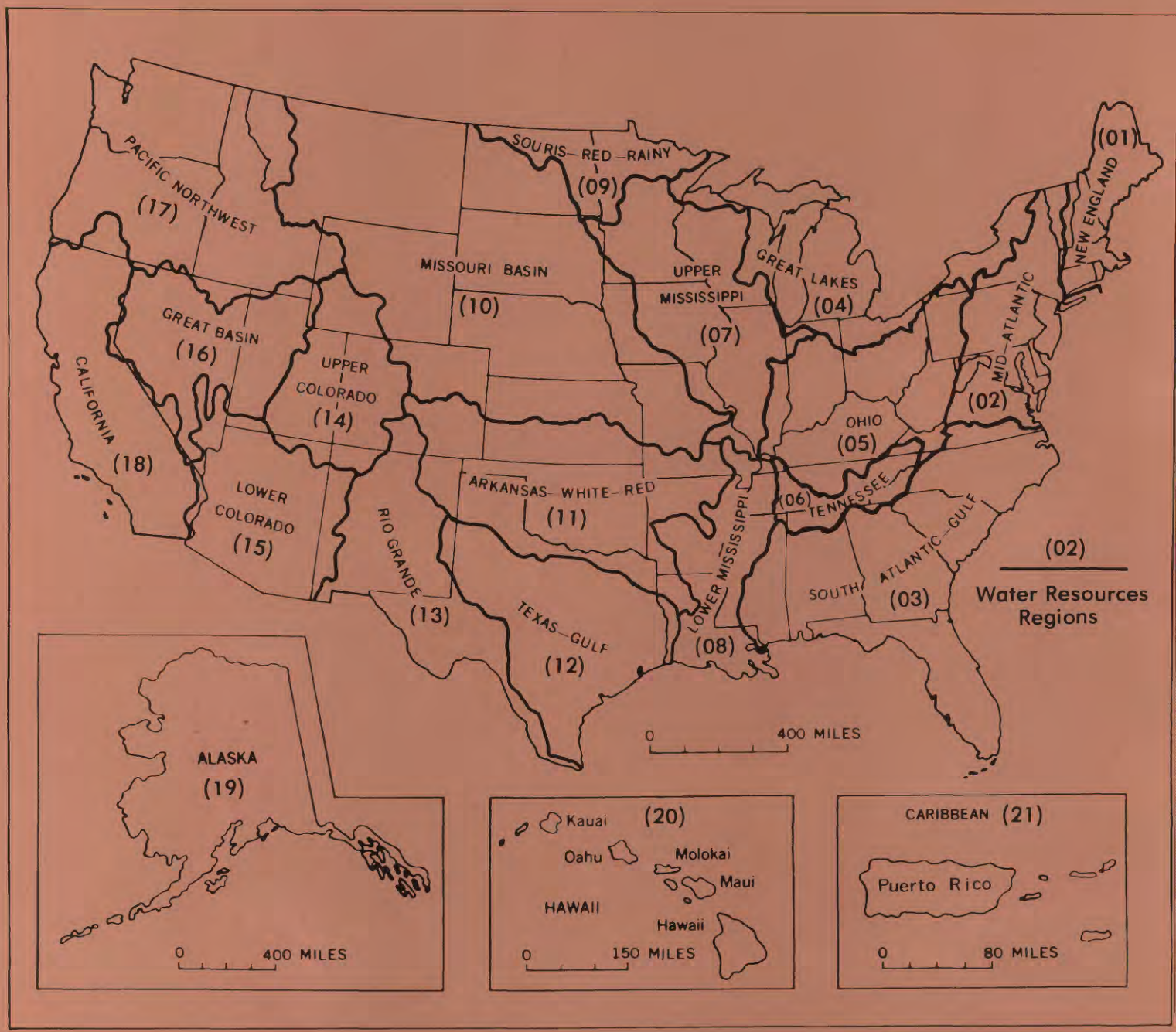
INTERAGENCY ADVISORY COMMITTEE ON WATER DATA

NOTES ON SEDIMENTATION ACTIVITIES CALENDAR YEAR 1983

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
OFFICE OF WATER DATA COORDINATION
RESTON VIRGINIA 22092



Water Resources Regions of the United States

NOTES ON SEDIMENTATION ACTIVITIES CALENDAR YEAR 1983

Prepared by
the
Subcommittee on Sedimentation
of the
INTERAGENCY ADVISORY COMMITTEE ON WATER DATA

U. S. DEPARTMENT OF THE INTERIOR
Geological Survey
Office of Water Data Coordination
Reston, Virginia 22092

September 1984

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Preface

A proposal to disseminate current information on activities in the field of sedimentation was made by the Chairman of the Federal Interagency River Basin Committee's Subcommittee on Sedimentation shortly after the subcommittee was formed in May 1946. At the fifth meeting of the subcommittee on September 17, 1946, the members approved this proposal and agreed to issue the quarterly report as one means of effecting better coordination of the work of various Federal agencies in the field of sedimentation.

Quarterly reports were issued from July 1, 1946, through June 30, 1947, when the reporting period was changed to a 6-month period, and semiannual reports were issued through 1953. Starting in 1954 and continuing through the present, these reports have been made annually and cover the activities of the Federal agencies in the field of sedimentation on the calendar year basis.

This report is a digest of information furnished by those Federal agencies conducting sedimentation investigations. It includes descriptions of work in progress or planned, important findings, new methods, new publications, laboratory and other research activities, and other pertinent information. The material has been organized by major drainage regions in the conterminous United States, Alaska, Hawaii, Puerto Rico, and foreign. There is also a section on Research and Other Activities.

Until 1979, each issue of "Notes on Sedimentation Activities" contained a list of stations at which sediment data have been obtained giving the station location, drainage area, and other related information. Because the station list did not change significantly from year to year, the decision was made to include the listings only every other year in the interest of economizing. After further consideration, however, it was decided to completely discontinue publication of the station list. The Committee felt that most users of the station list were only interested in the stations located in a particular geographic area and their needs could be served more efficiently by acquiring the information desired through the National Water Data Exchange (NAWDEX). Locations and addresses of NAWDEX assistance centers follow.

Information for "Notes on Sedimentation Activities" for calendar year 1983 was contributed by the representatives of participating Federal agencies. Suggestions for improving the report, both in content and in format, are welcome.

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NEW ENGLAND REGION

GEOLOGICAL SURVEY

St. John Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Aroostook River at Caribou, Maine, and bimonthly at St. John River near Van Buren, Maine, as a part of the National Stream Quality Accounting Network (NASQAN).

Penobscot Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Penobscot River at Eddington, Maine, as a part of NASQAN.

Kennebec Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Kennebec River near North Sidney, Maine, as a part of NASQAN.

Androscoggin Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Androscoggin River at Brunswick, Maine, as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at Wild River at Gilead, Maine, as a part of the National Hydrologic Benchmark Network.

Maine Coastal Subregion

1. Suspended-sediment data are being collected on a quarterly basis at St. Croix River at Milltown, Maine, and bimonthly at Narraguagus River at Cherryfield, Maine, as a part of NASQAN.

Saco Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Saco River at Cornish, Maine, and at Presumpscot River near West Falmouth, Maine, as a part of NASQAN.

Merrimack Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Merrimack River above Lowell, Mass., as a part of NASQAN.

Connecticut Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Connecticut River at Wells River, Vt., and at Connecticut River at North Walpole, N.H., and at Connecticut River at Thompsonville, Conn., as a part of NASQAN.

2. Suspended-sediment data are being collected on approximately a daily basis at Stony Brook near Suffield, Conn., Salmon River near East Hampton, Conn., and Coginchaug River at Rockfall, Conn., to determine daily sediment loads. The data collection is being done in cooperation with the State of Connecticut Department of Environmental Protection.

Massachusetts-Rhode Island Coastal Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Charles River at Dover, Mass., at Blackstone River at Millville, Mass., and at Pawcatuck River at Westerly, R.I., as a part of NASQAN.

Connecticut Coastal Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Housatonic River at Stevenson, Conn. and quarterly at Shetucket River at South Windham, Conn. and at Quinebaug River at Jewett City, Conn., as a part of NASQAN.

St. Francois Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Black River at Coventry, Vt., as part of NASQAN.

Special Studies

1. Daily sediment samples were collected at Bald Mountain Brook near Bald Mountain, Maine, and at Bishop Mountain Brook near Bald Mountain, Maine, in the St. John Subregion, as part of a study to evaluate the impact of a proposed open pit copper mine. The study is conducted in cooperation with the State of Maine Department of Environmental Protection.

2. Intermittent sediment data were collected at Johnson Brook near South Albion, Maine, in the Kennebec Subregion, to define storm hydrograph characteristics and to estimate phosphorus yields from the watershed. The study is conducted in cooperation with the State of Maine Department of Environmental Protection.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
150 Causeway Street, Suite 1309
Boston, MA 02114

NEW ENGLAND REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determination of sediment yields were made for work plans in the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Lake Memphremagog (St. Lawrence)	Barton & Clyde Rivers	Barton & Clyde Rivers	Essex, Orleans & Caledonia	Vermont
St. John	Patte Brook	Patte Brook	Aroostook	Maine
Connecticut	Clark Brook	Clark Brook	Grafton	New Hampshire
Housatonic	Patten Brook	Patten Brook	Tolloud	Connecticut
Thames (Connecticut Coastal)	Mill House Brook	Mill House Brook	Windham	Connecticut

b. River Basin Investigation

Major Basin	Basin Reported	State
Narragansett Bay	Mooshasuck River (Lincoln Downs Tributary)	Rhode Island

2. Reservoir Sedimentation Surveys

Reservoir sedimentations surveys were made in the following reservoirs:

Reservoir	County	State
Whitny-Kent Hollow Dam (Furnace Brook Site #1)	Stafford	Connecticut

3. Special Studies

An ephemeral gully investigation is underway in Aroostook County, Maine. The first year (1983) of this study showed ephemeral gullies increased by nearly 20 percent the rate of erosion predicted by the USLE. The 1983 study was limited to approximately 10,000 acres of land used for potato production in the township of Presque Isle in Aroostook County. This study will continue in 1984 in the same area.

