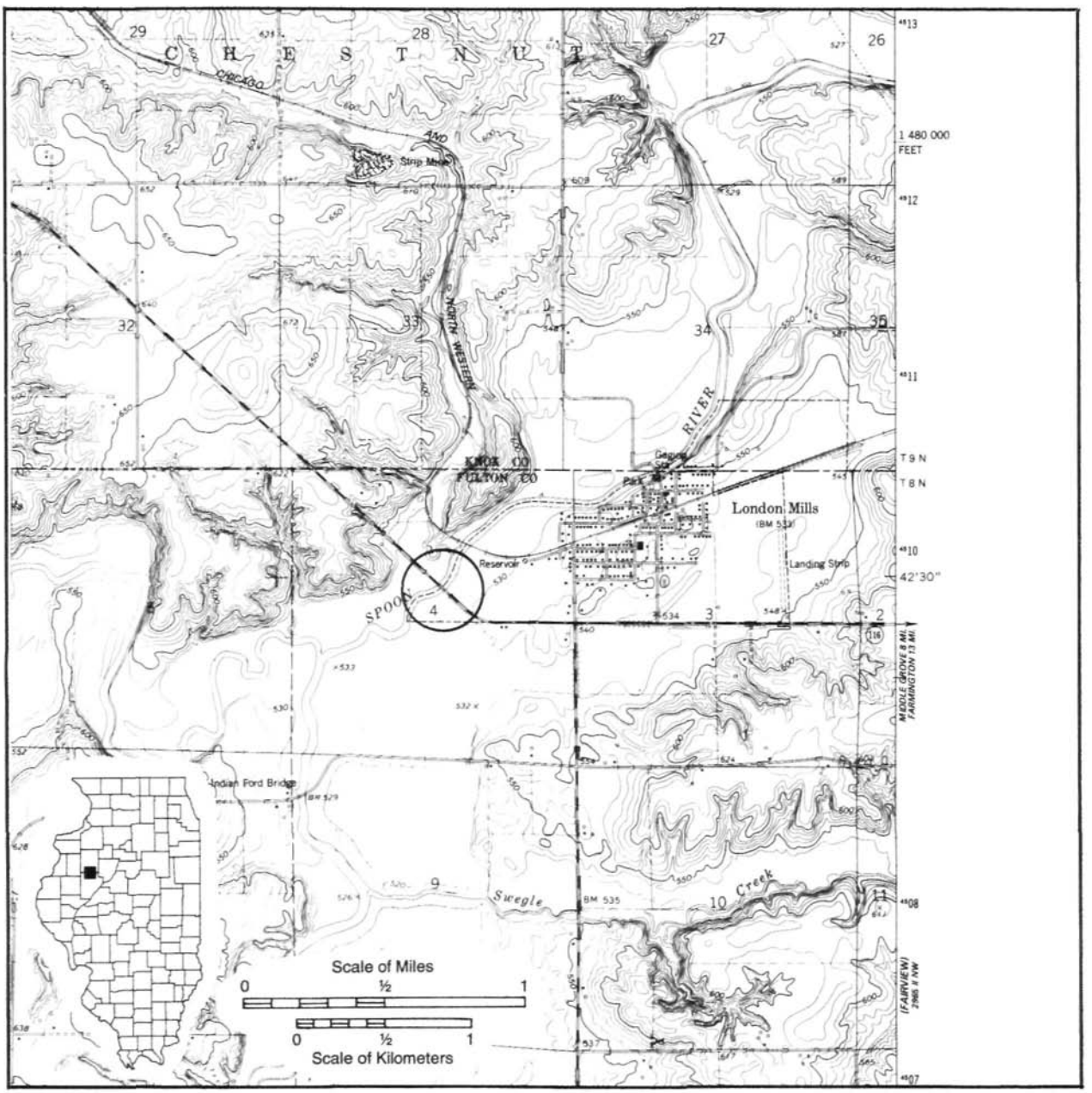
Location: Latitude 40°42'32", Longitude 90°16'53", in SW 1/4, NE 1/4, Section 4, T.8N., R. 2E., Fulton County, Hydrologic Unit 07130005, bridge on State Highway 116, 0.5 miles west of London Mills, at mile 69.2

Drainage Area: 1,072 sq. mi.

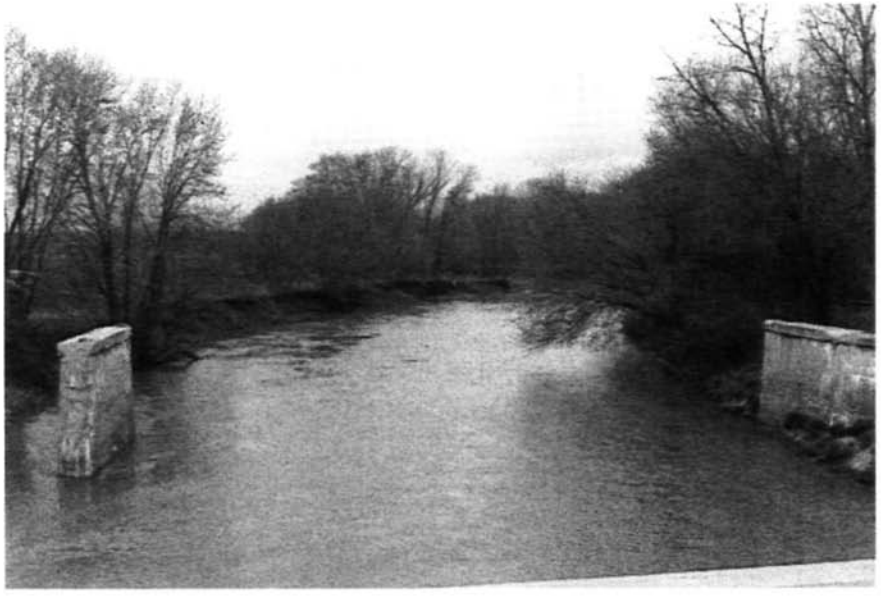
Period of Record: Water Years 1981 to 1988, and Water Year 1994 to Present

Observer **Sampling Location:** Downstream side of the bridge, 170 ft. from the left edge

Climate/Crop Reporting District: West



Looking upstream from gaging station



Looking downstream from gaging station

#242 - La Moine River at Colmar, IL (USGS #05584500)

