State Water Survey Division
SURFACE WATER SECTION
AT THE
UNIVERSITY OF ILLINOIS

Illinois Department of Energy and Natural Resources

SWS Contract Report 284

STATEWIDE INSTREAM SEDIMENT MONITORING PROGRAM FOR ILLINOIS: INTERIM REPORT

Submitted to:

Illinois Department of Energy and Natural Resources

Illinois Environmental Protection Agency

Illinois Department of Transportation, Division of Water Resources

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Champaign, Illinois
November 1981

CONTENTS

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FOR ILLINOIS: INTERIM REPORT

By

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INTRODUCTION

Sedimentation in Illinois lakes and sediment transported by Illinois streams is recognized as a major pollution issue. Although soil erosion, sediment transport and sedimentation are natural processes, they interfere with what society requires for stable, economical, and productive use of watersheds, streams, and lakes.

The major interactions between sediment and water are now recognized as major water resources problems. The magnitude of these problems has not been fully recognized. Various physical means to control soil erosion and stream erosion are now being considered. Their implementation will have enormous societal and environmental ramifications. Unfortunately, many of the physical and chemical aspects of sediments in rivers and lakes are not yet known or understood clearly.

Knowledge of sediments in Illinois water affects a multitude of -agency and business decisions in Illinois. For example, there are major questions with poorly quantified information on:

- Impacts of sediment on stream biota and stream environment
- Impacts of sediment on water treatment plants
- Lake sedimentation
- Locations and causes of sheet, gully, and stream bank erosion
- Effects of reduced field erosion on instream erosion
- Pollutants being carried by sediment
- Quantity and magnitudes of sediment carried by Illinois streams

The state needs a strategy to deal with these impacts, and to make regulatory decisions related to:

- Reductions in watershed erosion
- Best management practices to be followed
- Effects of changing land use and cropping patterns
- Stream channelization
- Land use and management along stream banks and lake shores

Sedimentation also affects the capacity and water quality of water supply lakes. It reduces storage capacity in flood control reservoirs. Sediment deposition in streams affects the conveyance of the stream and its capacity to sustain a viable aquatic habitat. The biota in all of these waters are potentially affected by the chemical composition of the sediments and sediment deposition and sediment load.

As a consequence of these complex, wide-ranging impacts, sediment is of concern in major state activities. These include: 1) the maintenance of water quality (Environmental Protection Agency); 2) farming (Department of Agriculture); 3) regulation of our waterways, construction of hydraulic structures, and development of surface water impoundments (Division of Water Resources); and 4) the preservation of natural stream courses (Department of Conservation). All of these impact areas relate to the overall maintenance and management of the state's natural resources (Department of Energy and Natural Resources).

Correct answers to this myriad of technological, scientific, and policy questions can only come from quality data of sufficient breadth, in both time and space, to allow research and production of reliable answers. Unfortunately, these data do not exist. Data are among the key components to the formulation of plans and policy.

The need for a long-term, statewide sediment monitoring network has been acknowledged for some time. The key values of the data and information derived will be to: 1) provide realistic answers to new or current problems; 2) provide answers and information for planning based on long-term data bases.

In the latter application, existing and envisioned issues relate to: 1) trends in sedimentation related to man-made changes; 2) the water quality in streams as affected by sediment load; 3) the magnitude of sedimentation in lakes and the sediment load in streams during prolonged wet and dry (drought) periods; 4) the pollutants (pesticides, nutrients, and heavy metals) being transported by sediments; and 5) the development of a set of direct relationships between rain and soil factors for different physiographic areas, so as to have adequate models for transferring results to all parts of the state and for predicting sediment load in unmeasured streams and sedimentation rates in lakes.

Data requirements to answer the above questions include a comprehensive statewide sediment network consisting of 50 or more stations operated for 10 to 20 years. To partially meet these ends, this project was developed and is being conducted. It has twin goals: 1) to collect and study data at 50 sediment monitoring stations located at strategic locations around the state; and 2) to act as a catalyst for a long-term multi-agency sediment monitoring program involving installation, operation, and study of data from a statewide sediment network.

The present project has been able to fulfill its first goal but is struggling to achieve the second one. Although it has received broad-based support from a number of state and federal agencies and financial support from three of these (Illinois Environmental Protection Agency, Illinois Department of Energy and Natural Resources, formerly the Institute of Natural Resources, and the Division of Water Resources of the Illinois Department of Transportation) , the present state of the economy and the commensurate state and federal budget cuts have severely jeopardized the short- and long-term future of the sediment monitoring program. At present, the network has lost nearly 55 percent of its original funding, resulting in a potential loss of over half of the original 50 monitoring stations for water year 1982.

Cooperative funding from several agencies is required to avert the potential impact of the loss of this program in terms of its present worth (investment in equipment, supplies, and time) and future value (usefulness of and need for the information gathered).

Acknowledgments

This project is being conducted under the administrative guidance of Stanley A. Changnon, Jr., Chief, Illinois State Water Survey, and Michael L. Terstriep, Head, Surface Water Section.

Many Water Survey employees helped in the collection to the data. The only two full-time field personnel on this project were Richard Allgire and D. Kevin Davie. They showed a true sense of dedication to their jobs and did an excellent job of collecting and reviewing the data, as well as installing and maintaining the sediment stations. They were ably assisted by William Fitzpatrick of the Surface Water Section and by John Nicol and Pamela S. Shipplett, undergraduate student employees at the Water Survey.

William C. Bogner was invaluable in contributing his time and ideas in setting up the monitoring stations and helping decide on the plan for the network. Ming T. Lee also participated in the designing and planning of the network.

Personnel from the Champaign District Office of the U.S. Geological Survey (USGS) were very helpful in offering technical advice. G. Douglas Glysson, Assistant District Chief, participated in the site selection process. Tim Lazarro helped with equipment purchasing and design.

All sediment samples were analyzed by the State Water Survey's Sediment Materials Laboratory. Michael V. Miller, Head of the Sediment Materials Laboratory, was invaluable in helping to design an efficient method to handle, analyze, and process the thousands of samples generated by the sediment network.

The data generated by the network were entered into computer files by members of the Data and Information Management Unit, under the general supervision of Robert A. Sinclair, Unit Head. All computer programs and data management systems were developed by Carl G. Lonnquist and Marvin C. Clevenger.

Many more Water Survey staffers were helpful in this project. Jim Harry helped with equipment development; Becky Rohl expedited equipment purchases. Several of the photos in this report were taken by Dave Kisser. Karen Vivian typed the rough draft; John Brother, Jr., William Motherway, and Linda Riggin prepared the illustrations. Kathy Brown prepared the camera ready copy. Loreena Ivens edited the report.

Finally, the authors are grateful for the recommendations and advice of the Advisory Committee for Sediment Monitoring in Illinois during the planning stages of this project. The authors also wish to thank Dave Jones of the Department of Energy and Natural Resources (DENR), Bob Clark and Bill Rice of the Illinois Environmental Protection Agency (IEPA), and Sam Mostoufi and Gary Clark of the Division of Water Resources (DOWR) for their constant support in helping this project achieve its goals.

DESCRIPTION OF SEDIMENT MONITORING NETWORK

As previously stated in this report, the primary goal of this project was to establish 50 sediment monitoring stations throughout the state of Illinois. The project coordinators felt that this number of stations, when combined with the approximately 25 to 30 stations monitored by the U.S. Geological Survey, would be ideal for measuring sediment transported through all the major streams and rivers within the state.