MID ATLANTIC REGION

CORPS OF ENGINEERS

North Atlantic Division

Baltimore District

Sedimentation Surveys.

1. Alvin R. Bush Lake. Nine sedimentation ranges were re-surveyed in 1983. The purpose of the survey was to determine the amount of sediment that has accumulated since the last survey in 1961. The survey was accomplished using standard land and hydrographic surveying methods. Results of the survey will be reported in 1984.

2. Tioga, Hammond and Cowanesque Lakes. Initial monumentation and surveys were done in 1983. A total of 28 ranges were surveyed: 11 at Tioga Lake, 8 at Hammond Lake and 9 at Cowanesque Lake. The surveys were accomplished using standard land and hydrographic surveying methods. Numerous errors were detected in the surveys at each lake which will have to be resolved in early 1984. Results will be reported in the 1984 annual sedimentation report.

3. Raystown Lake. A crude hydrographic survey was accomplished at the upper end of Raystown Lake in early 1983. The survey was done in response to complaints about the excessive amount of sedimentation in the upstream end of the Lake. The survey revealed that although the area is experiencing some sedimentation, it is not greater than the maximum rate predicted for Raystown Lake. This fact was expressed to local conservation Districts on two occasions in 1983.

4. Bloomington Lake. Through visual surveys and spot sedimentation measurements, it is thought that Bloomington Lake is experiencing an excessive amount of sedimentation in the extreme upper end of the reservoir. No major re-survey of the area is planned. The area will be monitored periodically to determine the extent of the problem.

Sediment Studies. Canisteo River, Chauncey Run, Crosby Creek, and Canacadea Creek, Hornell, New York. A study was initiated in 1983 to outline a method of alleviating the sedimentation problems in and around the Hornell, New York, local flood protection project. The study involves a hydraulic analysis of the project as well as a sedimentation analysis. The study is 60% complete at this writing. A full report of the results will be given in the 1984 annual sedimentation report.

Sediment Removal.

Project	Stream	Removal Location	Amount Removed Cu. Yd.
Almond Lake	Canacadea Creek	NY 21 Bridge	2,867
Arkport Dam	Canisteo River	Intake Channel	3,036
Binghamton, New York	Pierce Creek	Confluence with Susquehanna River	225
	Pierce Creek	Above Paved Channel	751
	Pierce Creek	From Paved Channel	30
Canisteo, New York	Purdy Creek	Check Dam	700
Corning, New York	Cutler Creek	Upper Channel	100
	Cutler Creek	Outlet of Twin Conduits Downstream to Lower Weir at Confluence with Chemung River	12,650
Hornell, New York	Canacadea Creek	Check Dam	1,526
	Canacadea Creek	Unpaved Channel from Check Dam Downstream to Senaca St. Weir	655
	Chauncey Run	Check Dam	73
	Chauncey Run	Confluence with Canisteo River	160
	Crosby Creek	Check Dam	2,160
Whitney Point Village, New York	Tioughnioga River	Channel	1,037
		TOTAL	25,970

New York District

The District conducted sediment tests at the following locations:

Project Name	Bioassay	Bioaccumulation	Elutriate	Grain Size	Bulk Sed.
Kill Van Kull-No. 63	X	X	X	X	X
Bay Ridge-No. 34	X	X	X	X	X
Red Hook-No. 62	X	X	X	X	X
South Shooters Island Reach-No. 63	X	X	X	X	X
Port Chester-No. 1	X	X	X	X	X
Eastchester-No. 6	X	X	X	X	X
Larchmont-No. 3	X	X	X	X	X
Echo Bay-No. 4	X	X	X	X	X
Milton Harbor-No. 85				X	X
Raritan River-No. 70	X	X	X	X	X
Hackensack River-No. 64	X	X	X	X	X
Buttermilk Channel-No. 36	X	X	X	X	X
Flushing Bay-No. 9			X	X	X
Special Projects					
Morris Canal-Upper New York Bay	X	X	X	X	X
Bayonne Military Ocean Terminal-Upper New York Bay*	X	X	X	X	X
Albany Turning Basin-Hudson River-No. 48			X	X	X
Sayreville NJ*			X		
Reference Site-Mud Dump Site	X	X	X	X	X

*EP Toxicity Test were made at those two projects. The above mentioned tests were made according to "Guidance for Performing Tests on Dredged Material to be Disposed of in Ocean Waters" prepared by New York District in conjunction with EPA, Region II.

Philadelphia District

Sediment load measurements were made at the following two stations:

1. Delaware River at Trenton, NJ

   Sampling Frequency - Daily

   Period of Record - September 1949 to Present

2. Schuylkill River at Manayunk, Philadelphia, PA

   Sampling Frequency - Daily

   Period of Record - November 1947 to Present

MID ATLANTIC REGION

GEOLOGICAL SURVEY

Richelieu Subregion

1. Suspended-sediment data are being collected on a periodic basis at Richelieu River (Lake Champlain) at Rouses Point, N.Y., as a part of the National Stream Quality Accounting Network (NASQAN).

Upper Hudson Subregion

1. Suspended-sediment data are being collected on a daily basis at Hudson River at Stillwater, N.Y., and Hudson River at Waterford, N.Y., in cooperation with the New York State Department of Environmental Conservation. Suspended-sediment data are being collected on a periodic basis at Hudson River at Rogers Island at Ft. Edward, N.Y., and Hudson River at Schuylerville, N.Y.

2. Suspended-sediment data are being collected on a periodic basis at Hudson River at Green Island, N.Y., as a part of NASQAN.

3. Suspended-sediment are being collected on a periodic basis at Esopus Creek at Shandaken, N.Y., as a part of the National Hydrologic Benchmark Network.

Lower Hudson-Long Island Subregion

1. Suspended-sediment data are being collected on a bimonthly basic at Passaic River at Little Falls, N.J., and quarterly at Raritan River at Queens Bridge at South Bound Brook, N.J., as a part of NASQAN.

Delaware Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Maurice River at Norma, N.J., and West Branch Wading River at Maxwell, N.J., and on a quarterly basis at Delaware River at Trenton, N.J., and Toms River near Toms River, N.J., as a part of NASQAN.

2. Suspended-sediment data are being collected on a periodic basis at Delaware River at Trenton, N.J., in cooperation with the U.S. Army Corps of Engineers (COE).

3. Suspended-sediment data are being collected on a monthly basis at McDonalds Branch in Lebonon State Forest, N.J., as a part of the National Hydrologic Benchmark Network.

4. Suspended-sediment data are being collected on a daily basis at Schuylkill River at Philadelphia, (Manayunk) Pa. The data will be anaylzed by the COE to evaluate the Delaware River dredging programs.

Susquehanna Subregion

1. Suspended-sediment data are being collected at Juniata River at Newport, Penn., as a Federal sediment index station.

2. Suspended-sediment data are being collected on a bimonthly basis at Susquehanna River at Conowingo, Md., as a part of NASQAN.

Upper Chesapeake Subregion

1. Suspended-sediment data are being collected on a daily basis at Choptank River near Greensboro, Md., as part of the Federal CBR program and as a part of NASQAN.

2. Suspended-sediment data are being collected on a bimonthly basis at Patuxent River near Bowie, Md., as a part of NASQAN.

Potomac Subregion

1. Suspended-sediment data are being collected on a daily basis at Monacacy River at Reichs Ford Bridge near Frederick, Md., in cooperation with the Maryland Geological Survey.

2. Suspended-sediment data are being collected on a daily basis at Potomac River at Point of Rocks, Md., as a part of the Federal CBR program.

3. Suspended-sediment data are being collected on a bimonthly basis at Potomac River at Shepherdstown, W. Va., Potomac River at Chain Bridge, Washington, D.C., and Shenandoah River at Millville, W. Va., as a part of NASQAN.

Lower Chesapeake Subregion

1. Suspended-sediment data are being collected on a daily basis on Rappahanock River at Remington, Va., as a Federal sediment index station.

2. Suspended-sediment data are being collected bimonthly at Rappahannock River near Fredericksburg, Va., Appomattox River at Matoaca, Va., Mattaponi River near Beulahville, Va., Pamunkey River near Hanover, Va. and James River at Cartersville, Va., as part of NASQAN.

3. Suspended-sediment data are being collected bimonthly at Holiday Creek near Andersonville, Va., as part of the National Hydrologic Benchmark Network.

Special Studies

1. A study of agricultural best management practices was started in the Conestoga River basin in Lancaster County, Pennsylvania during 1982.

Suspended-sediment, nutrient, and pesticide data were collected during 1983 from the Little Conestoga Creek near Churchtown, and from a 25 acre site draining farm fields that were selected for conservation treatment with best management practices. Automatic samplers are used at each of the sites.

2. Sediment data were collected during 1983 at two sites in Northern Pennsylvania. The data were collected as part of a study to evaluate the effects of surface mining on sediment yields.

3. Suspended-sediment data continued to be collected with automatic samplers at two sites in the Trotters Run Basin in western Maryland during 1983. Base-flow suspended-sediment sampling was also continued at three other sites in the basin. The data were collected as part of a study to evaluate the effects of mining on sedimentation (discontinued November 30, 1983).

4. A rainfall-runoff modeling station was installed on a small tributary to the West Branch Susquehanna River near Kylerstown, Pennsylvania during 1982. Hydrologic data collection is being controlled by a micrologger which also controls the operation of the automatic sediment sampler. The data are being used to test a model to predict the impacts of surface mining.

5. Suspended-sediment data are being collected from the Swatara Creek at Pine Grove and from the Lower Little Swatara Creek near Pine Grove, Pennsylvania with automatic samplers. The sediment data are being collected as part of a project to determine sediment deposition rates in a proposed reservoir.

6. A study to help the National Park Service develop best management practices for Prince William Forest Park in Prince William County, Va., was begun in 1983. Suspended-sediment data are being collected every other day by local observers and during storms by automatic samplers at three sites on the South Fork Quantico Creek and at one site on the Quantico Creek. Suspended-sediment data are also being collected on a monthly basis at six other sites and on a semiannual basis at nine other sites.