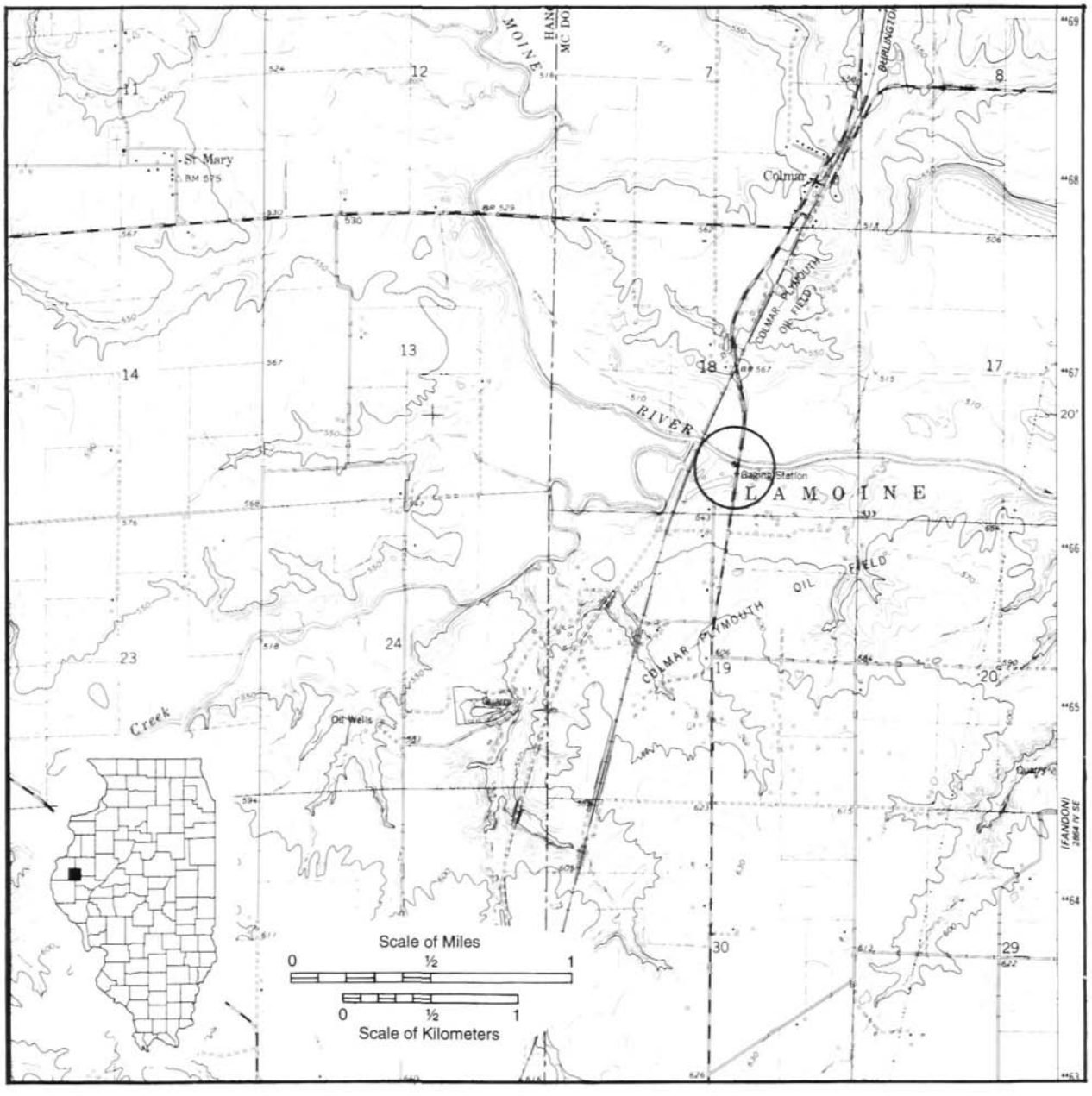
Location: Latitude 40°19'45", Longitude 90°53'55", in SE 1/4, SW 1/4, Section 18, T.4N. R. 4W., McDonough County, Hydrologic Unit 07130010, bridge on State Highway 61, 1.0 mile southwest of Colmar, at mile 61.8

Drainage Area: 655 sq. mi.

Period of Record: Water Years 1981 to 1988, and Water Years 1993 to Present

Observer Sampling Location: Downstream side of the bridge, 277 ft. from the left edge

Climate/Crop Reporting District: West



Looking upstream from gaging station

Looking downstream from gaging station

#245 - La Moine River at Ripley, IL (USGS #05585000)

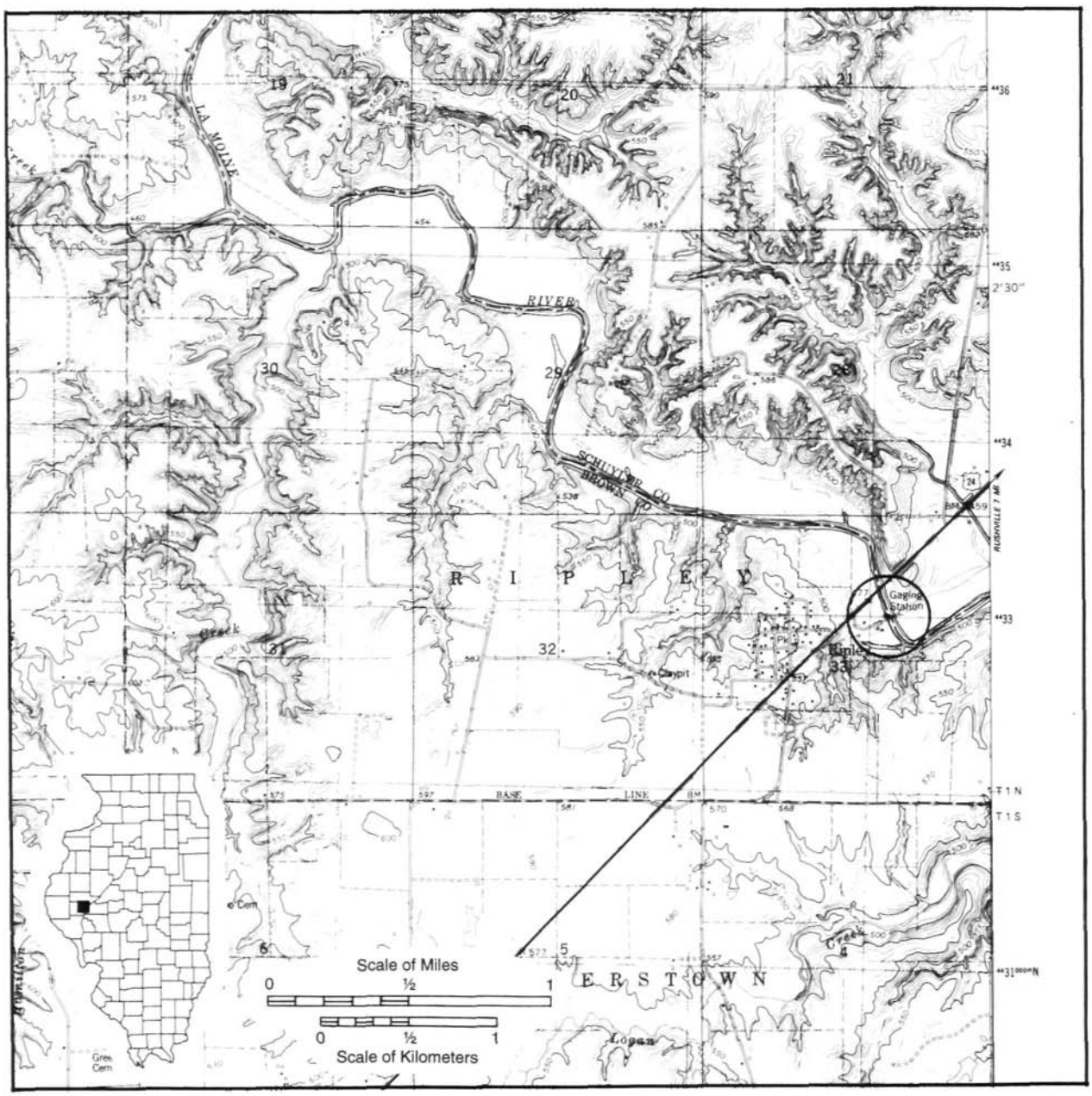
Location: Latitude 40°01'31", Longitude 90°37'55", in SW 1/4, NE 1/4, Section 33, T.1N., R. 2W., Brown County, Hydrologic Unit 07130010, bridge on old U.S. Highway 24, 600 ft. downstream from bridge on new U.S. Highway 24, 0.2 mile east of Ripley, at mile 12.3

Drainage Area: 1,293 sq. mi.

Period of Record: Water Years 1983 to 1990, and Water Year 1993 to Present

Observer Sampling Location: Downstream side of the bridge, 65 ft. from the left edge

Climate/Crop Reporting District: West



Looking upstream from gaging station

Looking downstream from gaging station

#249 - Sangamon River at Monticello, IL (USGS #05572000)