In September 1980 a coordination meeting was held between the three funding agencies (DENR, IEPA, DOWR) and the State Water Survey (SWS) to determine the objectives of the monitoring program and to establish criteria for selecting the monitoring stations. The objectives of the program were:

1. To select 50 gaging stations from around the state of Illinois to monitor for sediment.
2. To collect weekly depth-integrated suspended sediment samples from all the stations.
3. To collect samples across the width of the stream approximately once a month to calibrate the weekly samples.
4. To collect daily samples from as many stations as possible, within the limits of the budget, for a period of 90 days during early spring and summer.
5. To measure velocity distribution across the width of the stream approximately once a month at all the stations.
6. To analyze all the samples to determine suspended sediment concentration and total volatile solids concentration.
7. To determine the particle size distribution of the suspended sediments for some selected samples.

8. To analyze all the data and prepare a comprehensive report for use by private, state, federal, local, university, research, and other interested agencies.

Methods used to fulfill these objectives will be discussed later in this report.

The following criteria were established for selecting the 50 monitoring stations.

1. Avoid any duplication with other agencies monitoring for suspended sediments (i.e.,USGS).•
2. Select stations that will allow an adequate sampling of all the representative basins and physiographic regions of the state.
3. Locate stations at established USGS stream gaging stations (preferably continuous-record stations).
4. Select stations that will complement USGS sediment stations by establishing a complete record of sediment transported within a basin.
5. Attempt to select stations which are already part of the IEPA Water Quality Monitoring Network.
6. Request input from interested state and federal agencies for locating stations in areas that are of importance to those agencies.
7. Select stations which will complement the SWS Lake Sedimentation Program.

All the appropriate information was gathered and reviewed and 50 tentative monitoring stations were selected.

To fulfill criterion number six, a ten-member Advisory Committee for Sediment Monitoring in Illinois, composed of representatives from interested state and federal agencies, was established. This committee was presented the list of 50 tentative stations and was given an opportunity to recommend changes. After review by this committee, the 50 permanent sediment monitoring stations were established (figure 1, table 1).

These stations were divided into three "districts" (see figure 1). The northern district contained all the stations bounded by the state line in the north and a line at 41 north latitude in the south; the central district contained all the stations between the 41 north latitude and the 39 30' north latitude; and the southern district contained all the stations south of 39 30' north latitude. The Water Survey's main office in Champaign was responsible for monitoring stations in the central district. Field offices in Marion and Warrenville, which were established for this program, monitored the southern and northern districts, respectively.

The sediment network's 1981 budget allowed for 27 stations to be monitored on an intensive basis (see table 1) . This meant that a locally hired observer collected a sample once a day (twice daily during rising stages) during the period of approximately April 1 through July 31. Previous studies at the Water Survey (Bhowmik et al., 1980) have shown that from 60 to 90 percent of the total suspended sediment load is carried by a stream during this period. It is hoped that this intensive monitoring will better reflect the total yearly tonnages of sediment transported by a particular stream at a given site.

An effort was made to complement the USGS sediment monitoring program by locating intensive stations where they could best supplement data already being collected within a basin. It would have been desirable to expand this intensive monitoring to all the stations all year, but budgetary constraints and logistic problems limited this to only 27 stations for 4 months.

It must also be pointed out that in addition to the 50 stations mentioned in this report and shown in figure 1, the USGS also monitored about . 25 to 27 stations in water year 1981. Presently the State Water Survey and the U.S. Geological Survey are exploring the possibility of publishing all the sediment data in a joint publication.