For additional information about Geological Survey activities within this region, contact the following offices:

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P.O. Box 1350
Albany, NY 12201

District Chief, WRD
U.S. Geological Survey
Room 430 Federal Building
402 East State Street
Trenton, NJ 08608

District Chief, WRD
U.S. Geological Survey
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Charleston, WV 25301

District Chief, WRD
U.S. Geological Survey
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228 Walnut Street
Harrisburg, PA 17108

MID-ATLANTIC REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determinations of sediment yields were made for work plans in the following watersheds:

a. Public Law 534

Major Drainage	Watershed	Stream	County	State
Potomac River	Moffets Creek	Moffets Creek	Augusta	Virginia

b. Public Law 566

Major Drainage	Watershed	Stream	County	State
Potomac River	Rock Creek	Rock Creek	Adams	Pennsylvania
Susquehanna River	Buffalo Creek	Buffalo Creek	Union	Pennsylvania
Lake Champlain	Lemon Fair River	Lemon Fair River	Addison & Rutland	Vermont
Lake Champlain	Lower Winooski River	Lower Winooski River	Chittenden	Vermont
Atlantic Coastal	Navesink River	Navesink River	Monmouth	New Jersey
Delaware Bay	Murderkill	Murderkill	Kent	Delaware
James	Looney-Mill Creek	Looney & Mill Creek	Botetourt	Virginia

c. River Basin Investigations

Major Basin	Basin Reported	State
Chesapeake Bay (Elk River)	Big and Little Elk Creek	Maryland & Pennsylvania
Delaware	Mill Creek	Delaware
Lake Champlain	Rock and Pike Rivers, Malletts Bay and Lake Champlain Direct	Vermont

2. Reservoir Sedimentation Surveys

Reservoir	County	State
Sandy Creek, PA474	Mercer	Pennsylvania
Marsh Creek, PA600	Tioga	Pennsylvania
Briar Creek, PA497	Columbia	Pennsylvania
Honey Lake (Stoney Brook #14)	Mercer	New Jersey
Rocky Gorge	Montgomery	Maryland

3. Special Studies

a. New Jersey - Approximately 5,000 sample areas have been studied as part of Statewide Erosion Sediment and Agricultural Waste (SESAW) Inventory.

Each sample area is approximately 100 acres in size and the total represents about 10% of the rural-agricultural area of New Jersey. Report will be available in 1984.

b. Maryland - Periodic suspended sediment samples and turbidity measurements are being taken on the Choptank and Marshyhope Watershed projects to monitor the effects of channel modification works of improvement.

c. Daily suspended sediment samples are being gathered on the La Platte PL-566 Watershed, Chittenden County, Vermont, to monitor the effects of land treatment measures being installed. A similar study is being carried out on the St. Albans Bay Watershed Rural Clean Water Project, Franklin County, Vermont. Both watersheds drain into Lake Champlain.

SOUTH ATLANTIC - GULF REGION

CORPS OF ENGINEERS

South Atlantic Division

Charleston District

Coastal Shoreline Monitoring. Monitoring of coastal shoreline changes for the newly constructed weir jetty system at Little River Inlet, South Carolina, was continued during 1983. The initial 5-year monitoring program for the recently constructed weir jetty system at Murrells Inlet, South Carolina, was completed in October 1982. The anticipated report date for the Murrells Inlet Monitoring Program is May 1984. A reduced monitoring effort for a second 5-year period was continued in 1983 for Murrells Inlet. The monitoring of the projects is being performed to determine the effect that a weir jetty system has on littoral transport processes and adjacent shorelines. Data being gathered for monitoring these projects include:

a. controlled aerial photography,
b. beach profiles upcoast and downcoast of the jetties,
c. wave data,
d. hydrographic surveys of the inlet area, and
e. structural performance.

The data which is gathered on a regular basis is being forwarded to the Coastal Engineering Research Center at U. S. Army Engineers Waterways Experiment Station in Vicksburg, Mississippi, for analysis and report preparation.

Charleston Harbor Section III Study. A Section III study is currently being conducted for the Charleston Harbor jetties at Charleston, South Carolina. The evaluation of the rate of beach erosion in the vicinity of the jetties will be based on historical data obtained from historical surveys and charts which use consistent horizontal control and have relatable vertical datum. USC&gs charts will provide this type of information. Due to the age of the jetties and various man-made alterations affecting Charleston Harbor the following time frame analysis is being used:

a. Determine the erosion rate (V_1) for 1849 through 1864.

b. Construct shoreline position for year jetty construction was initiated ($1880^{\pm}$) using erosion rate V_1.

c. Determine erosion rate (V_2) for the period 1880 $\pm$ through 1900 (erosion during jetty construction).

d. Determine erosion rate (V_n) for each time period from 1900 to present with particular emphasis on major events such as the Santee Cooper diversion, harbor deepening, etc.

e. Compare the erosion rate before jetty construction (V_1) with rates during (V_2) and after (V_n) construction. A precent change can be determined and assigned for cost sharing purposes as appropriate.

The study will also discuss impacts of storms and hurricanes, changes in the offshore bar, review and present dredging records and LEO data and determine effects of sea level rise. Existing core borings will also be used, if possible. This data can be used to determine the movement of disposed dredged material and present a sand budget.

Suspended Sediment Sampling. Suspended sediment data is being collected by USGS on a monthly basis at three locations on the Santee River in the vicinity of St. Stephens, South Carolina where the tailrace canal of the Cooper River Rediversion project enters the Santee River.

Jacksonville District

One new sediment sampling program (suspended sediment, Mar - May 1983) was undertaken on the St. Lucie Canal for the purpose of St. Lucie Bank Erosion Study.

Mobile District

Sedimentation Range Network Monitoring.

1. The sedimentation range networks in Demopolis, Gainesville, Aliceville and Columbus Lakes were resurveyed during the year. These lakes are located on the Tombigbee River and part of the Tennessee-Tombigbee Waterway.

2. Resurveys of selected ranges in Lake Sidney Lanier and West Point Lake on the Chattahoochee River and Allatoona Lake on the Etowah River were also completed during the year.

Sedimentation Studies.

1. The sedimentation studies of the Alabama, Apalachicola, Pascagoula, and Tombigbee Rivers and Tibbee Creek will continue through 1984.

2. A sedimentation study was initiated on the Pearl River pertinent to the proposed Shoccoe Dam project near Canton, Mississippi.

Suspended Sediment Investigations.

1. Suspended sediment samples were periodically collected under a cooperative agreement by the U. S. Geological Survey Districts as follows:

Alabama

Alabama River at Montgomery, AL
Black Warrior River near Northport, AL
Tombigbee River at Gainesville, AL

Florida

Apalachicola River at Chattahoochee, FL

Georgia

Chattahoochee River near Whitesburg, GA
Chattahoochee River at West Point, GA
Flint River at Newton, GA
Oostanaula River at Resaca, GA
Etowah River near Kingston, GA

Mississippi

Noxubee River at Macon, MS
Town Creek near Nettleton, MS

The collection of suspended sediment samples on a daily basis was continued on the Tombigbee River at Columbus, Aberdeen and Amory, Mississippi. The sampling station at Fulton, Mississippi has been temporarily discontinued. Additionally, samples were periodically obtained from the Tombigbee River at four bendway cutoff locations. Also, suspended sediment samples for various studies were obtained from streams located throughout the District.

2. Sampling was discontinued on Chuquatonchee Creek near Egypt, Mississippi and Houlka Creek at McCondy, Mississippi as a result of sufficient data being collected to meet current planning and design purposes.

Savannah District

Funding limitations on both navigation and reservoir projects have resulted in severe restrictions on sedimentation measurements. For navigation projects the before and after dredging surveys are the only sediment measurements that have been taken during the past year.

Sedimentation ranges at the Richard B. Russell project were surveyed September 1983. Ranges at Clarks Hill were surveyed 1954, 1959, and 1973 and at Hartwell in 1961, 1971, and 1973. Although these surveys show no significant deposition in the lakes, we are currently computing the total deposition at each project.

A sedimentation study on Oates Creek near Augusta, Georgia, is being undertaken as a part of the preparation of the GDM for the flood control project to establish the stability of the water surface profiles and determine if a modification in design is warranted.

Wilmington District

In calendar year 1982, a system of 52 sedimentation and two retrogression ranges were established at Falls Lake project. A report describing the ranges, resurvey plans, and sedimentation characteristics of the project area will be prepared in calendar year 1984. Permanent impoundment of Falls Lake project began on 13 January 1983 and filling was complete on 7 Dec 1983.

SOUTH ATLANTIC-GULF REGION

GEOLOGICAL SURVEY

Chowan-Roanoke Subregion

1. Suspended-sediment data are collected bimonthly Dan River at Paces, Va., and quarterly at Nottoway River near Sebrell, Va., Meherrin River at Emporia, Va., and Blackwater River near Franklin, Va., as a part of NASQAN.

2. Suspended-sediment data are collected bimonthly at Roanoke River at Roanoke Rapids, N.C., as part of the National Stream Quality Accounting Network (NASQAN).

Neuse-Pamlico Subregion

1. Suspended-sediment data are being collected on a daily basis at the main station on the Chicod Creek and on a monthly basis at three sites in the Chicod Creek watershed near Grimesland, N.C., in cooperation with the U.S. Department of Agriculture, Soil Conservation Service. These data will be used to determine changes caused by channelization.

2. Suspended-sediment data are collected bimonthly at Neuse River at Kinston, Tar River at Tarboro, and Contentnea Creek at Hookerton, N. C. as a part of NASQAN.

3. Suspended-sediment data are being collected monthly at five headwater stations on the Neuse River to determine the quality of inflow into the new 12,500 acre Falls Reservoir. This effort is part of a cooperative program with the U.S. Army Corps of Engineers (COE).

Cape Fear Subregion

1. Suspended-sediment data are being collected on a monthly basis at Deep River at Moncure, Haw River near Bynum, and Haw River near Moncure, NC, in cooperation with the North Carolina Department of Natural Resources and Community Development.

2. Suspended-sediment data are collected bimonthly on the Cape Fear River at Lock 1 near Kelly, N.C. as part of the NASQAN program.

3. Suspended-sediment data are collected monthly at three headwater stations, to determine the quality of inflow into the new 3,900 acre Jordan Lake, in cooperation with the COE.

4. Suspended-sediment data are being collected on a monthly basis at 5 sites in the Grove Creek basin, near Kenansville, N.C., to define effect of channel modifications, in cooperation with the North Carolina Department of Human Resources.