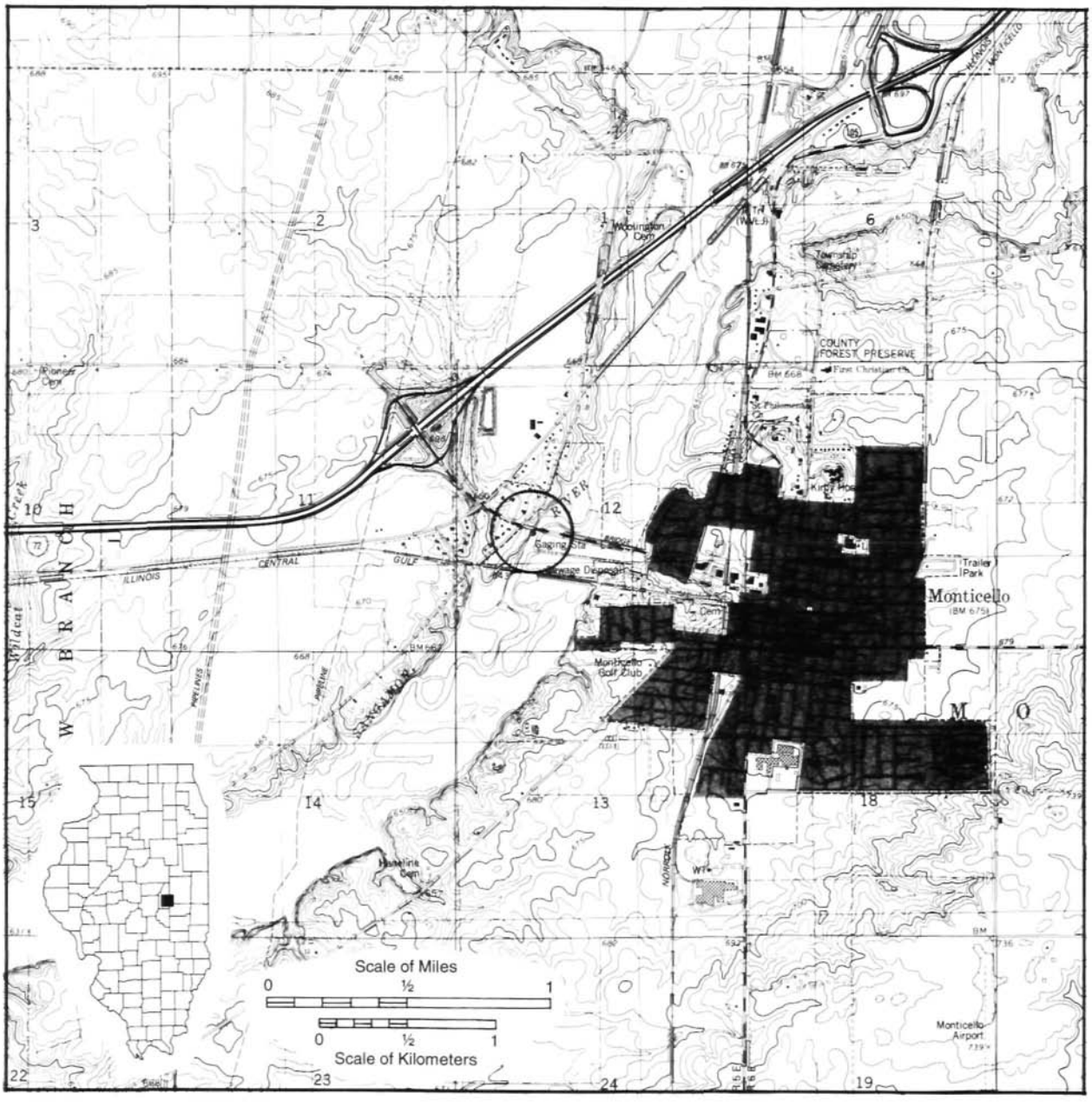
Location: Latitude 40°01'51", Longitude 88°35'20", in NE 1/4, SW 1/4, Section 12, T.18N., R. 5E., Piatt County, Hydrologic Unit 07130006, Highway bridge, 0.5 miles west of Monticello, at mile 162.2

Drainage Area: 550 sq. mi.

Period of Record: Water Year 1981 to Present

Observer Sampling Location: Downstream side of the bridge, 285 ft. from the left edge

Climate/Crop Reporting District: East



Looking upstream from gaging station

Looking downstream from gaging station

#361 - Kaskaskia River at Vandalia, IL (USGS #05592500)

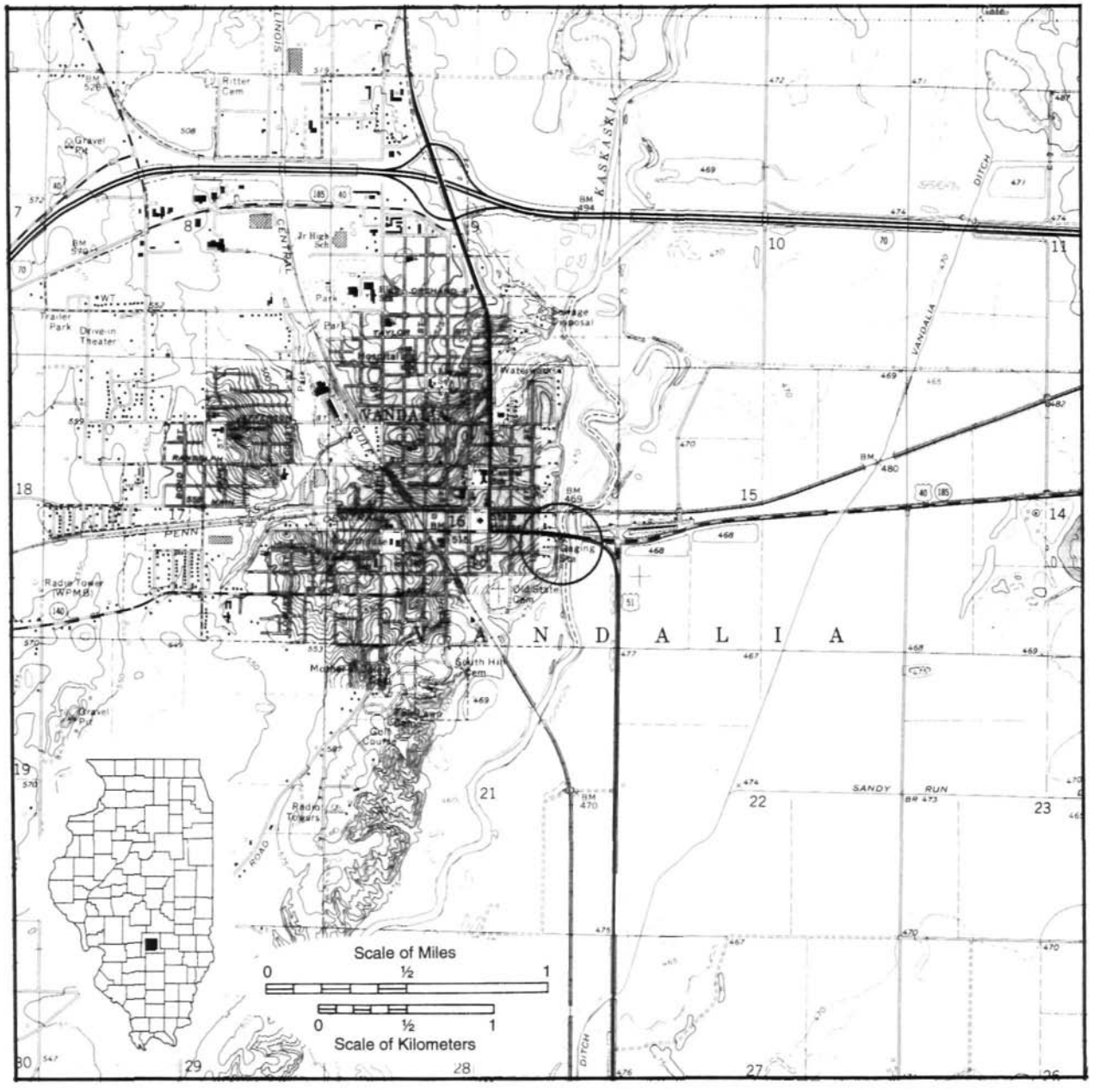
Location: Latitude 38°57'35", Longitude 89°05'20", in NW 1/4, SE 1/4, Section 16, T.6N., R. 1E., Fayette County, Hydrologic Unit 07140202, on Gallatin Street Bridge, at mile 135.7

Drainage Area: 1,940 sq. mi.