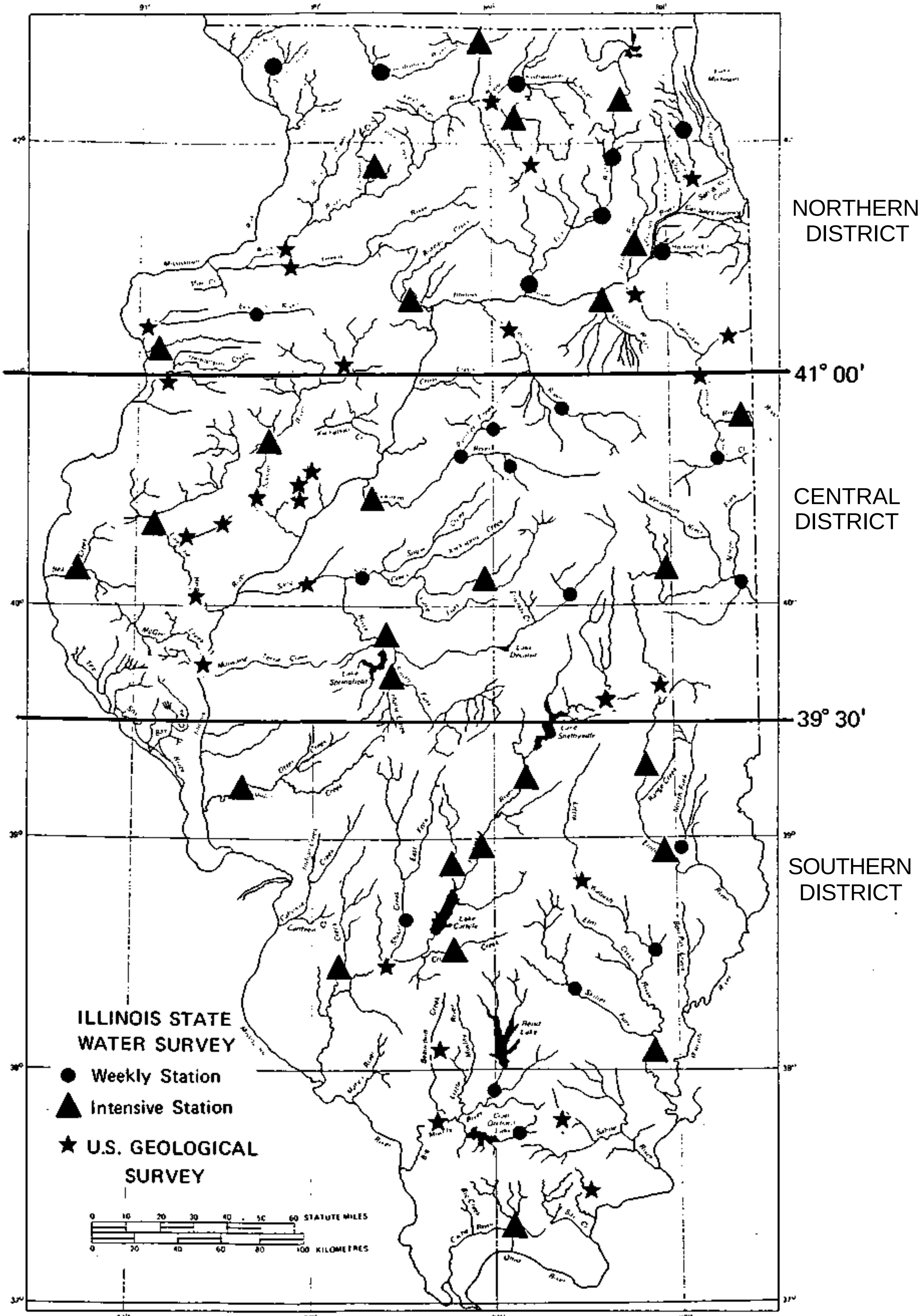


Figure 1. Sediment Monitoring Network for Illinois for water year 1981

Table 1. Illinois State Water Survey Sediment Network

USGS No.	Station Name
I.	Northern District
05418950	Apple River near Elizabeth, IL (D.A. 207 sq mi)
05435500	Pecatonica River at Freeport, IL (D.A. 1326 sq mi)
*05437500	Rock River at Rockton, IL (D.A. 6363 sq mi)
05438500	Kishwaukee River at Belvidere, IL (D.A. 538 sq mi)
*05439500	South Branch Kishwaukee River near Fairdale, IL (D.A. 387 sq mi)
*05444000	Elkhorn Creek near Penrose, IL (D.A. 146 sq mi)
05466000	Edwards River near Orion, IL (D.A. 155 sq mi)
*05467000	Pope Creek near Keithsburg, IL (D.A. 183 sq mi)
05529000	Des Plaines River at Des Plaines, IL (D.A. 360 sq mi)
05539000	Hickory Creek at Joliet, IL (D.A. 107 sq mi)
*05540500	Du Page River at Shorewood, IL (D.A. 324 sq mi)
*05542000	Mazon River near Coal City, IL (D.A. 455 sq mi)
*05550000	Fox River at Algonquin, IL (D.A. 1403 sq mi)
05551200	Ferson Creek near St. Charles, IL (D.A. 51.7 sq mi)
05551540	Fox River at Montgomery, IL (D.A. 1732 sq mi)
05552500	Fox River at Dayton, IL (D.A. 2642 sq mi)
*05556500	Big Bureau Creek at Princeton, IL (D.A. 196 sq mi)
II.	Central District
*03336900	Salt Fork near St. Joseph, IL (D.A. 134 sq mi)
03339000	Vermilion River near Danville, IL (D.A. 1290 sq mi)
*05495500	Bear Creek near Marcelline, IL (D.A. 349 sq mi)
*05525000	Iroquois River at Iroquois, IL (D.A. 686 sq mi)
05525500	Sugar Creek at Milford, IL (D.A. 446 sq mi)
05554490	Vermilion River at McDowell, IL (D.A. 551 sq mi)
05564400	Money Creek near Towanda, IL (D.A. 49.0 sq mi)
05566500	East Branch Panther Creek at El Paso, IL (D.A. 30.5 sq mi)
05567510	Mackinaw River below Congerville, IL (D.A. 776 sq mi)
*05568005	Mackinaw River below Green Valley, IL (D.A. 1092 sq mi)
*05569500	Spoon River at London Mills, IL (D.A. 1062 sq mi)
05572000	Sangamon River at Monticello, IL (D.A. 550 sq mi)
*05576022	South Fork Sangamon River below Rochester, IL (D.A. 870 sq mi)
*05576500	Sangamon River at Riverton, IL (D.A. 2618 sq mi)
*05578500	Salt Creek near Rowell, IL (D.A. 335 sq mi)
05582000	Salt Creek near Greenview, IL (D.A. 1804 sq mi)
*05584500	La Moine River at Colmar, IL (D.A. 655 sq mi)
III.	Southern District
*03344000	Embarras River near Diona, IL (D.A. 919 sq mi)
*03345500	Embarras River at Ste. Marie, IL (D.A. 1516 sq mi)
03346000	North Fork Embarras River near Oblong, IL (D.A. 318 sq mi)
03379600	Little Wabash at Blood, IL (D.A. 1387 sq mi)
03380500	Skillet Fork at Wayne City, IL (D.A. 464 sq mi)
*03381500	Little Wabash at Carmi, IL (D.A. 3102 sq mi)
*03612000	Cache River at Forman, IL (D.A. 244 sq mi)
*05587000	Macoupin Creek near Kane, IL (D.A. 868 sq mi)
*05592100	Kaskaskia River near Cowden, IL (D.A. 1330 sq mi)
*05592500	Kaskaskia River at Vandalia, IL (D.A. 1940 sq mi)
*05592800	Hurricane Creek near Mulberry Grove, IL (D.A. 152 sq mi)
*05593520	Crooked Creek near Hoffman, IL (D.A. 254 sq mi)
05594000	Shoal Creek near Breese, IL (D.A. 735 sq mi)
*05594800	Silver Creek near Freeburg, IL (D.A. 464 sq mi)
05597000	Big Muddy River at Plumfield, IL (D.A. 794 sq mi)
05597500	Crab Orchard Creek near Marion, IL (D.A. 31.7 sq mi)

*intensively monitored sites
D.A. = Drainage Area

METHODOLOGY AND INSTRUMENTATION

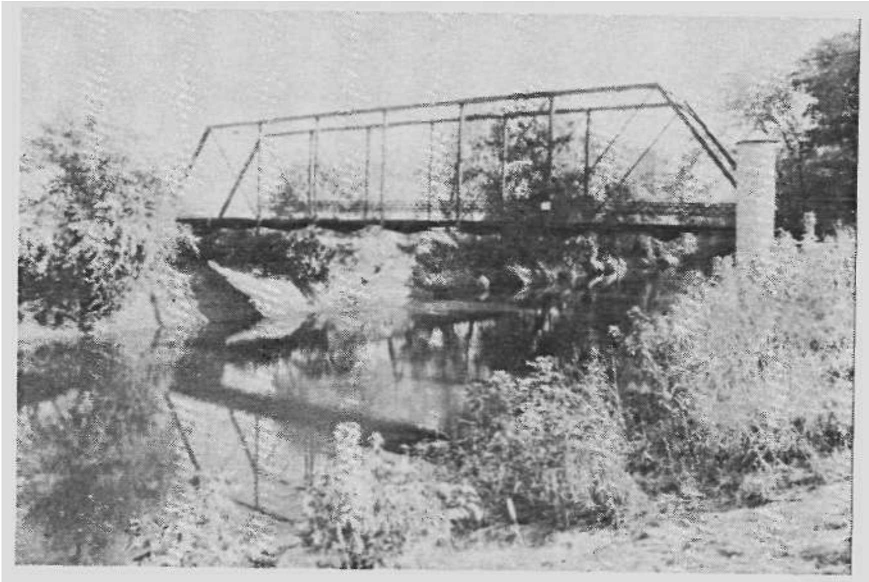
Throughout the development phase of the Water Survey's sediment network, an attempt was made to make the data collection program, methodology, and instrumentation compatible with and similar to those used by the U.S. Geological Survey as dictated by the U.S. Department of the Interior's series of publications entitled Techniques of Water-Resources Investigations of the United States Geological Survey (Buchanan and Somers, 1969; Guy, 1969; Guy and Norman, 1970; Porterfield, 1972). This compatibility was necessary to insure that the data collected by the SWS had the same level of quality control and quality assurance as those collected by the USGS.

Forty-five (90 percent) of the 50 network stations were located at continuous record USGS stream gaging stations (figures 1 and 2). The remaining 5 stations were located at sites which have been rated by the USGS. Locating the sediment stations at USGS stream gaging stations was important because it enabled us to read the river stage each time a sample was taken and later obtain a water discharge value corresponding to the recorded stage. Combining this discharge value with the sediment concentration value of the sample yields the total suspended sediment load transported by the stream through that gaging station at that moment.