Pee Dee Subregion

1. Suspended-sediment data are being collected on a monthly basis at Scape Ore Swamp near Bishopville, S.C., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a bimonthly basis at Lynches River at Effingham, S.C., Black River at Kingstree, S.C., Pee Dee River near Rockingham, N.C., and at Pee Dee River at Pee Dee, S.C., as a part of NASQAN.

3. Suspended-sediment data are being collected daily and more frequently during flood events at the Yadkin River at Yadkin College, N.C., as part of the Federal CBR program.

Santee-Edisto Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Lakes Marion - Moultrie Diversion Canal near Pineville, S.C., at Edisto River near Givhans, S.C., and at Coosawhatchie River near Hampton, S.C., as a part of NASQAN.

2. Suspended-sediment data are being collected on a monthly basis at Crawl Creek near Pineville, S.C., Santee River below St. Stephens, S.C. This is being done in cooperation with the COE.

Ogeechee-Savannah Subregion

1. Suspended-sediment data are being collected on a monthly basis at Upper Three Runs near New Ellenton, S.C., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a bimonthly basis at Savannah River near Clyo, Ga., and at Ogeechee River near Eden, Ga., as a part of NASQAN.

3. Suspended-sediment data are being collected on a periodic basis at Brier Creek near Wayneboro, Ga., in cooperation with the Georgia Geologic Survey.

Altamaha-St. Marys Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Falling Creek near Juliette, Ga., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a bimonthly basis at Altamaha River near Everett City, Ga., and quarterly at Satilla River at Atkinson, Ga., and bimonthly at St. Mary's River near Macclenny, Fla. as a part of NASQAN.

3. Suspended-sediment data are being collected at Pates Creek near Flippin, Ga., Ohoopee River near Reidsville, Ga., Penholoway Creek near Jesup, Ga., and at Little Satilla River near Offerman, Ga., in cooperation with the Georgia Geologic Survey.

St Johns Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at three sites in Florida as a part of NASQAN.

Southern Florida Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at seven sites in Florida as a part of NASQAN.

Peace-Tampa Bay Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at five sites in Florida as a part of NASQAN.

Suwannee Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at four sites in Florida as a part of NASQAN.

Ochlockonee Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at two sites in Florida as a part of NASQAN.

2. Suspended-sediment data are being collected on a periodic basis at one site in Florida as a part of the National Hydrologic Benchmark Network.

Apalachicola Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at three sites in Florida as a part of NASQAN. Suspended-sediment data are being collected periodically at 16 sites in the Apalachicola River basin in cooperation with the COE.

2. Suspended-sediment data are being collected on a periodic basis at Chattahoochee River near Cornelia, Ga., at Sweetwater Creek near Austell, Ga., at Upatoi Creek near Columbus, Ga., in cooperation with the Georgia Geologic Survey.

3. Suspended-sediment data are being collected on a bimonthly basis at Flint River at Newton, Ga., and Chattahoochee River near Columbia, Al., as part of NASQAN.

Choctawhatchee-Escambia Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at four sites in Florida as a part of NASQAN.

Alabama Subregion

1. Suspended-sediment data are being collected on a periodic basis at Coosawatee River near Ellijay, Ga., and Holly Creek near Chatsworth, Ga., in cooperation with the Georgia Geologic Survey.

2. Suspended-sediment data are being collected 10 times per year and quarterly at Alabama River near Montgomery, Ala., in cooperation with the COE, as a part of NASQAN, respectively, and bimonthly at Alabama River at Claiborne, Ala., as a part of NASQAN.

Mobile-Tombigbee Subregion

1. Suspended-sediment data are being collected 10 times per year at Tombigbee River at Gainesville, Ala., and at Black Warrior River at Northport, Ala., in cooperation with the COE, bimonthly at Tombigbee River at Gainesville and Black Warrior River below Warrior Dam near Eutaw, Ala., and quarterly at Tombigbee River at Coffeeville lock and dam, Ala., as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at Sipsey Fork near Grayson, Ala., as a part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected by an automatic pumping sampler at Mackeys Creek below Bay Springs Lock and Dam, Miss., in cooperation with the COE, to estimate the impact of sediment loads on the Tennessee-Tombigbee Waterway (discontinued August, 1973).

4. Suspended-sediment data are being collected on about a 6-week basis at Town Creek at Nettletown, Miss., and at Noxubee River at Macon, Miss., on cooperation with the COE.

Pascagoula Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Pascagoula River near Benndale, Miss., and quarterly at Wolf Creek near Landon, Miss., as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at Cypress Creek near Janice, Miss., as a part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected on a quarterly basis at Escatawpa River near Agricola, Miss., as part of NASQAN.

Pearl Subregion

1. Suspended-sediment data are being collected on a daily basis at Pearl River near Bogulusa, La., as a part of the Federal CBR program.

2. Suspended-sediment data are being collected on a bimonthly basis at Bogue Chitto River near Bush, La., as a part of NASQAN.

Special Studies

1. Suspended-sediment sampling by an automatic sampler was continued at Turkey Creek below State Hwy. 69 near Tuscaloosa, Ala., and through September 1983 at Blue Creek near Oakman, Ala., as part of a study of coal-mine hydrology in cooperation with the Bureau of Land Management. Samples were collected monthly and during flood events at Yellow Creek near Northport, Ala., and Bear Creek near Samantha, Ala. through September, 1983.

2. Once daily and storm event suspended-sediment samples were collected by automatic pumping samplers at Boxes Creek near Howard, Ala., and at Tributary to Little Creek near Boley Springs, Ala., as part of a federal project to model small basins.

3. Suspended-sediment and bed material data are being collected periodically and during 2 storm events per year at 5 sites in order to gage sediment deposition in certain Georgia reservoirs as part of a cooperative program with the COE.

4. Suspended sediment data are being collected every 6 hours at Congaree River near Wateree, S.C., and the Wateree River at Wateree, S.C., and on a weekly basis at Lakes Marion-Moultrie diversion canal near Pineville, S.C., Lake Moultrie tailrace canal near Moncks Corner, S.C., and Santee River near St. Stephens, S.C. Bottom sediment data are being collected once annually at both high and low flow at all locations. Core data are being collected at various locations in Lakes Marion and Moultrie, and the bathymetry of the lakes are being mapped. This is part of a program to determine the rates of sedimentation in Lakes Marion and Moultrie, conducted in cooperation with the South Carolina Department of Health and Environmental Control and the South Carolina Public Service Authority.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
520 19th Avenue
Tuscaloosa, AL 35401

District Chief, WRD
U.S. Geological Survey
325 John Knox Road, Suite F-240
Tallahassee, FL 32303

District Chief, WRD
U.S. Geological Survey
6481 Peachtree Industrial Blvd.
Suite B
Doraville, GA 30360

District Chief, WRD
U.S. Geological Survey
P.O. Box 66492
Baton Rouge, LA 70896

District Chief, WRD
U.S. Geological Survey
Suite 710, Federal Building
100 West Capitol Street
Jackson, MS 39269

District Chief, WRD
U.S. Geological Survey
P.O. Box 2857
Raleigh, NC 27602

District Chief, WRD
U.S. Geological Survey
1835 Assembly Street, Suite 658
Columbia, SC 29201

District Chief, WRD
U.S. Geological Survey
200 West Grace Street, Room 304
Richmond, VA 23220

SOUTH ATLANTIC - GULF REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determinations of sediment yields were made for watershed plans in the following watersheds during 1983:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Pamlico	Fishing Creek	Fishing Creek	Granville	North Carolina
Cape Fear	Ramseur Reservoir	Sandy Creek	Randolph	North Carolina
			Guilford	North Carolina
Apalachicola	Shoal Creek (continuation)	Shoal Creek	Marion	Georgia
Apalachicola	Middle Chatta-hoochee-03130002	Moores Creek W/S No.-250	Chambers	Alabama

b. River Basin Investigations

Major Basin	Basin Reported	State
Cape Fear	Haw River	North Carolina
Cape Fear	Deep River	North Carolina
Pamlico	Neuse	North Carolina
Southeast Georgia Land and Water Resource Cooperative Study - 28 Counties (continuation)	Savannah Ogeechee Altamaha	Georgia

c. Resource Conservation and Development

Project Name	County	State
Mitten Lane	Berkeley	South Carolina
Mayesville	Sumter	South Carolina
McClellanville	Charleston	South Carolina

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoirs:

Reservoir	County	State
Little Tallapoosa River Site No. 34	Carroll	Georgia

Sharp Mountain Site No. 12	Pickens	Georgia

3. Special Studies

Sediment yield studies on selected existing reservoirs were continued in conjunction with the Statewide Cooperative River Basin Study of South Carolina.

A sediment yield study of a special channel modification project, Eastover, South Carolina, was completed.

Flood plain damage assessments were made in the following locations:

Name Project	County	State
TVA Area in Georgia	13 (2.6 million acres)	Georgia
Southeast Georgia Land and Water Resource Cooperative Study	28 (7.8 million acres)	Georgia

GREAT LAKES REGION

CORPS OF ENGINEERS

North Central Division

Buffalo District

Cazenovia Creek Ice Retention Structure at West Senenca, NY. An ice retention structure is being considered as a possible alternative for the Cazenovia Creek Section 205 Project at West Seneca, New York. One significant aspect of this study is whether the structure will have an effect on erosion and deposition. If it is determined that sediment will accumulate upstream of the structure, data will be used in maintenance and operations considerations.

For this analysis, the morphology of the stream has been examined. A sediment transport analysis will be conducted to obtain the approximate quantity of sediment that is moved during high flows. Sediment characteristics such as grain size, lithology, and providence will also be assessed. Six grab samples of sediment were collected from the channel and bars. Sampling sites are located between the project limits as well as selected sites upstream and downstream. Results from this sediment analysis are unavailable at this time because the study is still in progress.