Period of Record: Water Year 1981 to Present

Observer Sampling Location: Upstream side of the bridge, 110 ft. from the right edge

Climate/Crop Reporting District: Southeast



Looking upstream from gaging station

Looking downstream from gaging station

#367 - Silver Creek near Freeburg, IL (USGS #05594800)

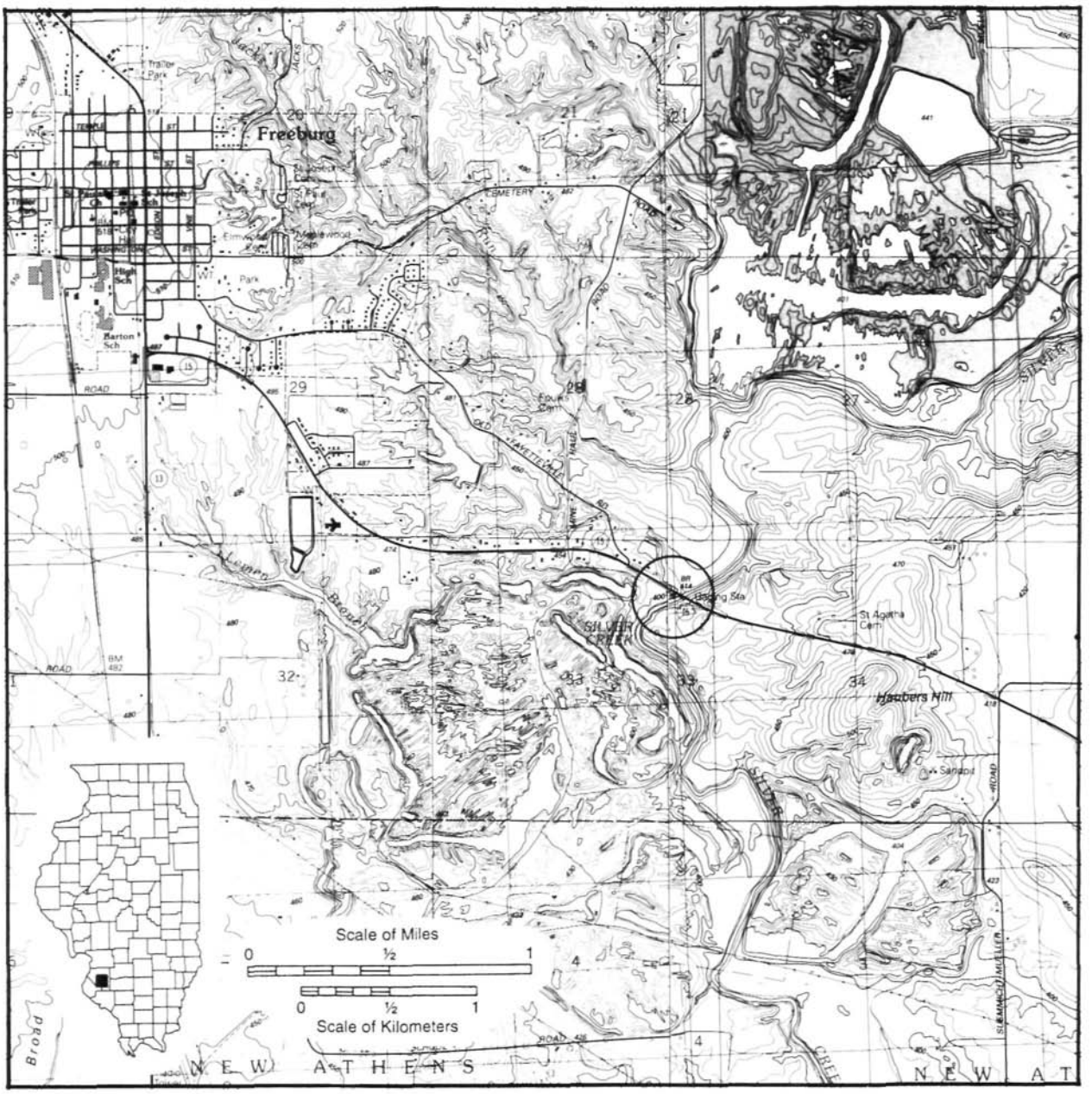
Location: Latitude 38°24'22", Longitude 89°52'26", in NE 1/4, NE 1/4, Section 33, T.1S., R. 7W., St. Clair County, Hydrologic Unit 07140204, bridge on U.S. Highway 15, 2.2 mile southeast of Freeburg, at mile 9.6

Drainage Area: 464 sq. mi.

Period of Record: Water Year 1981 to Present

Observer Sampling Location: Downstream side of the bridge, 185 ft. from the left edge

Climate/Crop Reporting District: Southwest



Looking upstream from gaging station

Looking downstream from gaging station

#370 - Little Wabash River at Carmi, IL (USGS#03381500)

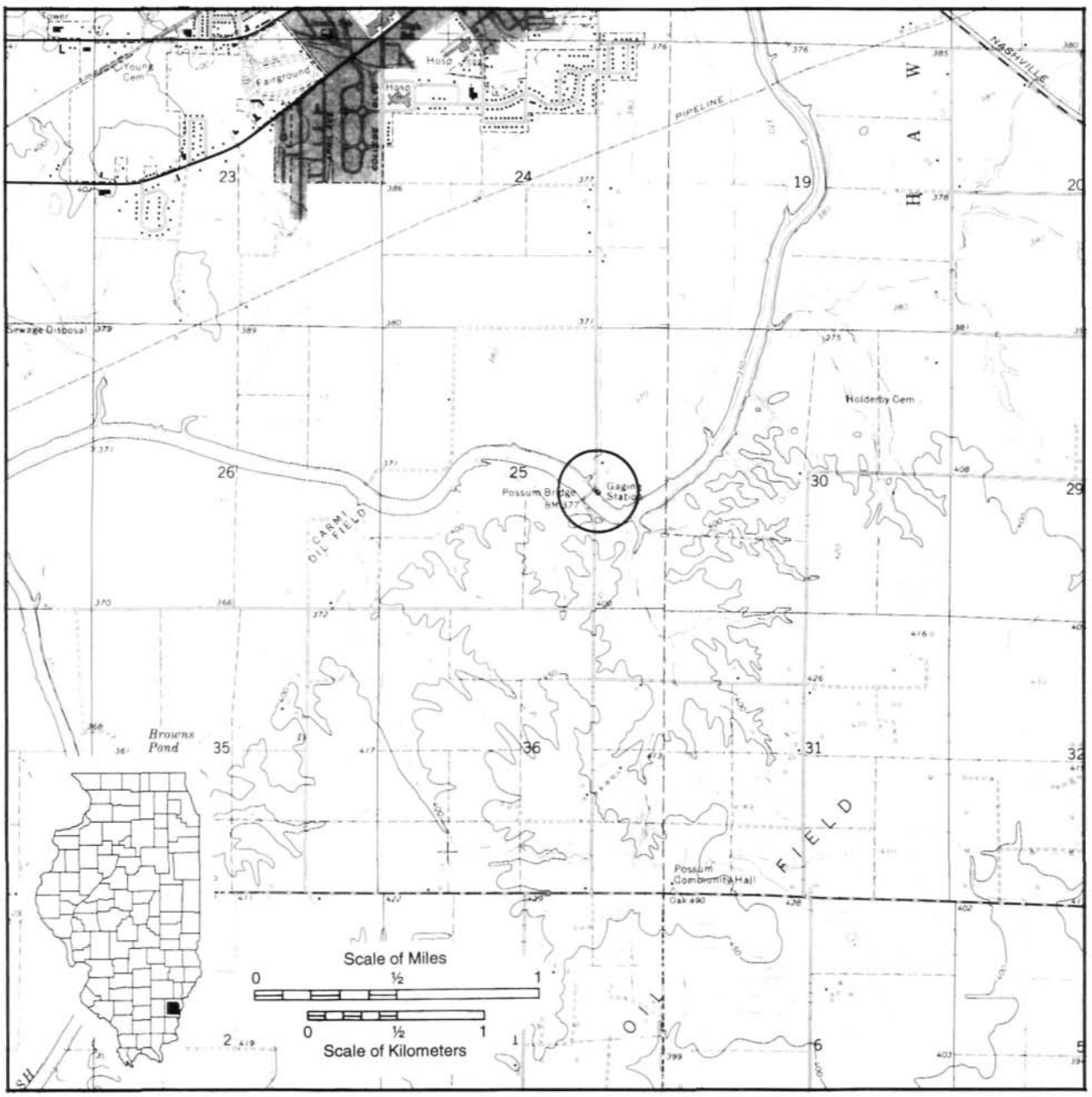
Location: Latitude 38°03'40", Longitude 898°09'35", in NW 1/4, SE 1/4, Section 25, T.5S., R. 9E., White County, Hydrologic Unit 05120114, bridge on Possum Road, 2.3 mile south of Main Street, at mile 30.5

Drainage Area: 3,102 sq. mi.