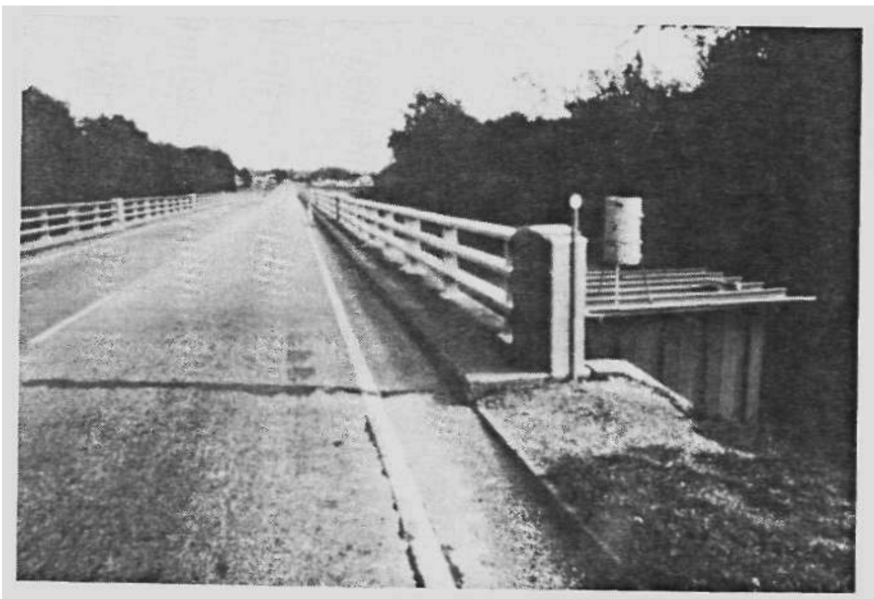
Field Methods and Equipment

Suspended Sediment. Two types of sampling for suspended sediment concentrations were used in this project. First, all weekly and daily samples were collected at a single location, or vertical, in each channel cross section. This location was termed the "box site."

The positioning of this box site was somewhat arbitrary since no previous



A. Spoon River at London Mills



B. Sangamon River at Monticello

Figure 2. Typical USGS continuous record stream gaging stations in Illinois

knowledge of the dynamics of the sediment flow at the site was available. The box site was located in the deepest, fastest portion of the stream cross section. As more information on the sediment flow characteristics of each stream becomes available, we hope it will be possible to reposition the box site so that the concentration of the sample collected at the site is as close as possible to the mean concentration in the cross section.

The second type of sediment sampling involved collecting suspended sediment samples at several verticals along the entire channel cross section once every 4 to 6 weeks. The purpose of this sampling was to calibrate the samples taken at the box site to determine the ratio of the sediment concentration at the box site to the average concentration in the entire cross section. This value could then be used to adjust the concentration values at the box site so they would better reflect the average suspended sediment concentration in the channel cross section. The reader is referred to Porterfield (1972) for an explanation of this "adjustment" method.

Three types of suspended sediment samplers were used in this project. All of them have been approved by the Federal Inter-Agency Sedimentation Project of the Inter-Agency Committee on Water Resources, located at the St. Anthony Falls Hydraulic Laboratory in Minneapolis, Minnesota, and are commonly used by the USGS. The three samplers are 1) the depth-integrating suspended sediment wading-type hand sampler, US DH-48 (figure 3); 2) the depth-integrating suspended sediment hand-type sampler, US DH-59 (figure 4); and 3) the point-integrating suspended sediment cable and reel sampler, US P-72 (figure 5).

These three samplers perform the same function but are designed for different stream conditions. The US DH-48 is used for wadable streams

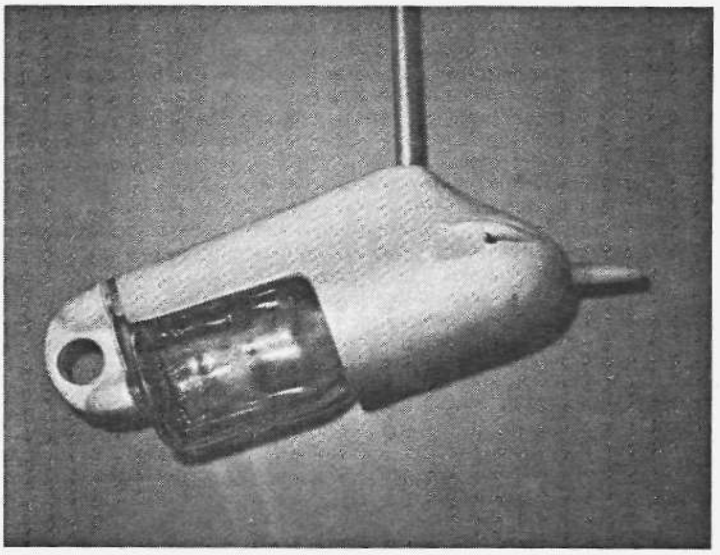


Figure 3. Depth-integrating suspended sediment wading-type hand sampler, US DH-48