Canaseraga Creek Flood Control Project at Dansville, NY. Canaseraga Creek is the largest tributary of the Genesee River with a drainage area of 335 square miles at the mouth. It is located in the lower Genesee River Basin and joins the Genesse River about 4 miles downstream of Mt. Morris Dam. Canaseraga Creek has a total length of 42 miles. A sedimentation analysis was conducted for the Dansville Flood Control Project General Design Memorandum II in the vicinity of Dansville, New York, along a river reach of approximately 5,000 feet in length. This study included an aerial photograph analysis of determine rates of streambank erosion, a field reconnaissance to assess the characteristics of the bank material, the river morphology and the stream bed material, and a tractive force analysis to determine the stability of the eroding bank.

Also conducted in this analysis was an assessment of existing bank protection within the project limits.

Along the right bank at a local furnace shop, approximately 250 feet of original bank was lost during the 1973 Tropical Storm Agnes. Erosion in excess of 40 feet occurred between two bridges further downstream.

In an attempt to minimize damage to a plant site, various debris including old cars and random stone fill was dumped. Over the years the irregular slope was grouted; however, the slope contained voids beneath the surface and settlement or movement down the slope occurred. Since the protection was placed, no measurable erosion of that bank has been detected; however, an event of the same magnitude as Tropical Storm Agnes has not occurred. Because the bank

protection was placed in an emergency situation, a design analysis was not conducted. The suitability of this slope protection is, therefore, in question.

Results from the aerial photograph analysis identified one major area of erosion with a current recession rate of 1.4 feet per year. A summary table of bank recession rates within the project limits was compiled. The field reconnaissance resulted in the following conclusions. The sediment in the bank is primarily composed of laminated gravel sand, silt, and clay showing a fining upward sequence. The sediment identified in the channel is composed of sandstones, shales, and carbonates in the largest quantity with some igneous and metamorphic rock also present. The origin of the channel sediment is primarily local bedrock within the drainage basin and from glacial deposits present in the headlands. Results from the tractive force analysis further verified the occurrence of an unstable bank in the previously identified reach.

Limestone Creek Flood Control Project at Manlius, NY. Limestone Creek flows in a northerly direction as it crosses the Appalachian Uplands and the Ontario Lowlands where it joins Chittenango Creek. It has a drainage basin with an area of approximately 85 square miles. A sediment analysis was conducted for the flood control project at Manlius, New York.

The purpose of this investigation is to determine whether the proposed modifications to the channel and the addition of a diversion channel would affect the existing sedimentological characteristics of the stream.

For this study, the project area was divided into four main reaches based upon significant changes in slope, velocity, water depth, and discharge. Changes in the channel characteristics affect the sediment distribution within the project. A comparison was made between the existing hydraulic conditions for a 2-year event and a 50-year event. All examined in this analysis were the differences between the sediment from the various sedimentological reaches. A 3-foot by 3-foot representative area was selected at each sampling site. Samples were collected from the channel and bars. Sampling of the armored layer was conducted separately from the sand gravel below.

Analysis of the data from this project is currently in progress; therefore, results are unavailable at this time.

Preliminary Assessment of Bank Erosion for the St. Lawrence Seaway Additional Locks Study. The St. Lawrence River flows between the United States and Canada for approximately 105 miles and continues through Canada to join the Atlantic Ocean. The purpose of the study was to address the concern of whether increased bank erosion would occur as a result of increased vessel size and increased transits within the seaway. A literature search was conducted to determine if erosion was a problem and where the problem exists.

For this preliminary analysis, areas showing bank erosion were identified based upon previous work primarily conducted by Cold Regions Research and Engineering Laboratory. Their study included an aerial photograph analysis and a field reconnaissance which were both used to identify significantly eroding banks. From these data, approximate rates of erosion were determined for specific eroding sites. Sedimentary characteristics of the eroding banks were identified based upon existing literature.

Results from this analysis showed that of the 130-mile reach of the St. Lawrence River, a total of 10.9 miles of partially vegetated or bare banks occurred. Eight specific sites were identified as having measurable erosion. Rates of erosion, locations of eroding banks, and the geologic characteristics of the banks were shown on a summary table.

Reservoir Sedimentation Survey at Mt. Morris Dam, NY. Mt. Morris Dam is located on the Genesee River in Livingston County, New York, about 67 miles upstream from the mouth. The 17-mile reservoir is entirely contained within the deep valley gorge of the river between Mt. Morris and the lower Portage Falls. In accordance with EM 1110-2-4000, Reservoir Sedimentation Investigation Program, a resurvey of this reservoir was conducted in 1982 and was extended into 1983. The purpose of this investigation was to analyze sediment characteristics such as grain size, density, providence and lithology, assess the river morphology, and to determine whether sediment deposition upstream of the dam has reduced the capacity of the reservoir.

The first photogrammetric survey was conducted in January 1980. The area capacity curve developed from this survey was used for the 1982 sedimentation survey. It was compared to the area capacity curve developed from the range survey profile conducted in 1963 to determine the net charge. Based upon the results from the analysis, it was determined that an 11 percent loss in the capacity of the reservoir resulted from sediment accumulating behind the dam since its construction in 1951.

For the work conducted in 1983, detailed characteristics of the sediment were investigated. Based upon changes in the channel morphology, sediment texture, and valley width, the reservoir was divided into three sedimentological reaches. The upper reach extends from the lower falls approximately 4.5 miles downstream. The middle reach has been defined as the portion of the river that occurs 4.5 to 9.0 miles downstream of the lower falls. The lower reach extends from the downstream limit of the middle reach to the dam.

Eleven grab samples were collected within the reservoir from the lower reach. Results show the sediment ranges in size from medium sandy gravel to silty clay. Visual observations indicate that the sediment from the middle and upper reaches continues to coarsen upstream with sand, gravel, cobbles, and boulders being the primary constituents. A petrographic examination of a sample indicates the sediment is primarily locally derived shale and carbonates.

The in-situ density survey of the lower reach showed a range from 77 pounds/ft^3 to 129 pounds/ft^3 with an average density of 101 pounds/ft.^{3}.

Results from 1983 study indicates that the storage capacity of the Mt. Morris Dam Reservoir has been reduced by 11 percent since the initial survey of 1952. The portion of the reservoir which shows the most significant sediment accumulation is from the dam to about 4 miles upstream. To determine future long-term rates of sedimentation, it was recommended that the 1980 photogrammetric survey be used as a base control for future surveys. A resurvey using the same method was also recommended within the next 10 years to assess the changes in the reservoir capacity during the period of record unless a storm of significant magnitude (25-year event) occurs prior to that time. If such an event should occur, the necessity of conducting another survey will be determined at that time. It was also recommended that a periodic land survey be conducted in the lower four miles of the reservoir to detect more accurate rates of accumulation.

Genesee River Downstream Erosion Study. In April 1983, the University of Minnesota signed an $8,000 contract with the Buffalo District to accomplish a portion of an ongoing study regarding the effects the Mt. Morris Dam and its operational policy has on downstream erosion and lateral stream movement. A computer model is being used to predict the lateral river migration with and without the dam being in place. The model is calibrated and verified using actual stream alignments obtained from aerial photographs from 1938 to the present. The dam's operational policy relationship to bank stability is also being studied.

Cattaraugus Creek Harbor, NY. Cattaraugus Creek is approximately 70 miles long with a watershed covering 554 square miles and flows generally westward entering Lake Erie about 24 miles southwest of Buffalo, NY. The Cattaraugus Creek project is primarily a small-boat navigation project but also is expected to provide some flood control. Construction of the project was completed in January 1983 and consist of: (a) two breakwaters and a berm with an aggregate length of 2,500 feet in Lake Erie at the mouth of Cattaraugus Creek; (b) an outer entrance channel 8 feet deep, 100 to 200 feet wide and 1,375 feet long: (c) an inner entrance channel 6 feet deep, 100 feet wide and 3,625 feet long; and (d) development of recreational facilities for breakwater fishing.

In January 1983 the Buffalo District, in cooperation with CERC, initiated a 4-year monitoring program at Cattaraugus Creek under the Monitoring Completed Projects Program. As a part of this program beach and offshore profile surveys of the project area and adjacent shoreline were conducted in June 1983 and October 1983. The surveys cover 10,000 feet of shore. In addition, 35 sediment samples were collected over a 2,500-foot wide grid centered at the harbor entrance from survey profile lines north, south and offshore of the project area. Also, six samples were collected at points along the channel. The samples were evaluated for grain-size distribution.

Presque Isle State Park, PA. Presque Isle is a large recurved sand spit which completely shelters the harbor for Erie, PA, and functions as a very popular State park. Since 1975, the Buffalo District, in cooperation with the Commonwealth, conducts an annual replenishment program. In 1983, 194,000 tons of medium sand was obtained from various land sources located within a 20-mile radius of Erie, PA, and placed on the beach.

In 1978, three prototype rubblemound offshore breakwaters were constructed at Beach 10. The performance of these breakwaters and the associated beach has been monitored through semiannual surveys. Fifteen stations were bathometrically and topographically surveyed in April 1983 and September 1983. In addition, during the September survey, 41 sediment samples were collected at established offset locations along a 100-foot increment sampling grid. Samples were evaluated for grain-size distribution.

The results of a hydraulic physical model test on the design for prevention of beach erosion at Presque Isle Beaches, Erie, PA were published by the Waterways Experiment Station in June 1983. Also, under contract to the Buffalo District, a report entitled "A Tracer Study of Sediment Movement in the Bar System at Presque Isle, PA" by Dag Nummedal and David Sonnenfeld was published in August 1983.

Lakeview Park, OH. Lakeview Park is located one mile west of Lorain Harbor on the south shore of Lake Erie. In the summer of 1977, three detached offshore breakwaters plus 100,000 cubic yards of beach fill were placed as a cooperative beach erosion control project for Lakeview Park. An additional 9,000 cubic yards of beach fill has been placed at the west end of the park as part of the periodic replenishment program, 6,000 cubic yards in July 1980 and 3,000 cubic yards in September 1981. All beach fill used was obtained from commercial offshore sources.

The Buffalo District in cooperation with CERC was involved in a 5-year monitoring program (1977-1982) to document the effectiveness of these offshore breakwaters in retaining the fill and controlling beach erosion.

To continue documentation of the shoreline changes at Lakeview Park, hydrographic and topographic surveys were made in April 1983 of the shoreline behind the breakwaters. Quantities of sediment transport in the project area were computed from the survey data.