Period of Record: Water Years 1981 to 1985, and Water Year 1994 to Present

Observer Sampling Location: Downstream side of the bridge, 185 ft. from the left edge

Climate/Crop Reporting District: Southeast



Looking upstream from gaging station

Looking downstream from gaging station

#378 - Cache River at Forman, IL (USGS #03612000)

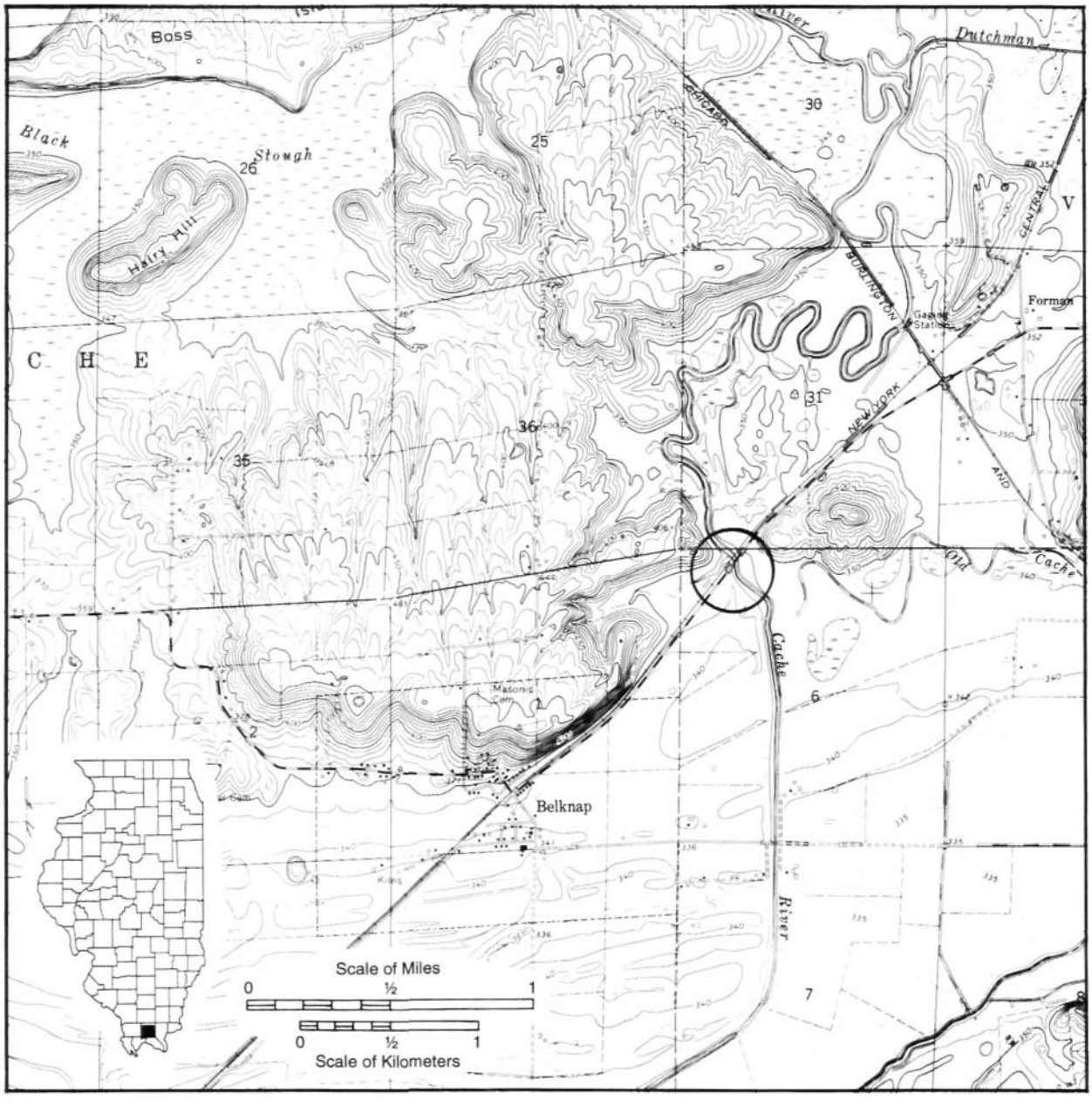
Location: Latitude 37°20'11", Longitude 88°55'26", in NE 1/4, NW 1/4, Section 6, T. 14S., R. 3E., Johnson County, Hydrologic Unit 05140206, bridge on County Highway 3, 1.2 miles southwest of Forman, at mile 8.1

Drainage Area: 244 sq. mi.

Period of Record: Water Year 1981 to Present

Observer Sampling Location: Downstream side of the bridge, 90 ft. from the left edge

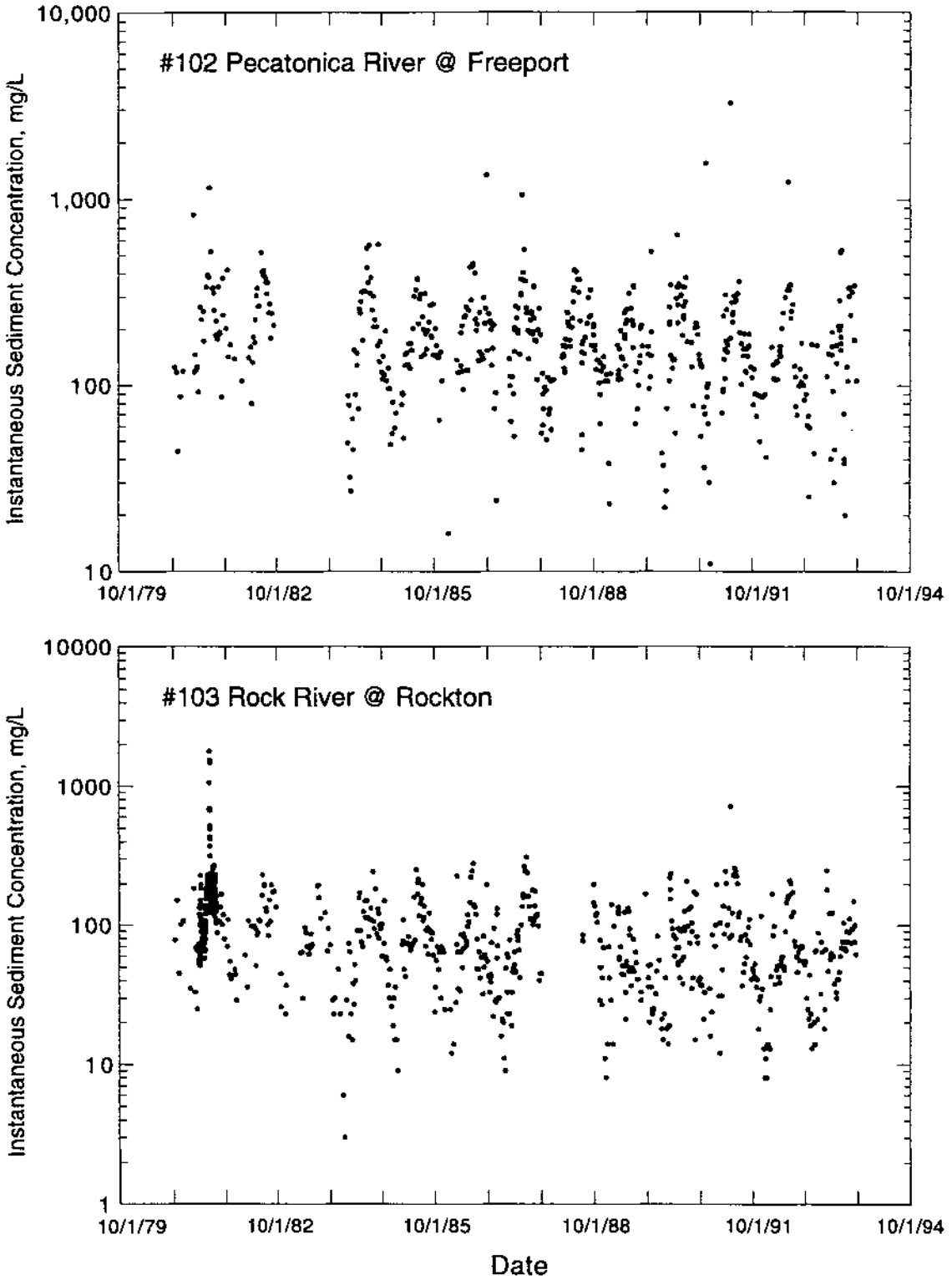
Climate/Crop Reporting District: Southwest