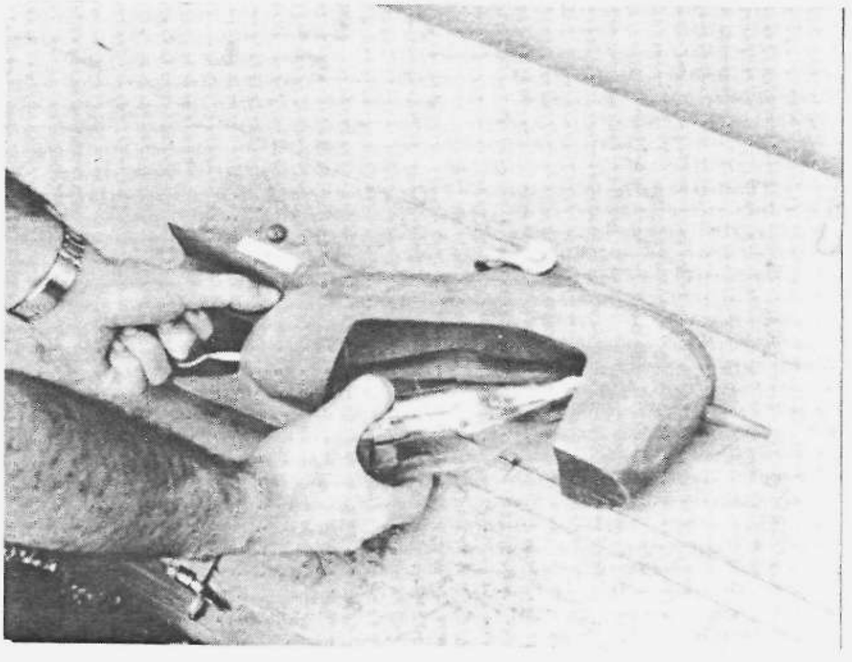


Figure 4. Depth-intergrating suspended sediment hand-type sampler, US DH-59

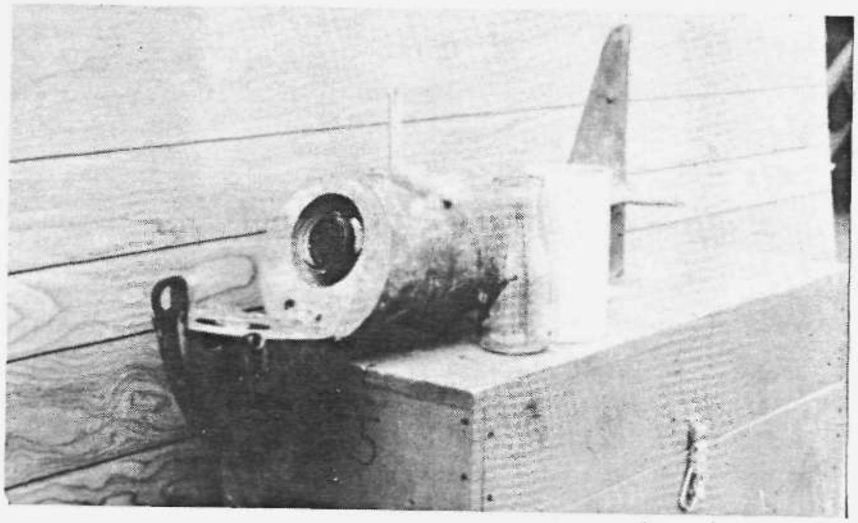


Figure 5. Point-integrating suspended sediment cable and reel sampler, US P-72

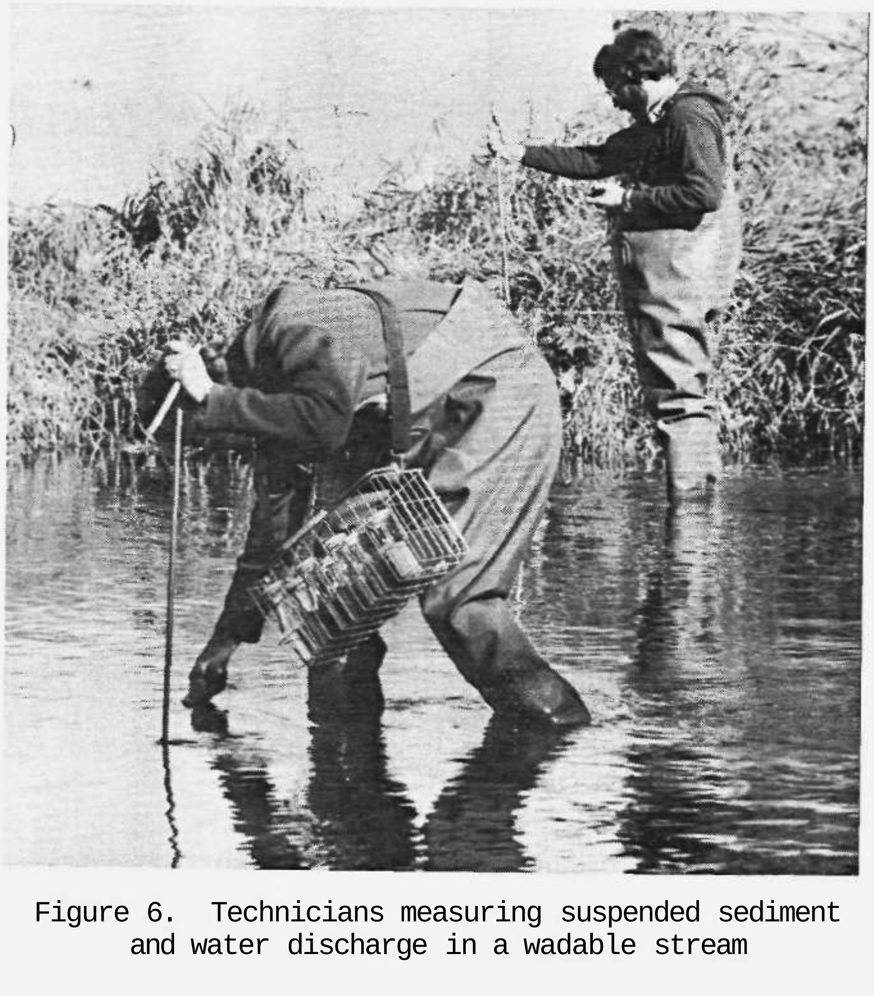


Figure 6. Technicians measuring suspended sediment and water discharge in a wadable stream

(figure 6); the US DH-59 is used for medium sized streams, moderate flow conditions, and maximum depths of approximately 16 feet (figure 7); and the US P-72 is for use in deep, fast flows.

The techniques used to collect the samples were the same for all three samplers. For lowering and raising the samplers through the water column, the equal transit-rate (ETR) method was used at all times. In addition, the equal width-increment (EWI) method was used for all of the 4-6 week cross section analyses. A complete and detailed discussion of the samplers, their proper use, and the sampling techniques described above can be found in Guy and Norman (1970).

Twenty-seven of the sediment stations were monitored by a locally hired observer on an intensive basis for approximately four months in spring and summer. These stations were referred to as intensive stations. During this period, the observers were instructed to collect one sample a day during steady or falling stages and to collect two samples a day (8- to 10-hour separations) during rising, bankfull, and flood stages. This sampling schedule was designed to yield a good representation of the sediment hydrograph and was based on our general understanding of the temporal relationship between sediment and discharge in a stream. As more data for each stream become available, it will be possible to adjust the sampling routine to better fit each individual stream.

The intensive stations were equipped with a special unit designed to assist the observer and to improve the consistency of the data. This unit consisted of a US DH-59 or US P-72 sampler suspended from a Stevens Sounding Reel (which is similar to a USGS Type A reel) by a 0.10-inch diameter steel cable. This equipment was housed in the USGS California-type sediment

Figure 7. Technician using a US DH-59 to collect a sample

sampling box (figure 8). The box was installed on the stream side of the bridge railing at the "box site." Its purpose is to protect the equipment from weather and vandals as well as to support the sampler/reel apparatus (figure 9). This device is commonly used at locations where frequent measurements are taken at the same vertical.

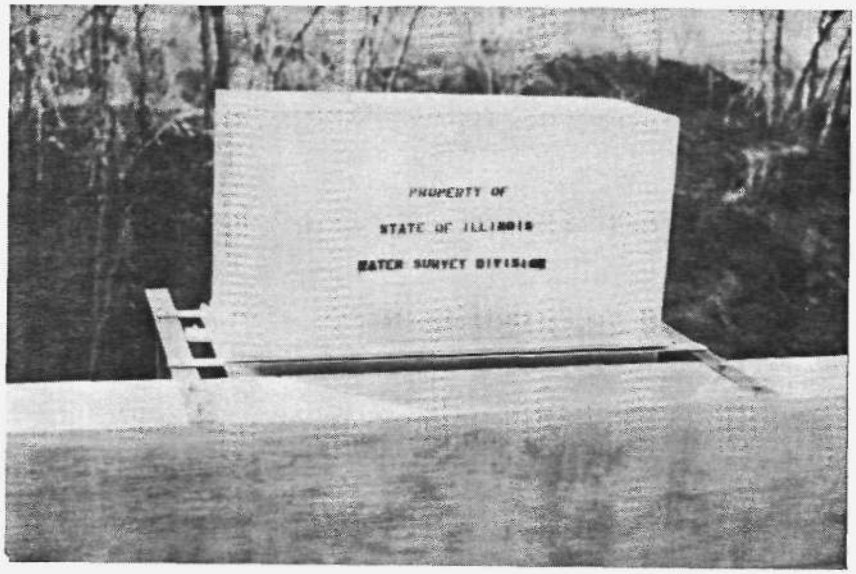
Water Discharge. Whenever sediment samples were collected throughout a channel cross section, a discharge measurement was made according to the techniques and procedures described by Buchanan and Somers (1969). Measuring discharge at the same time complete sediment concentration data are collected allows accurate calculation of the sediment discharge at each station for the time measurements are taken. These data may then be used to develop a sediment-discharge rating at that particular location.

All discharge measurements were made with Teledyne Gurley's No. 622 Price Current Meter Type AA (figures 10 and 11). The meter was suspended from either a metric wading rod or a Stevens Sounding Reel attached to a USGS 3-wheel base (figure 12). All discharge measurements were made in metric units and all data collected in this project are reported using the metric system.