Environmental Analyses of Harbor Sediments for O&M Program. In 1983, sediment samples were obtained from the following list of project locations within the Buffalo District. Sediment sampling consisting of bulk sediment, metals and organics testing was conducted at Buffalo, Lorain, Toledo, Ashtabula, Cleveland (only metals testing), and Little River. Additional testing consisted of elutriate, bioassay, and particle size at Toledo Harbor, particle size testing at Cleveland, and EP Extraction at Little River. Also, plant and animal bioassay testing was conducted at the Times Beach Disposal Area.

The purpose of the testing is to evaluate the sediments for suitability for a particular type of disposal following maintenance dredging of the Federal navigation channels.

Project Location	No. of Samples	Type of Test: Bulk Sediment	Type of Test: Other
Buffalo (Outer Harbor)	13	Metals Organics	-
Lorain	21	Metals Organics	-
Toledo	15	Metals Organics	Elutriate Bioassay Particle Size
Ashtabula (Outer Harbor)	14	Metals Organics	
Cleveland (Upper Cuyahoga, off-shore at Bratenahl and Edgewater Park)	15	Metals	Particle Size
Little River (Niagara River)	13	Metals Organics	EP Extraction (6 Samples)
Times Beach Disposal Area (Buffalo)	Plant and Animal Bioassay (WES)		

Chicago District

Indiana Harbor Ship Canal. A sediment sampling program was conducted on the Indiana Harbor Canal in East Chicago, Indiana during August 1983 in relation to proposed maintenance dredging. Sediment corings were made at eight (8) locations on the canal and the sediment samples analyzed for polychlorinated biphenyls (PCBs) and other chemicals. The results were presented in a report dated November 1983, and the PCB data are available on STORET.

Detroit District

In order to determine need for sediment traps, suspended sediment concentration and particle size were obtained at 6 stations (Saginaw, Marsh, Tittabawassee, Siawassee, Cass, Flint Rivers) at Siawassee Flats.

GREAT LAKES REGION

GEOLOGICAL SURVEY

Western Lake Superior Subregion

1. Suspended-sediment data are being collected on a periodic and storm-event basis at Nemadji River near South Superior, Wisc., and at Bad River near Odanah, Wis., and on a bimonthly basis at Baptism River near Beaver Bay, Minn., and at St. Louis River at Scanlon, Minn., as a part of the National Stream Quality Accounting Network (NASQAN).

2. Suspended-sediment data are being collected on an intermittent basis during storm runoff at the Sand River near Red Cliff, Wis., as a part of a water resources appraisal of the Apastle Islands National Lakeshore, in cooperation with the National Park Service.

Southern Lake Superior-Lake Superior Subregion

1. Suspended-sediment data are being collected on a intermittent basis at Washington Creek at Windigo (Isle Royale), Mich., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a bimonthly basis at Ontonagon River near Rockland, Mich., Sturgeon River near Chassell, Mich., and at Tahquamenon River near Tahquamenon, Mich., as a part of NASQAN.

Northwestern Lake Michigan Subregion

1. Suspended-sediment data are being collected on an intermittant basis at Popple River near Fence, Wis., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a periodic and storm-event basis at Fox River at Wrightstown, Wis., and on a bimonthly basis at Ford River near Hyde, Mich., Escanaba River at Cornell, Mich., and at Menominee River near McAllister, Wis., as a part of NASQAN.

Southwestern Lake Michigan Subregion

1. Suspended-sediment data are being collected on a periodic and storm-event basis at Milwaukee River at Milwaukee, Wis., and at Manitowac River at Manitowac, Wis., as a part of NASQAN.

2. Suspended-sediment data are being collected as a part of a study of Milwaukee Harbor, in cooperation with the Southeastern Wisconsin Regional Planning Commission. Data are being collected on a periodic and storm-event basis at the following sites:

Menomonee River at Menomonee Falls, Wis.
Milwaukee River at Milwaukee, Wis.
Milwaukee River at North Avenue Dam at Milwaukee, Wis.
Menomonee River at 70th Street @ Wauwatosa, Wis.
Menomonee River at Falk Corp. at Milwaukee, Wis.
Milwaukee River near Cedarburg, Wis.
Kinnickinnic River at Milwaukee, Wis.

Data are being collected on an intermittent basis at 11 other sites on these rivers in the Milwaukee area.

Southeastern Lake Michigan Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Grand River at Eastmanville, Mich., St. Joseph River at Niles, Mich., and at Kalamazoo River at Saugatuck, Mich., as a part of NASQAN.

2. Suspended-sediment data are being collected in cooperation with the Michigan Departments of Natural Resources and Agriculture and Van Buren County on a daily basis as part of the Van Buren County study at the following sites (project discontinued August 1982):

Paw Paw River near Paw Paw, Mich.
Paw Paw River near Hartford, Mich.
Black River near Bangor, Mich.

On monthly basis at the following sites:

Dowagiac Drain near Decatur, Mich.
Lake of the Woods Drain near Decatur, Mich.
South Branch Paw Paw River near Paw Paw, Mich.
East Branch Paw Paw River at Lawton, Mich.
East Branch Paw Paw River at Paw Paw, Mich.
South Branch Paw Paw River near Paw Paw, Mich.
North Branch Paw Paw River near Paw Paw, Mich.
Unnamed Tributary to North Branch Paw Paw River near Paw Paw, Mich.
Brandywine Creek near Paw Paw, Mich.
Bush Creek at Lawrence, Mich.
Brandywine Creek near Covert, Mich.
Deerlick Creek near South Haven, Mich.
Black River Drain near Bangor, Mich.
Haven & Max Lake Drain near Bangor, Mich.
Black River at Bangor, Mich.
Cedar Creek near South Haven, Mich.
Black River near South Haven, Mich.

On a periodic basis at the following sites:

Dowagiac Drain at Decatur, Mich.
Obsorne Drain near Keeler, Mich.
Eagle Lake Drain near Lawton, Mich.

Gates Drain near Lawton, Mich.
East Branch Paw Paw River near Lawton, Mich.
Cook Drain near Mattawan, Mich.
Brandywine Creek near Gobels, Mich.
North Extension Drain near Gobels, Mich.
Brush Creek near Lawrence, Mich.
Red Creek near Lawrence, Mich.
Pine Creek near Hartford, Mich.
Paw Paw River at Riverside, Mich.
Haven & Max Lake Drain at Bloomingdale, Mich.
Haven & Max Lake Drain near Bloomingdale, Mich.
Middle Fork Black Lake near Bloomingdale, Mich.
Melvin Creek near Bloomingdale, Mich.
Barber Creek near Grand Junction, Mich.
Pine Creek near Gobles, Mich.

Northeastern Lake Michigan-Lake Michigan Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Manistique River above Manistique, Mich., at Muskegon River near Bridgeton, Mich., and at Manistee River at Manistee, Mich., as a part of NASQAN.

Northwestern Lake Huron Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Cheboygan River at Cheboygan, Mich., and Au Sable River near Au Sable, Mich., as a part of NASQAN.

Southwestern Lake Huron-Lake Huron Subregion

1. Suspended-sediment data are being collectd on a bimonthly basis at Pigeon River near Caseville, Mich., Thunder Bay River at Alpena, Mich., Rifle River near Sterling, Mich., and at Saginaw River at Saginaw, Mich., as a part of NASQAN.

St. Clair-Detroit River Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Clinton River at Mt. Clemons, Mich., and at River Raisin near Monroe, Mich., as a part of NASQAN.

Western Lake Erie Subregion

1. Suspended-sediment data are being collected on a daily basis at Maumee River at Waterville, Ohio, in cooperation with the U.S. Corps of Engineers, and at Sandusky River near Fremont, Ohio, in cooperation with the Ohio Department of Natural Resources.

Southern Lake Erie Subregion

1. Suspended-sediment data are being collected on a daily basis at Cuyahoga River at Independence, Ohio, in cooperation with the U.S. Corps of Engineers, Buffalo District.

2. Suspended-sediment data are being collected on a daily basis at Grand River at Painseville, Ohio, in cooperation with the Ohio Department of Natural Resources.

Eastern Lake Erie-Lake Erie Subregion

1. Suspended-sediment data are being collected on a periodic basis at Cattaraugas Creek at Gowanda, N.Y., Niagara River (Lake Ontario) at Ft. Niagara, N.Y., and Tonawanda Creek at Batavia, N.Y., as a part of NASQAN.

Southwestern Lake Ontario Subregion

1. Suspended-sediment data are being collected on a periodic basis at Genesee River at Charlotte Docks at Rochester, N.Y., as a part of NASQAN.

Southeastern Lake Ontario Subregion

1. Suspended-sediment data are being collected on a periodic basis at Oswego River at Lock 7 at Oswego, N.Y., and at Sandy Creek at Adams, N.Y., as a part of NASQAN.

2. Suspended-sediment data are being collected on a weekly and storm-event basis in cooperation with Onondaga County Environmental Management Council at the following sites (discontinued September 30, 1983):

Spafford Creek at Bromley Rd. near Spafford, N.Y.
Spafford Creek at Sawmill Rd. near Spafford, N.Y.
Rice Brook at Rice Grove, N.Y.
Willow Brook at Lader Point, N.Y.
Amber Brook at Amber, N.Y.
Van Benthuysen Brook at Amber, N.Y.
Ninemile Creek near Marietta, N.Y.

Northeastern Lake Ontario-Lake Ontario-St. Lawrence Subregion

1. Suspended-sediment data are being collected on a periodic basis at Black River at Watertown, N.Y., Raquette River at Raymondville, N.Y., St. Regis River at Brasher Center, N.Y., St. Lawrence River at Cornwall, Ontario, near Massena, N.Y., and at Oswegatchie River at Heuvelton, N.Y., as a part of NASQAN.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Champaign County Bank Plaza
102 East Main St., 4th Floor
Urbana, IL 61801

District Chief, WRD
U.S. Geological Survey
6520 Mercantile Way, Suite 5
Lansing, MI 48910

District Chief, WRD
U.S. Geological Survey
702 Post Office Building
St. Paul, MN 55101

District Chief, WRD
U.S. Geological Survey
P.O. Box 1350
Albany, NY 12201

District Chief, WRD
U.S. Geological Survey
975 West Third Avenue
Columbus, OH 43212

District Chief, WRD
U. S. Geological Survey
1815 University Avenue
Madison, WI 53705

District Chief, WRD
U.S. Geological Survey
6023 Guion Road
Suite 201
Indianapolis, IN 46254

GREAT LAKES REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and/or determinations of sediment yields were made in the following watershed:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Lake Michigan	Black Creek	Black Creek	Ottawa, Allegan	Michigan

OHIO REGION

CORPS OF ENGINEERS

Ohio River Division

Report on sedimentation activities in the Ohio River Division is as follows:

Sedimentation Resurveys.