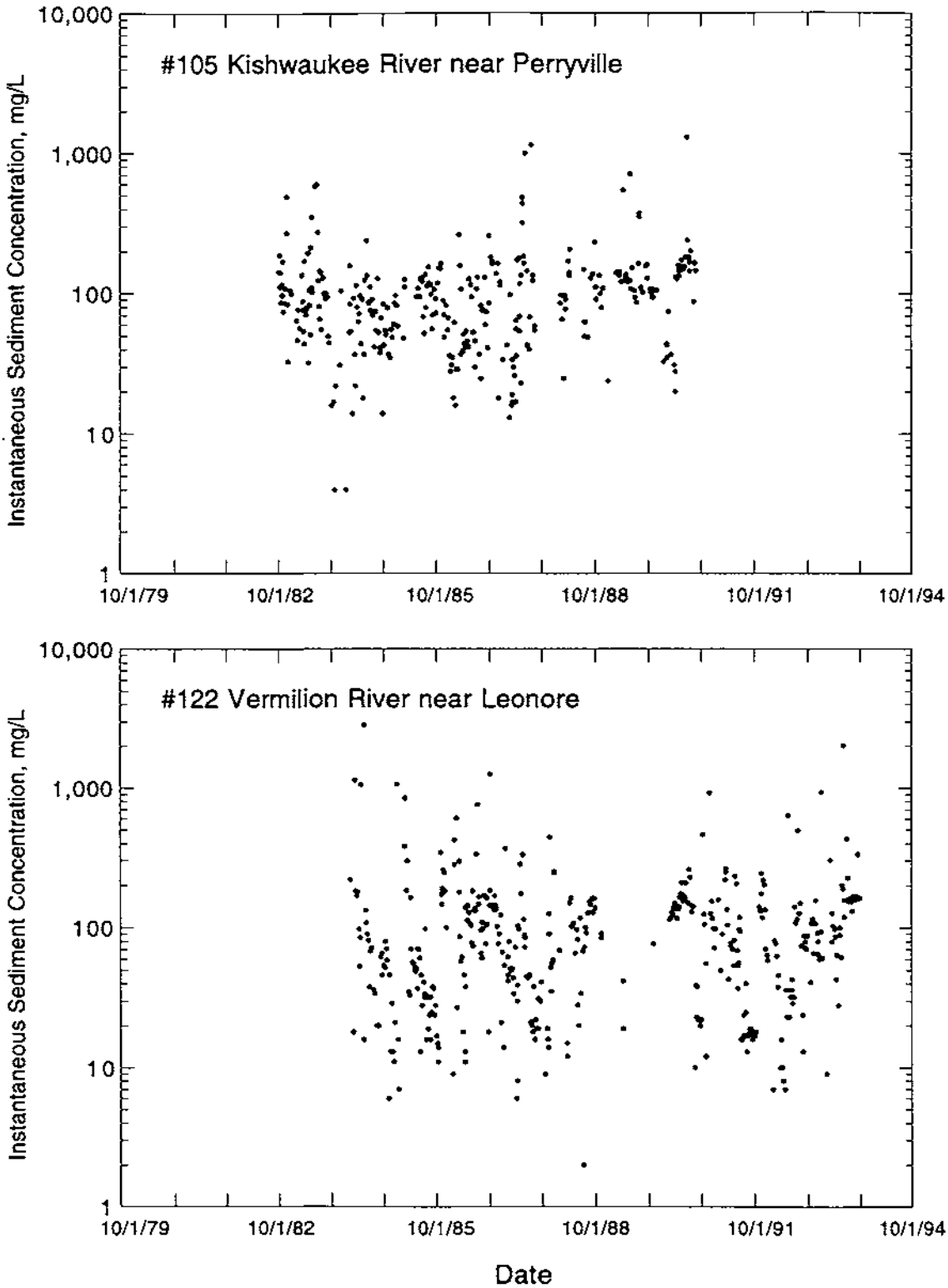


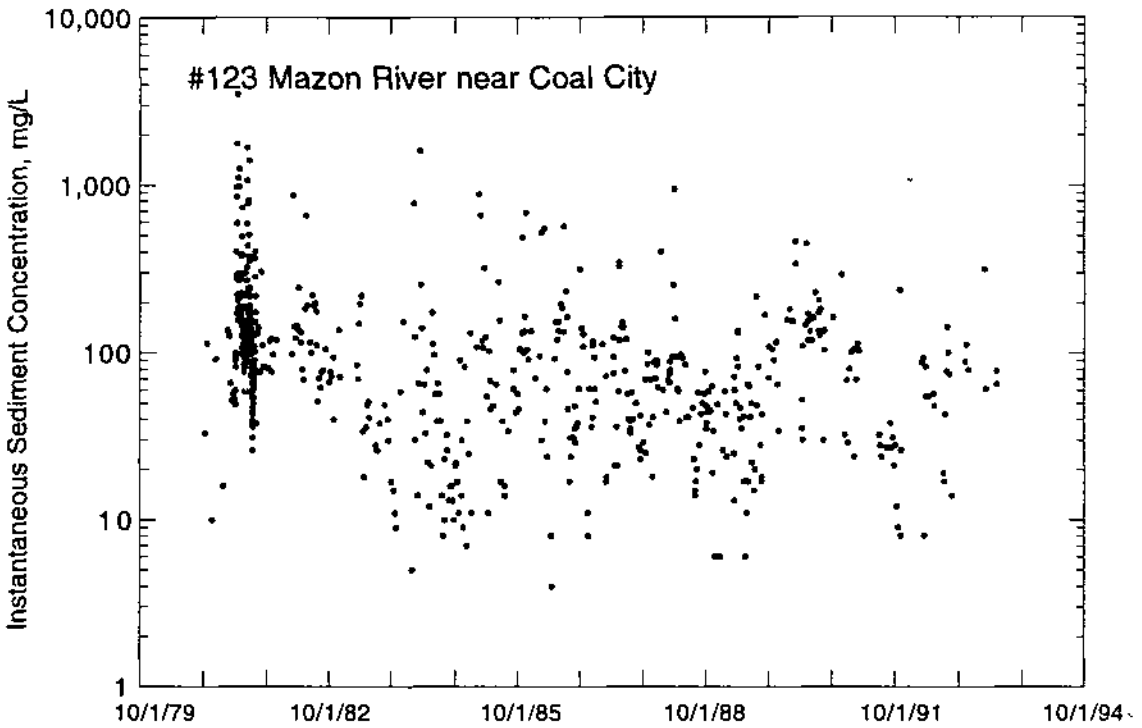
Looking upstream from gaging station

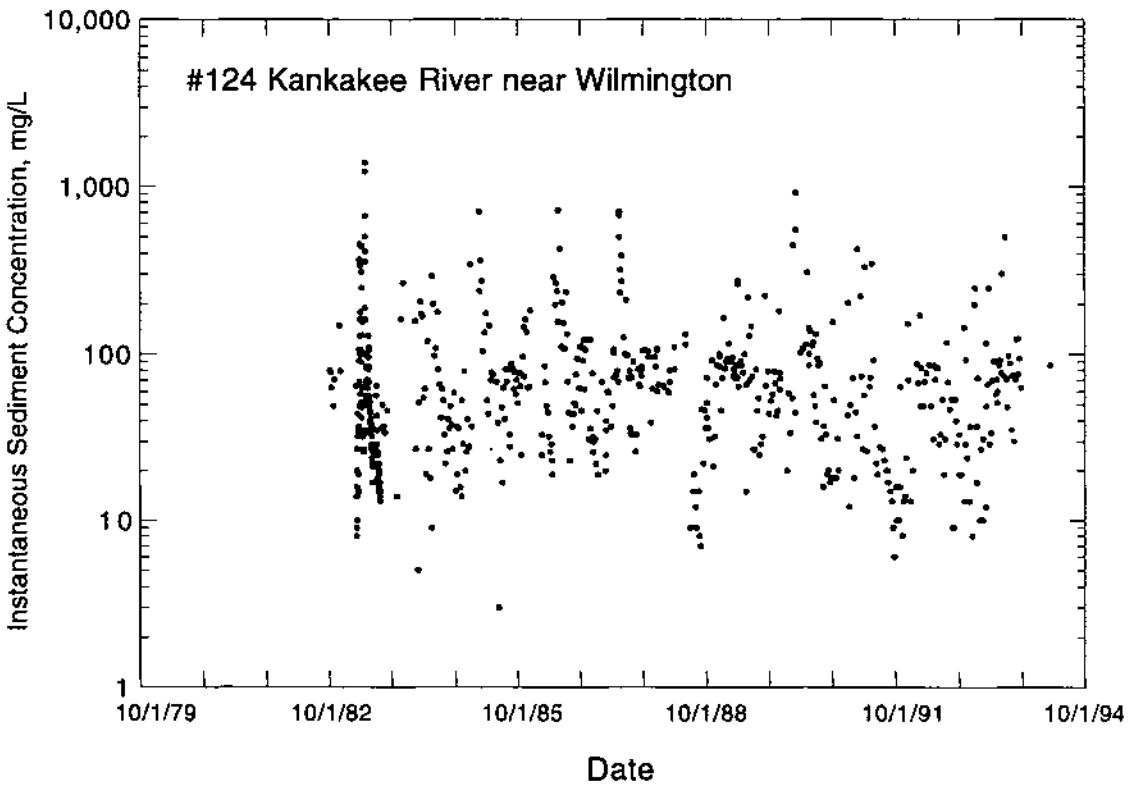
Looking downstream from gaging station

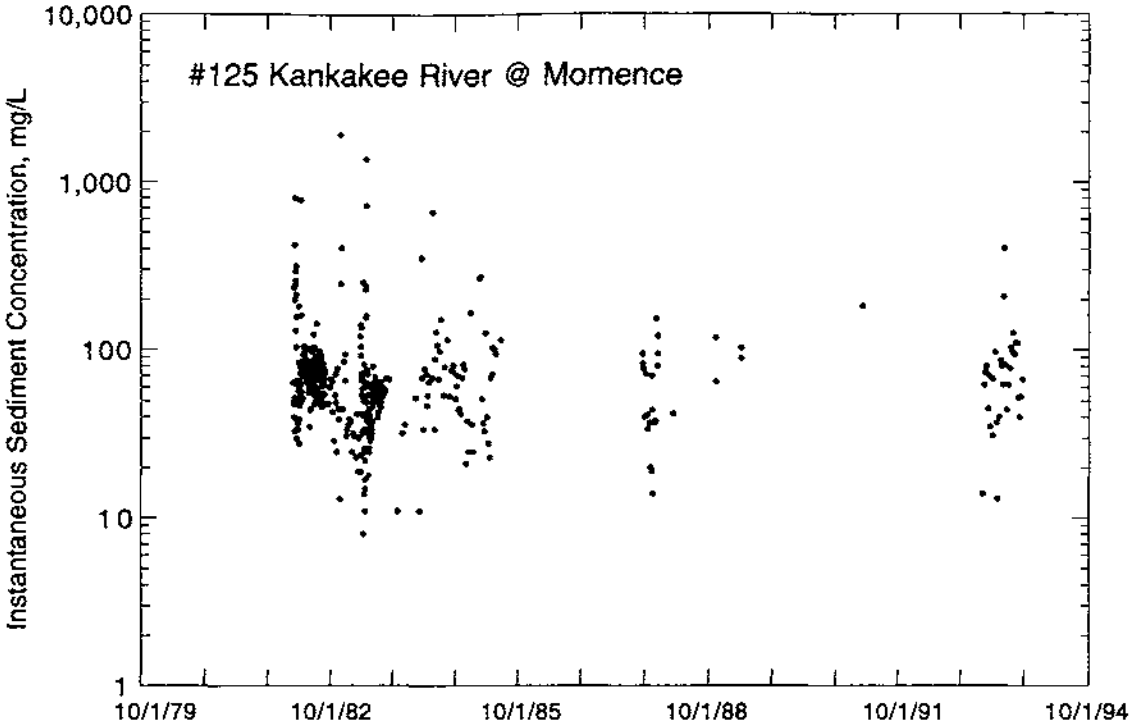
APPENDIX B: PLOTS OF INSTANTANEOUS SUSPENDED SEDIMENT CONCENTRATIONS FOR THE PERIOD