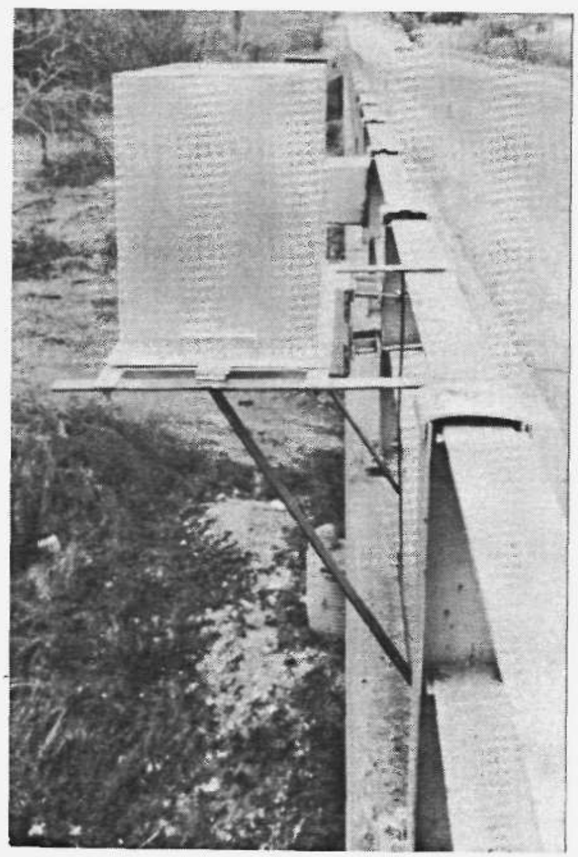
Laboratory Analysis

Suspended Sediment Concentration. Suspended sediment samples were analyzed by the filtration method or evaporation dish method at the Illinois State Water Survey Sediment Materials Laboratory. The methods used are described by Guy (1969).

1. Samples are checked into the laboratory as soon as practicable after they are received from the field:



A. Front view



B. Side view

Figure 8. USGS California-type sediment sampling box

Figure 9. Preparing to collect a sediment sample using a US DH-59 installed in a California-type sediment sampling box

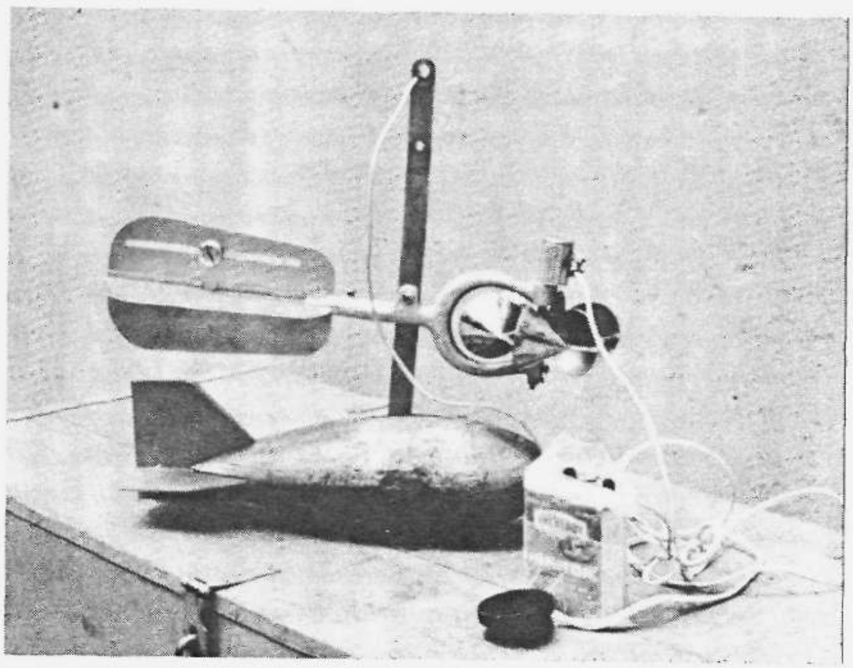


Figure 10. Price Current Meter Type-AA apparatus

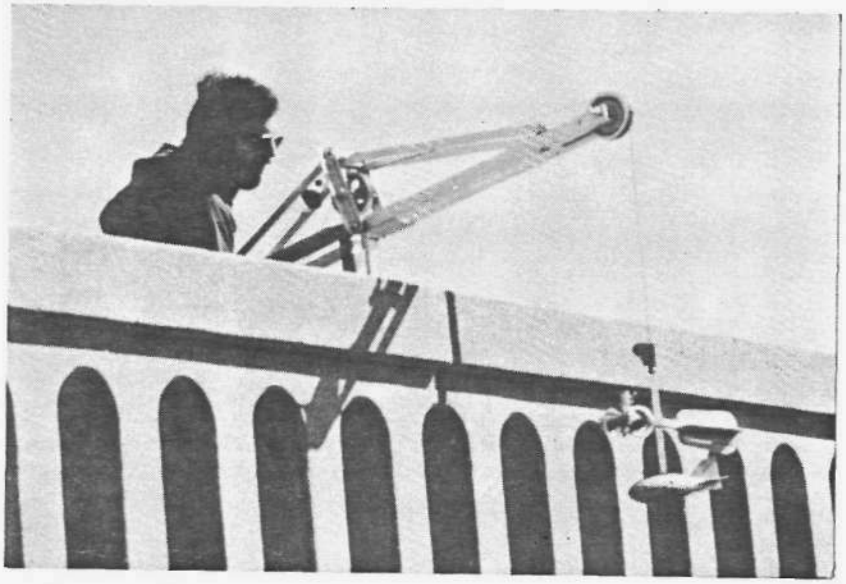


Figure 11. Technician using current meter to measure stream discharge

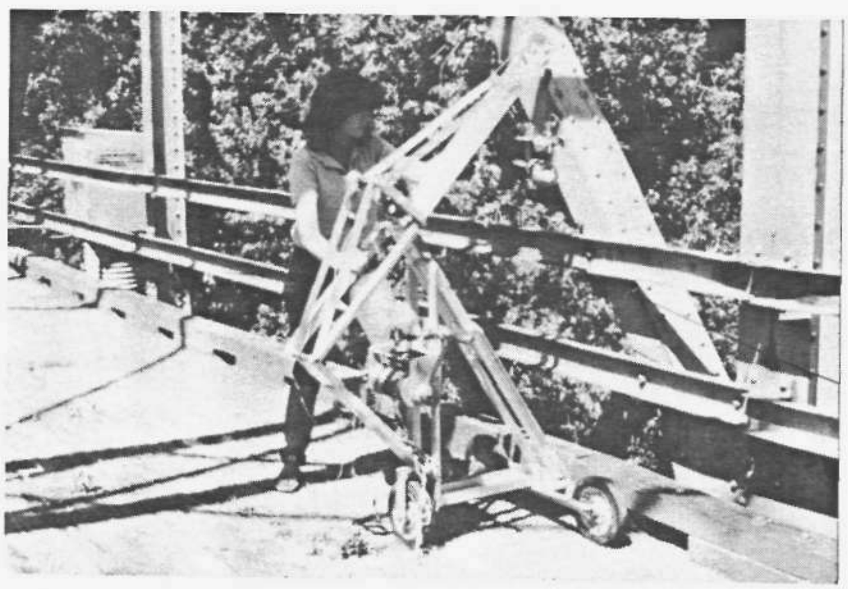


Figure 12. Stevens Sounding Reel and USGS 3-wheel base apparatus

   a. Field information is transferred to laboratory forms and a laboratory number is assigned.
   b. Bottles are weighed to the nearest 0.1 gram on a top loading electronic balance for sample volume determination.
   c. Samples are stored in a cool dark room to inhibit evaporation and growth of algae or other organisms.
2. Samples are stored long enough to allow complete settling of all suspended sediment.
3. After solids have settled, the volume of liquid is reduced by suction with a "J" tube to approximately 80 ml.
4. The sample is vacuum filtered through 934 AH glass fiber filters. (If amount of sediment in sample is too large for convenient filtering then evaporation method is used).
5. The weight of the sediment is determined by oven drying and weighing to the nearest 0.1 mg on an analytical balance.
6. Appropriate calculations are made to determine the sediment concentration, in ppm, of the samples.