1. Sedimentation reconnaissance scope investigations were conducted in 1983 at J. W. Flannagan Lake, Pound River, Virginia, Charles Mill Lake, Black Fork at Mohican River, Ohio, Clendening Lake, Stillwater Creek, Ohio, and North Branch of Kokosing Lake, North Branch of Kokosing River, Ohio. Letter reports on these reconnaissance scope investigations are scheduled for submission in 1984.

2. Letter reports on the sedimentation reconnaissance scope investigations conducted in 1982 at Beech Fork Lake, Beech Fork, West Virginia and Burnsville Lake, Little Kanawha River, West Virginia were submitted in 1983.

3. Bluestone Lake, New River, West Virginia. A resurvey of 12 existing sediment ranges at Bluestone Lake was conducted in 1983. A report on the resurvey is scheduled for completion in 1984.

4. Dale Hollow Lake, Obey River, Tennessee. The Dale Hollow Lake resurvey of July 1980 was submitted and approved in March 1983. The report showed a minor amount of deposition had occurred and that the reservoir volume is essentially remaining stable.

5. Martins Fork Lake, Martins Fork, Kentucky. The report on the June 1983 sediment survey was submitted in 1983. The June 1983 resurvey was performed because it is believed that the sediment rate calculated for the period May 1978-July 1980 does not represent true yield due to an illegal opening of the low level sluice gates at Cranks Creek Dam. Cranks Creek Dam is located on a principle tributary upstream of Martins Fork Dam. The June 1983 resurvey showed a significant decrease in the deposition rate compared to that of the period May 1978-July 1980. The Nashville District has recommended that another survey be made in 1984 to verify the results of the 1983 resurvey. The district has been requested to provide additional justification of need prior to making the 1984 survey.

6. Center Hill Lake, Caney Fork, Tennessee. The resurvey of sedimentation ranges was conducted in August 1983. The report of resurvey will be submitted in 1984. Preliminary results of the resurvey indicate that reservoir volume is essentially stable. A reconnaissance resurvey is recommended for 1988.

7. Wolf Creek Dam, Lake Cumberland, Kentucky. Additional ranges were established in the sediment range network in 1983 as recommended in the report

(1980) of the 1979 resurvey. A supplement to the 1980 report is planned for completion in February 1984.

8. Taylorsville Lake, Salt River, Kentucky. Approximately 75 percent of the initial sediment range survey for Taylorsville Lake was completed in 1983. The initial range survey will be completed in 1984.

9. Loyalhanna Reservoir, Loyalhanna Creek, Pennsylvania. A selected range, sedimentation survey was completed at Loyalhanna Reservoir during the fall of 1983. The survey covered five selected ranges, established in the 1963 survey. A report of findings will be submitted during the third quarter of FY 84.

10. Tygart Lake, Tygart River, West Virginia. A selected range, sedimentation survey was completed at Tygart Lake during the winter of 1983. The survey covered six selected ranges, established in the 1959 survey. A sedimentation report will be submitted during the second quarter of FY 84.

11. Berlin Lake, Mahoning River, Ohio. A detailed sedimentation survey was completed at Berlin Lake during the summer-fall of 1983. This survey covered 20 ranges established in the 1953 survey. A sedimentation report will be submitted during FY 84.

12. Conemaugh Reservoir, Kiskiminetas River, Pennsylvania. A detailed report for the 1982 Conemaugh Reservoir survey will be submitted in FY 84, following a resampling of sediments in the reservoir in the third quarter of FY 84.

13. Middlesboro, Kentucky, Local Protection Project. A resurvey of the 12 existing sediment ranges of the Bennetts Fork diversion canal was made in June 1983. Sixteen additional ranges were also established at that time to better define the amount and location of sediment deposition. A Standard Project Flood (SPF) profile was computed using the 28 sediment ranges as cross-section input data. The computed profile was within one foot of the top of levee for a distance of approximately 2,600 feet along the diversion canal. As a result of the reduction in project freeboard, it was recommended that funds be programmed into the FY 86 Operations and Maintenance Budget for cleanup of the channel.

14. Tennessee-Tombigbee Waterway, Divide-Cut Section and Bay Springs Lake, Mississippi. An additional 12 sediment ranges were established in 1983 as work continued toward completing the sediment range network for this portion of the project. Two additional ranges were added at the Bay Springs Lock and Dam and the remaining 10 ranges were established in the divide section. Vertical control was established on the Bay Springs Lake range network. Future work includes completing establishment of the range network for the divide section and running horizontal control for the Bay Springs Lake network.

15. Lake City, Tennessee, Local Protection Project. A resurvey of the sediment ranges at the Coal Creek channel improvement project was conducted in 1983. A water surface profile of the design flood was computed using the surveyed ranges in order to determine the need for channel maintenance. Recommendations were made for those ranges requiring clean-out. The State of Tennessee provided a grant to Lake City for the purpose of removing accumulated sediment from portions of Coal Creek.

16. Spring City, Tennessee, Local Protection Project. Fifteen sediment ranges were established along Piney River at Spring City, Tennessee for the purpose of monitoring the severity of gravel bar formation and degree of channel meandering. This project was completed in November 1958 and involved clearing and snagging and some minor channel rectification for a reach of 2.2 miles. There has been little local maintenance of the project since construction.

Sediment Load Measurements.

1. Fishtrap Lake, Levisa Fork, Kentucky. Suspended sediment data were collected by the Huntington District at the Levisa Fork at Big Fork, Virginia, gaging station and at gaging stations on five tributary streams in the Fishtrap Lake drainage basin throughout 1983.

2. Dewey Lake, Johns Creek, Kentucky. Suspended sediment data were collected by the Huntington District at the Johns Creek at Meta, Kentucky monitoring station and at gaging stations on three tributary streams in the Dewey Lake drainage basin throughout 1983.

3. R. D. Bailey Lake, Guyandotte River, West Virginia. Suspended sediment data were collected by the Huntington District at the Clear Fork and at the Baileysville monitoring stations on 15 October 1983.

4. Upper Cumberland River Basin, Kentucky. Suspended sediment sampling by the U. S. Geological Survey at Harlan, Pineville, Middlesboro, Barbourville, and Williamsburg, Kentucky, is continuing in anticipation of sedimentation studies, necessary for implementation of Section 202 (PL 96-367) work.

5. Barbourville, Kentucky, Local Protection Project. Sediment transport was modeled using a modified version of HEC-6 for the Cumberland River and a high flow diversion channel as a part of the Barbourville Local Protection project design studies (Section 202, PL 96-367). Results of the study showed that there would not be excessive maintenance in the main and diversion channels due to sediment deposition or scour.

6. Carr Fork Lake, Carr Fork, Kentucky. Data collection was completed for the LITTCARR sediment dam studies at Carr Fork Lake. A report will be submitted in 1984.

7. Due to funding limitations, the suspended sediment data collection program conducted by USGS for the Ohio River at Louisville was discontinued effective 1 October 1983.

OHIO REGION

GEOLOGICAL SURVEY

Monongahela Subregion

1. Suspended-sediment data are being collected on a an event basis at Taylor Run at Bowden, W. Va., as part of the Shavers Fork Basin Cooperative Program with the West Virginia Department of Highways (discontinued September 30, 1982).

Upper Ohio Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Chio River at Benwood, near Wheeling, W. Va., and at Little Kanawha River at Palestine, W. Va., as a part of the National Stream Quality Accounting Network (NASQAN).

2. Suspended-sediment data are being collected on a monthly basis at Little Grave Creek near Moundsville, W. Va., at Par Run near mouth near Moundsville, W. Va., and at Middle Grave Creek near Moundsville, W. Va., in cooperation with the U.S. Soil Conservation Services (discontinued September 30, 1982).

3. Suspended-sediment data are being collected on a daily basis at Unnamed tributary to Bend Fk. near Belmont, Ohio, as part of the U.S. Geological Survey (USGS) Energy Program.

4. Suspended-sediment data are being collected on a daily basis at Hocking River below Athens, Ohio, in cooperation with the Ohio Department of Natural Resources (discontinued September 30, 1983).

5. Suspended-sediment data are being collected on a daily basis at East Branch Shade River near Tuppers Plains, Ohio, West Branch Shade River near Harrisonville, Ohio and West Branch Shade River near Burlingham, Ohio in cooperation with Ohio Department of Natural Resources.

Muskingum Subregion

1. Suspended-sediment data are being collected on a daily basis at Muskingum River at McConnelsville, Ohio, in cooperation with the Ohio Department of Natural Resources.

2. Suspended-sediment data are being collected on a daily basis at Little Mill Creek near Coshoeton, Ohio, as part of the USGS Energy Program.

Kanawha Subregion

1. Suspended-sediment data are being collected on a near quarterly basis at Kanawha River at Winfield, W. Va. as a part of NASQAN.

2. Suspended-sediment data are being collected on a daily basis at Little Coal River at Danville, W. Va., Little Coal River at Julian, W. Va. (discontinued June 30, 1983), Coal River at Tornado, W. Va., Rock Creek at Danville, W. Va., (discontinued June 30, 1983), Trace Fork at Ruth, W. Va., and Trace Fork Downstream Dryden Hollow at Ruth, W. Va., in cooperation with the West Virginia Department of Highways.

3. Suspended-sediment data were collected at on an event basis at Soak Creek at Sophia, W. Va., in cooperation with the U.S. Soil Convervation Service.

4. Suspended-sediment data are being collected on an event basis at Peters Creek at Lockwood, W. Va., as part of the Gauley River basin project in cooperation with the West Virginia Geological and Economic Survey (discontinued September 30, 1982).