OF RECORD FOR CURRENT MONITORING PROGRAM SAMPLING SITES

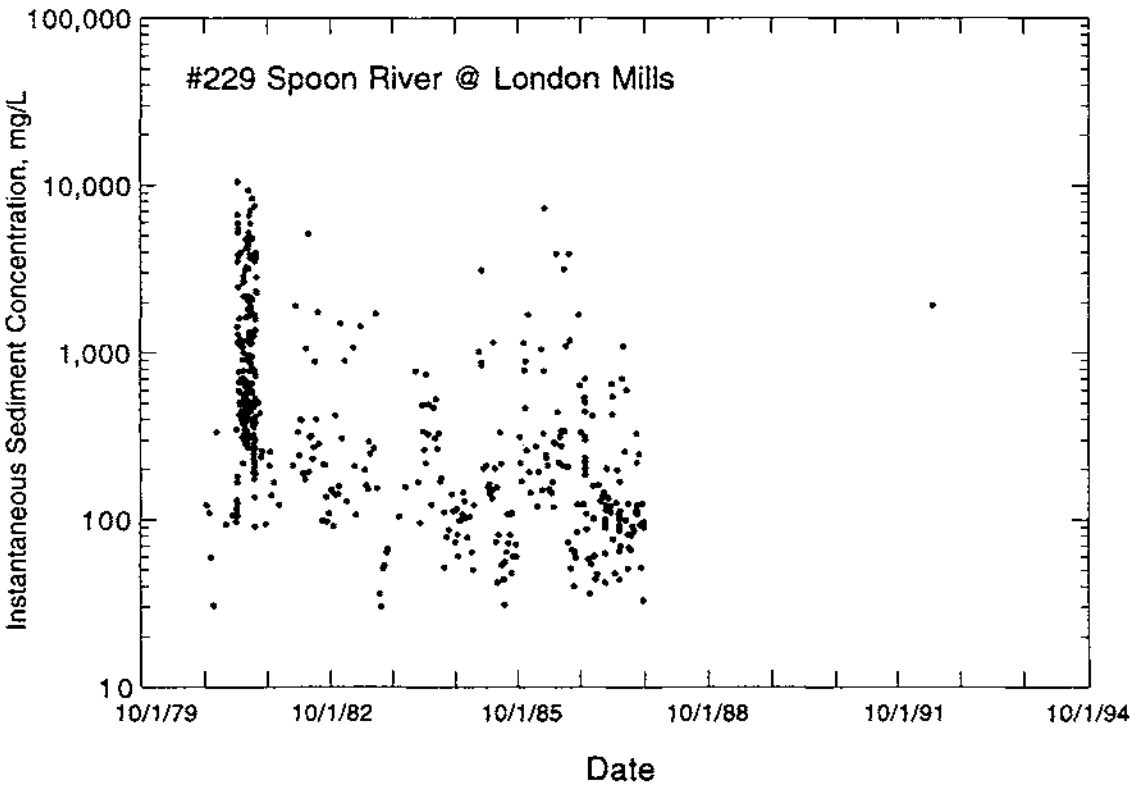

#102 Pecatonica River @ Freeport
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
#103 Rock River @ Rockton
Instantaneous Sediment Concentration, mg/L
10000
1000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
Date