Particle Size. Suspended sediment samples were analyzed for particle size by the pipet/sieve methods described in the National Handbook of Recommended Methods for Water Data Acquisition (U.S. Geological Survey, 1978). The analyses were conducted in the Water Survey Sediment Materials Laboratory as described below.

Suspended sediment samples are composited from a given cross section and wet seived through a 230 mesh (62.5 microns) sieve to separate the sand from the fine material. If the sand weighs less than 0.5 gram, the fraction is reported as a unit greater than 62.5 microns. If the fine material weighs

0.4 gram or more, a pipet analysis is performed. If the fines weigh less than 0.4 gram, they are reported as a unit finer than 62.5 microns.

A. Sieve Procedure

1. Air dry sand is put on top screen of appropriate sieve stack and seived on shaker with vertical motion for 15 minutes.
2. The material retained on sieves is weighed to nearest 0.1 gram.
3. The percent finer values are calculated.

B. Pipet Procedure

1. Colloidal organics are removed by the sodium hypochlorite method.
2. Organic free sample is oven dried, weighed and dispersed by shaking the sample in a solution of hexametaphosphate (40 g/L) and sodium carbonate (8 g/L) for 12 hours.
3. Dispersed sample is transferred to pipet chambers and pipetted for 31, 16, 8, 4, and 2 microns according to a predetermined chart of sampling depths for given temperatures.
4. Pipetted sample is oven dried and the weight of the fraction determined to the nearest 0.1 mg.
5. The percent finer values are calculated.

Percent Volatile Solids. Suspended sediment samples were analyzed to determine the percentage of volatile solids present. The procedure for volatile analysis is identical to that for suspended sediment concentrations up through the filtering stage. After the sample has been filtered, it is dried in the oven at 105 C overnight. The sediment is cooled in a desiccator and weighed to determine the dry weight. The sample is then placed in the muffle furnace for 15 minutes at 550 C. It is cooled in a desiccator, weighed again, and the weight loss is used to calculate the percentage of volatile solids that was present in the sample.

RESULTS: WATER YEAR 1981

None of the sediment data have been completely and thoroughly analyzed at this writing. Approximately 5700 samples have been analyzed by the laboratory and are on-line. However, the analyses cannot be completed until all the data for the entire water year are available. Once the remaining data have been analyzed by the laboratory, the process of applying adjustment coefficients to the daily and weekly samples will begin. In addition, discharge values will be combined with cross-sectional concentration values to yield sediment discharge, and suspended sediment particle size samples will be reviewed.

After all of the data have been properly analyzed and reviewed, the following information will be available to interested users:

1. Station name and number
2. Date
3. Time
4. Gage height
5. Water temperature
6. Suspended sediment concentration
7. Percent volatile solids present
8. Particle size of selected suspended sediment samples

The suspended sediment concentration data will later be combined with the USGS discharge record to calculate the estimated sediment yield for each station. Table 2 shows the type and period of record for data available from both the USGS (water discharge) and SWS (sediment data) for the 50 stations in the SWS sediment monitoring network.

Table 2. Information and Data Available for the State Water Survey's Sediment Monitoring Network

USGS station name*	USGS station number*	Drainage area* (sq mi)	Period of discharge record*	Type of discharge record*	Period of sediment record**	Frequency of sediment measurement
I. NORTHERN DISTRICT						
Apple River near Elizabeth, IL	05418950	207	10/1977-present	estimated	10/1980-present	weekly
Pecatonica River at Freeport, IL	05435500	1326	9/1914-present	continuous	10/1980-present	weekly
Rock River at Rockton, IL	05437500	6363	6/1903-presentt	continuous	10/1980-present	intensive
Kishwaukee River at Belvidere, IL	05438500	538	10/1939-present	continuous	10/1980-present	weekly
S. Br. Kishwaukee River near Fairdale, IL	05439500	387	10/1939-present	continuous	10/1980-present	intensive
Elkhorn Creek near Penrose, IL	05444000	146	10/1939-present	continuous	10/1980-present	intensive
Edwards River near Orion, IL	05466000	155	10/1940-present	continuous	10/1980-present	weekly
Pope Creek near Keithsburg, IL	05467000	183	10/1934-present	continuous	10/1980-present	intensive
Des Plaines River at Des Plaines, IL	05529000	360	10/1940-present	continuous	11/1980-9/1981	weekly
Hickory Creek at Joliet, IL	05539000	107	10/1944-present	continuous	10/1980-9/1981	weekly
DuPage River at Shorewood, IL	05540500	324	10/1940-present	continuous	10/1980-9/1981	intensive
Mazon River near Coal City, IL	05542000	455	10/1939-present	continuous	10/1980-present	intensive
Fox River at Algonquin, IL	05550000	1403	10/1915-present	continuous	10/1980-present	intensive
Ferson Creek near St. Charles, IL	05551200	51.7	12/1960-present	continuous	10/1980-present	weekly
Fox River at Montgomery, IL	05551540	1732	10/1977-present	estimated	11/1980-present	weekly
Fox River at Dayton, IL	05552500	2642	11/1914-present	continuous	10/1980-9/1981	weekly
Big Bureau Creek at Princeton, IL	05556500	196	3/1936-present	continuous	10/1980-present	intensive
II. CENTRAL DISTRICT						
Salt Fork near St. Joseph, II	03336900	134	10/1958-present	continuous	10/1980-present	intensive
Vermilion River near Danville, IL	03339000	1290	10/1914-present	continuous	10/1980-9/1981	weekly
Bear Creek near Marcelline, IL	05495500	349	3/1944-present	continuous	10/1980-present	intensive
Iroquois River at Iroquois, IL	05525000	686	10/1944-present	continuous	10/1981-present	intensive
Sugar Creek at Mitford, II,	05525500	446	7/1948-present	continuous	10/1980-9/1981	weekly
Vermilion River at McDowell, IL	05554490	551	10/197 7-present	estimated	11/1980-present	weekly
Money Creek near Towanda, IL	05564400	49.0	5/1958-present	continuous	10/1980-9/1981	weekly
E. Br. Panther Creek at El Paso, IL	05566500	30.5	10/1949-present	continuous	10/1980-present	weekly
Mackinaw River below Congerville, IL	05567510	776	10/1977-present	estimated	10/1980-present	weekly
Mackinaw River below Green Valley, IL	05568005	1092	10/1977-present	estimated	11/1980-9/1981	intensive
Spoon River at London Mills, IL	05569500	1062	10/1942-present	continuous	10/1980-present	intensive