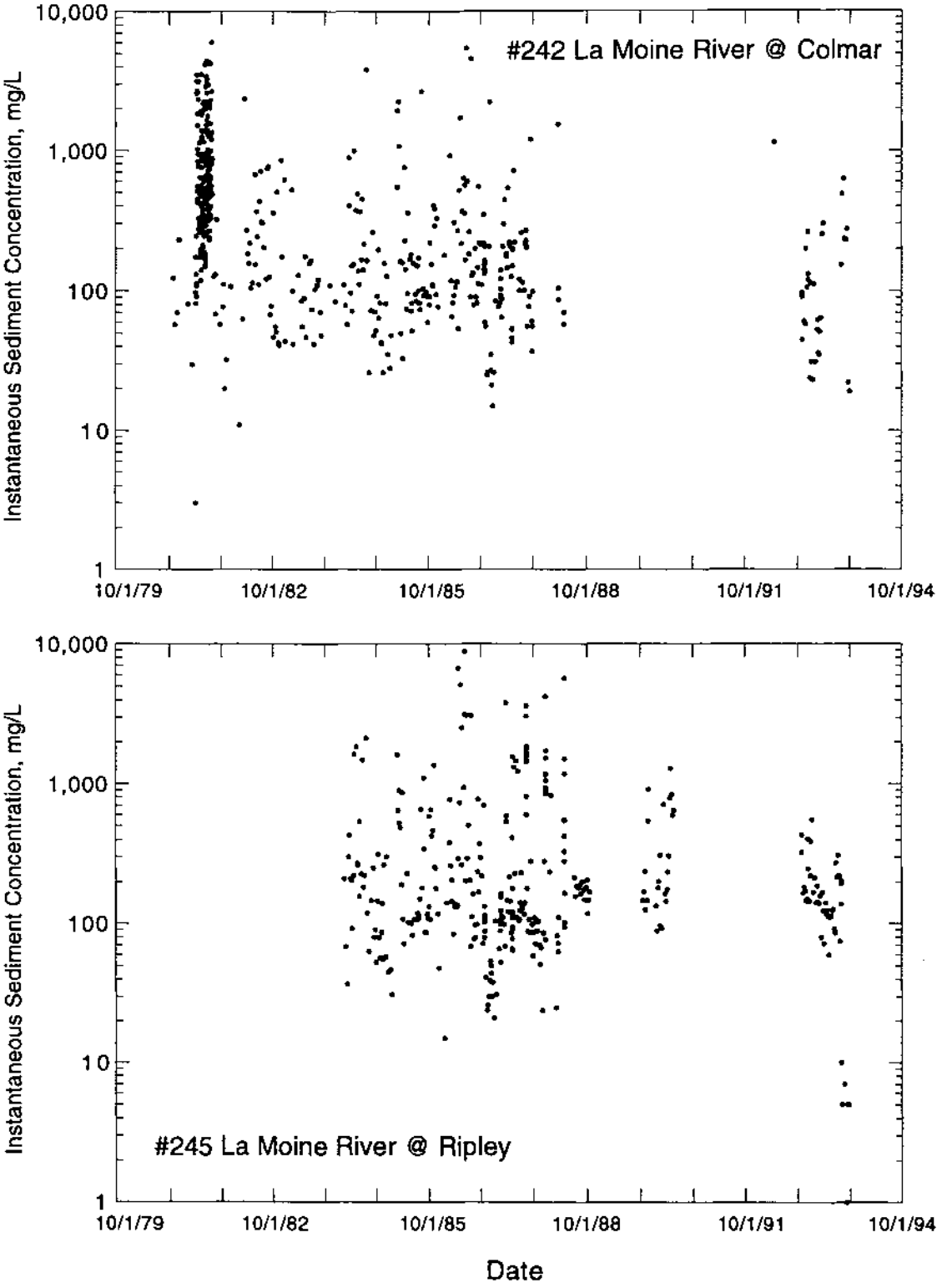

#105 Kishwaukee River near Perryville
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
#122 Vermilion River near Leonore
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
Date

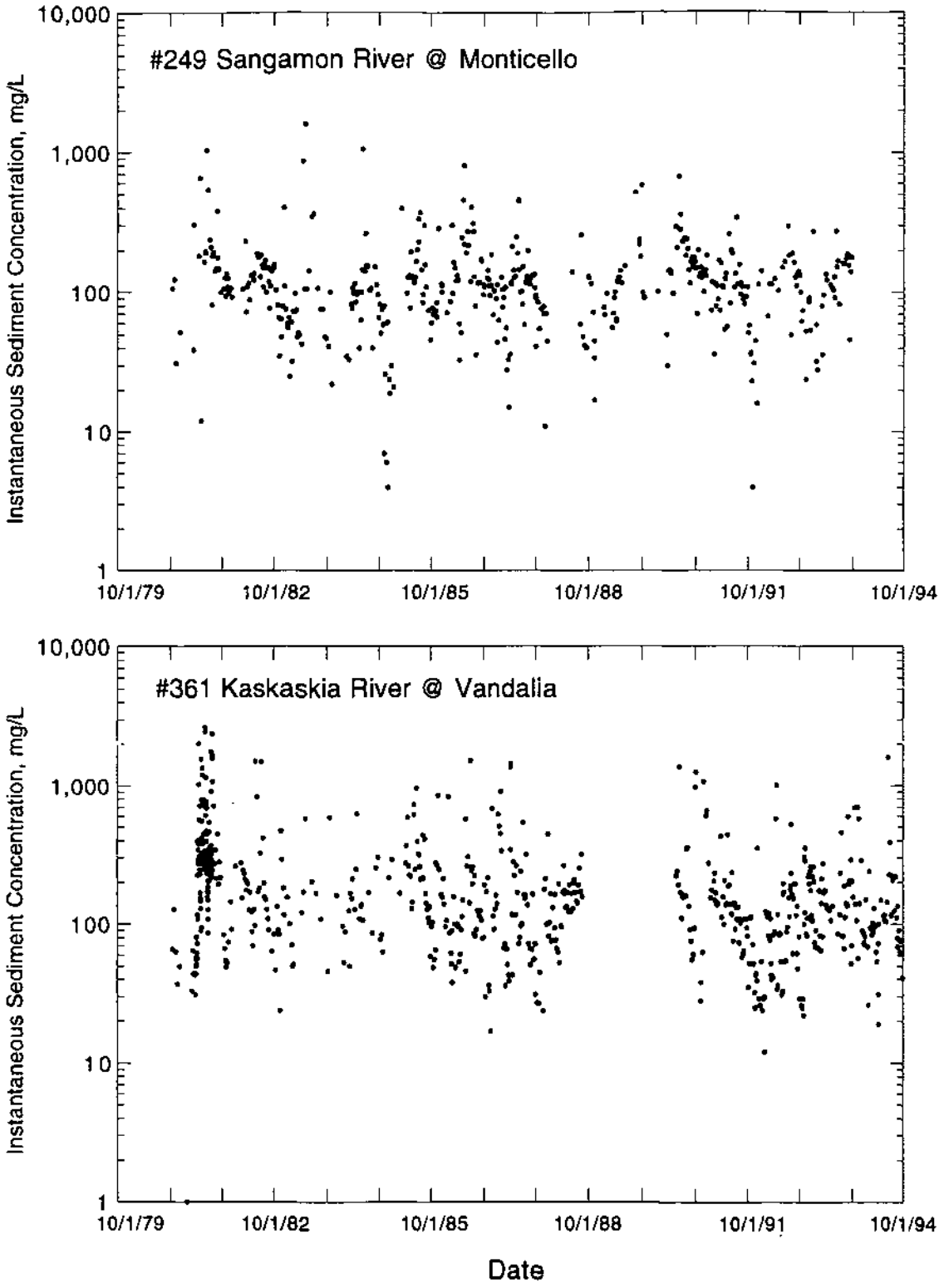

#123 Mazon River near Coal City
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94


#124 Kankakee River near Wilmington
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
Date


#125 Kankakee River @ Momence
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94


#229 Spoon River @ London Mills
Instantaneous Sediment Concentration, mg/L
100,000
10,000
1,000
100
10
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
Date


#242 La Moine River @ Colmar
#245 La Moine River @ Ripley
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
Date


#249 Sangamon River @ Monticello
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
#361 Kaskaskia River @ Vandalia
Instantaneous Sediment Concentration, mg/L
10,000
1,000
100
10
1
10/1/79
10/1/82
10/1/85
10/1/88
10/1/91
10/1/94
Date

[redacted]