Table 2. Continued

USGS station name*	USGS station number*	Drainage area* (sq mi)	Period of discharge record*	Type of discharge record*	Period of sediment record**	Frequency of sediment measurement
II. CENTRAL DISTRICT (cont'd)						
Sangamon River at Monticello, IL	05572000	550	2/1908-presentt	continuous	10/1980-present	weekly
S. Fork Sangamon River below Rochester, IL	05576022	870	10/1977-present	estimated	11/1980-present	intensive
Sangamon River at Riverton, IL	05576500	2618	10/1977-present	estimated	10/1980-present	intensive
Salt Creek near Rowell, IL	05578500	335	10/1942-present	continuous.	10/1980-present	intensive
Salt Creek near Greenview, IL	05582000	1804	10/1941-present	continuous	10/1980-present	weekly
LaMoine River at Colmar, IL	05584500	655	10/1944-present	continuous	10/1980-present	intensive
III. SOUTHERN DISTRICT						
Embarras River near Diona, IL	03344000	919	12/1938-presentt	continuous	10/1980-present	intensive
Embarras River at Ste. Marie, IL	03345500	1516	10/1909-presentt	continuous	10/1980-present	intensive
N. Fork Embarras River near Oblong, IL	03346000	318	10/1940-present	continuous	10/1980-present	weekly
Little Wabash at Blood, IL	03379600	1387	10/1972-presentt	continuous	11/1980-present	weekly
Skillet Fork at Wayne City, IL	03380500	464	8/1908-presentt	continuous	11/1980-9/1981	weekly
Little Wabash at Carmi, IL	03381500	3102	10/1908-presentt	continuous	10/1980-present	intensive
Cache River at Foreman, IL	03612000	244	10/1922-presentt	continuous	10/1980-present	intensive
Macoupin Creek near Kane, IL	05587000	868	3/1941-presentt	continuous	10/1980-9/1981	intensive
Kaskaskia River near Cowden, IL	05592100	1330	7/1970-present	continuous	11/1980-present	intensive
Kaskaskia River at Vandalia, IL	05592500	1940	2/1908-presentt	continuous	10/1980-present	intensive
Hurricane Creek near Mulberry Grove, IL	05592800	152	10/1970-present	continuous	10/1980-9/1981	intensive'
Crooked Creek near Hoffman, IL	05593520	254	10/1974-present	continuous	10/1980-present	intensive
Shoal Creek near Breese, IL	05594000	735	11/l909-presentt	continuous	10/1980-present	weekly
Silver Creek near Freeburg, IL	05594800	464	10/1970-present	continuous	10/1980-present	intensive
Big Muddy River at Plumfield, IL	05597000	794	6/1908-presentt	continuous	11/1980-present	weekly
Crab Orchard Creek near Marion, IL	05597500	31.7	10/1951-present	continuous	10/1980-9/1981	weekly

* From Water Resources Data for Illinois, 1979, vol. I and II, United States Geological Survey.

** Sediment record includes the following information: date, time, gage height, water temperature, suspended sediment concentration, percent volatile solids present, suspended sediment particle size (select samples only).

† Discharge record was interrupted one or more times during this period. Refer to Water Resources Data for Illinois for details.

PLANNED REDUCTIONS FOR WATER YEAR 1982

Unfortunately, it has been necessary to design and partially implement a plan to reduce the size and depth of the Water Survey's sediment monitoring program in 1982 because of budget cuts of nearly 55 percent. These budget cuts could severely reduce the scope of the network by limiting it to as few as 20 monitoring stations.

If some additional funds become available by the end of the 1981 calendar year, a two-phase cutback has been developed. In the first phase, 12 stations were eliminated that were considered to yield data that were of poor or marginal quality or had logistic problems with the site or watershed (table 3). This reduced the network to 38 stations. Unless a significant increase in funding occurs prior to the end of calendar year 1981, an additional 15 to 18 stations will have to be dropped.

A list of criteria for rating the remaining 38 stations is being developed. These ratings will be used to help select the 20 to 23 stations of highest priority that can continue to be monitored within the constraints of a reduced budget. Criteria suggested for use in making this second round of cuts include:

1. Concentrate stations in key basins.
2. Review water year 1981 data and select stations with higher sediment delivery ratios.
3. Select stations which tie in with the State Water Survey's lake sedimentation program.
4. Concentrate stations in certain physiographic regions (i.e., regionalize by soil type, erodibility factor of area, land use, etc.).

Table 3. Sediment Network Stations Dropped During Phase I Cutback

USGS Station No.		Location
1.	03339000	Vermilion River near Danville
2.	03380500	Skillet Fork at Wayne City
3.	05525500	Sugar Creek at Milford
4.	05529000	Des Plaines River at Des Plaines
5.	05539000	Hickory Creek at Joliet
6.	05540500	DuPage River at Shorewood
7.	05552500	Fox River at Dayton
8.	05564400	Money Creek near Towanda
9.	05568005	Mackinaw River below Green Valley
10.	05587000	Macoupin Creek near Kane
11.	05592800	Hurricane Creek near Mulberry Grove
12.	05597500	Crab Orchard Creek near Marion

5. Keep in mind the needs of the Department of Conservation (fish and other aquatic concerns, including recreation lakes); Department of Agriculture (soil erosion, soil stability and productivity); Department of Transportation, Division of Water Resources (stream sedimentation, levee repair and construction, hydraulic structures, water supply, floods and flood elevations); Environmental Protection Agency (water quality and water supply) ; municipalities (water supply and recreation); U.S. Army Corps of Engineers (water supply, flood control, navigation and hydraulic structures); Soil Conservation Service; U.S. Geological Survey; State Geological Survey; and State Natural History Survey.

Cutbacks in two additional areas of the program have been implemented. There are no plans to monitor any of the stations on an intensive basis during the spring and early summer. However, there is a need to strike a balance between the minimum number of stations necessary to adequately cover the state and the need for sufficient data at each station to make the information useful. Therefore, if any additional funds are made available to the Survey, reinstating this part of the program will have the highest priority.

Field personnel have been reduced by one-third with a commensurate cut in the amount of area covered by the network. Only two-thirds of the state will be monitored in 1982. This is an economy move designed to get the most use out of the fewer available dollars. The cost of having the remaining field personnel cover the additional one-third of the state is prohibitive.

SUMMARY

Sedimentation in Illinois lakes and sediment transported by Illinois streams is recognized as a major pollution issue. Although soil erosion, sediment transport, and sedimentation are natural processes, they interfere with what we require for stable, economical, and productive use of watersheds, streams, and lakes.

The major interactions between sediment and water are now recognized as major water resources problems. The magnitude of these problems is still not recognized. Various physical means to control soil erosion are now being considered. Their implementation will have enormous societal and environmental ramifications. Unfortunately, many of the physical and chemical aspects of sediments in rivers and lakes are not yet known or understood clearly.

The State Water Survey's Statewide Instream Sediment Monitoring Program for Illinois was designed and established to improve our knowledge and understanding of sediment and sediment transport in Illinois streams and rivers. The program began to monitor sediment discharge in the 1981 water year. Fifty stations (combined with the 25-30 USGS monitored stations) were considered a sufficient number for adequately monitoring the state's major watersheds."

The parameters measured included suspended sediment concentration, percent of volatile solids present, particle size of suspended sediments, water discharge, river stage, and water temperature. All equipment and procedures used for sampling and analysis conformed to the standards set by the Federal Inter-Agency Sedimentation Project and the U.S. Geological Survey.

Presently, laboratory analysis of these data is being performed. After the laboratory analysis, data will be checked for consistency and

incompatability, and subsequently the sediment load will be computed from the measured sediment concentration and computed discharge from rating curves.

When all of the data for the 1981 water year have been analyzed and reviewed, they will be made available to all interested users to aid in the planning and use of the water resources of the state of Illinois.

Although the Water Survey's sediment network was very successful in its first year of operation, severe budget cuts in water year 1982 have forced a reduction in the scope of the program. As many as 30 stations will be eliminated. In addition, no intensive monitoring is likely to occur. The field staff has been reduced by one-third making it impossible to monitor one-third of the state.

It is the hope of the authors that interested user agencies will realize the potential impact of the loss of this program in terms of its present worth and future value, and make every effort to support the program and help elevate it back to its full funding level.

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