5. Suspended-sediment data are being collected on a bimonthly basis as part of NASQAN on the New River at Glen Lyn, Va.

Scioto Subregion

1. Suspended-sediment data are being collected on a daily basis at Scioto River at Higby, Ohio, in cooperation with the Ohio Department of Natural Resources (discontinued September 30, 1982).

Big Sandy-Guyandotte Subregion

1. Suspended-sediment data were collected on a periodic basis and during selected storm events at the following stations (discontinued September 30, 1984):

Barton Fork near Council, VA
Grisson Creek near Council, VA
Russell Fork near Birchleaf, VA
Russell Fork near Council, VA

2. Suspended-sediment data are being collected, on a near bimonthly basis at Guyandotte River at Branchland, W. Va., as a part of NASQAN.

3. Suspended-sediment data are being collected on a bimonthly basis at Big Sandy River at Louisa, Ky., as part of NASQAN.

4. Suspended-sediment data are being collected on a daily basis at the following stations as a part of the Coal Hydrology project:

Dicks Fork At Phyllis, Ky.
Elkfoot Branch near Nigh, Ky.
Right Fork Hurricane Creek near Stopover, Ky. (discontinued September 30, 1983).

Great Miami Subregion

1. Suspended-sediment data are being collected on an intermittent basis at Whitewater River at Brookville, In., as a part of NASQAN.

Middle Ohio Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Upper Twin Creek at McGaw, Ohio, and at South Hogan Creek near Dillsboro, Ind., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a daily basis at Little Miami River at Milford, Ohio, in cooperation with the Ohio Department of Natural Resources.

3. Suspended-sediment data are being collected daily at Big Four Hollow Creek near Lake Hope, Ohio, in cooperation with the Ohio Department of Natural Resources.

4. Suspended-sediment data are being collected on a bimonthly basis at Ohio River at Greenup Dam, Ky., and Ohio River at Markland Dam, Ky., as a part of NASQAN.

Kentucky-Licking Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Licking River at Butler, Ky., and at Kentucky River at Lock 2 at Lockport, Ky., as a part of NASQAN.

Green Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Green River near Beech Grove, Ky., as a part of NASQAN.

2. Suspended-sediment data are being collected on a daily basis at Green River at Munfordville, Ky., as a part of the Federal Sediment Index Network.

Wabash Subregion

1. Suspended-sediment data were collected during flood events at one site in Indiana using automatic sediment samplers as part of the Federal Coal Hydrology program (discontinued June, 1983).

2. Suspended-sediment data were collected quarterly at White River at Hazelton, Ind., as part of NASQAN.

3. Suspended-sediment data are being collected on a bimonthly basis at Wabash River at New Harmony, Ind., and at Little Wabash River at Main Street at Carmi, Ill., as a part of NASQAN.

Cumberland Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Cumberland River at Carthage, Tenn., and at Cumberland River near Grand Rivers, Ky., as a part of NASQAN.

2. Suspended-sediment data are being collected on a daily and storm-event basis in cooperation with the U.S. Army Corps of Engineers (COE), Nashville District at the following stations:

Clover Fork near Harlan, Ky.
Yellow Creek near Middlesboro, Ky.
Cumberland River at Barbourville, Ky.
Cumberland River near Pineville, Ky.
Cumberland River at Cumberland Falls, Ky.
Cumberland River at Williamsburge, Ky.

Lower Ohio Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Rolling Fork near Lebanon Junction, Ky., and Ohio River at Cannelton Dam, Ky., and on a bimonthly basis at Ohio River at Lock and Dam 53 near Grand Chain, Ill., and Salt River at Shephardsville, Ky., as part of NASQAN.

Special Studies

1. Suspended-sediment data were collected with an automatic sampler at Enlow Fork near West Finley, Pennsylvania. These data were collected as part of a study to evaluate the effects of mining on streams in Washington County.

2. Rainfall-runoff and sediment discharge data were collected from a small tributary in the Loyalhanna Creek basin near Greensburg, Pennsylvania. Hydrologic data collection is being controlled by a micrologger which also controls the operation of the automatic sediment sampler. The data are being used to test a model to predict the impacts of surface mining.

3. Suspended-sediment data were collected at two sites below a surface mine in Western Clearfield County, Pennsylvania. An automatic sampler collects samples from the inflow and outflow of a sediment control pond. The study is designed to collect data to calibrate a sediment yield-surface mining model.

4. A 4-year study began in 1978 to evaluate surface mining influences on sedimentation characteristics of basins in the Allegheny and Monogahela geologic series in Ohio.

5. Suspended-sediment data were collected at selected sites in the coal mining region of Ohio during storm-events, once in 1979 and 1980, as part of the USGS's Coal Hydrology Monitoring project (discontinued October 30, 1980).

6. A 4-year study began in 1978 to evaluate and quantify any impact that highway construction has on sediment loads to neighboring streams at the construction site of Ohio State Route 315 in Columbus, Ohio.

7. Suspended-sediment data are being collected at two sides draining small basins (less than 2 mi^2) in Buchanan County, VA. The data will serve as input to the USGS Precipitation - Runoff Model.

8. Suspended-sediment data are being collected on an event basis at Conner Run near Valley Point, W. Va. (discontined September 30, 1983), and on an event daily basis at Little Creek at Chelyan, W. Va., as part of a rainfall-runoff sediment transport modeling study in coal areas of West Virginia.

9. Suspended-sediment data were collected with automatic samplers at four sites in the Big Sandy Creek basin in Fayette County Pennsylvania during 1983. Two of these sites are below a surface mine which is being reclaimed. The data were collected as part of a study to evaluate the effects of surface mining on the Big Sandy Creek basin of southwestern Pennsylvania.

10. Automatic suspended-sediment samplers are operating at 5 sites in the Smoky Creek Basin in conjunction with the Coal Hydrology Small Basin Modeling Project.

11. In cooperation with the COE, two suspended sediment discharge stations are being operated; New River at New River, Tenn., and Big South Fork Cumberland River near Stearns, Kentucky. These stations monitor daily and storm-event loads. These data will be used to define current water-quality conditions within the Big South National River and Recreation Area, Tennessee.

12. Professional paper 427D edited by Robert A. Krieger, a report on the 1974 phase of sediment studies at Cane Branch near Parkers Lake, Ky., was approved for publication in January 1983. This work was done in cooperation with a number of Federal and state agencies.

13. Suspended-sediment data were collected at all synoptic sites in the coal mining region of Ohio during high-water -- once in 1980 and 1981, as part of the USGS's Coal Hydrology Monitoring project (discontinued October, 1981).

14. Water Resources Investigations Report 83-4136 entitled "Measurement of Bedload Discharge in Nine Illinois Streams with the Helley-Smith Sampler", by Julia B. Graf was published. The work was done in cooperation with Illinois Department of Transportation, Division of Water Resources, and the COE.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Champaign County Bank Plaza
102 E. Main St., 4th Floor
Urbana, IL 61801

District Chief, WRD
U.S. Geological Survey
6023 Guion Road
Suite 201
Indianapolis, In 46254

District Chief, WRD
U. S. Geological Survey
208 Carroll Building
8600 La Salle Road
Towson, Maryland 21204

District Chief, WRD
U.S. Geological Survey
P.O. Box 1107
4th Floor, Federal Building
228 Walnut Street
Harrisburg, PA 17108

District Chief, WRD
U.S. Geological Survey
A-413 Federal Building
U.S. Courthouse
Nashville, TN 37203

District Chief, WRD
U.S. Geological Survey
Rm. 572, Federal Building
600 Federal Place
Louisville, KY 40202

District Chief, WRD
U.S. Geological Survey
603 Morris Street
Charleston, WV 25301

District Chief, WRD
U.S. Geological Survey
200 West Grace Street
Room 304
Richmond, VA 23220

District Chief, WRD
U.S. Geological Survey
975 West Third Avenue
Columbus, OH 43212

OHIO REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determinations of sediment yields were made for work plans in the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Cumberland	Pigeon Roost	Indian Creek	Jackson	Kentucky
Ohio River	Middle & Little Grave Creek	Middle & Little Grave Creek	Marshall	West Virginia
Ohio River	Great Miami	Mad River	Logan	Ohio

b. River Basin Investigations

Major Basin	Basin Reported	State
Ohio River	Lower Kanawha	West Virginia
Ohio River	Southeast Ohio	Ohio
Ohio River	All	Kentucky

2. Reservoir sedimentation surveys were made in the following reservoirs:

Reservoir	County	State
Lake Reba	Madison	Kentucky
Upper Green River #5	Lincoln	Kentucky
Salt Lick Creek #2	Menifee	Kentucky
Mill Creek MPS #4	Monroe	Kentucky
Margaret Creek WS No. 2	Athens	Ohio
Pine Creek WS No. 8	Lawrence	Ohio

TENNESSEE REGION

GEOLOGICAL SURVEY

Upper Tennessee Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at French Broad River at Marshall, N.C., French Broad River near Knoxville, Tenn., and at Clinch River at Melton Hill Dam, Tenn., and at Holston River near Knoxville, Tenn., as part of the National Stream Quality Accounting Network (NASQAN).

2. Suspended-sediment data are collected on a bimonthly basis at Cataloochee Creek near Cataloochee, N.C., as a part of the National Hydrologic Benchmark program.

Middle Tennessee-Hiwassee Subregion

1. Suspended-sediment data are being collected on a monthly basis at Tennessee River at Watts Bar Dam, Tenn., as part of NASQAN.

2. Suspended-sediment data are being collected in the Tennessee River basin in Georgia at three sites on a monthly basis and at 13 sites on a semi-annual basis as part of the OSM Coal Hydrology program.

Tennessee-Elk Subregion

1. Suspended-sediment data are being collected on a monthly basis at Tennessee River at South Pittsburg, Tenn., as a part of NASQAN.

2. Suspended-sediment data are being collected by an automatic PS-69 sampler at Tennessee-Tombigbee Waterway at Cross Roads, Miss., in cooperation with the U.S. Corps of Engineers (COE).

Lower Tennessee Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Tennessee River at Pickwick Landing Dam, Tenn., and at Tennessee River at Highway 60 near Paducah, Ky., as a part of NASQAN.

2. Suspended-sediment data are being collected on a periodic basis at Buffalo River near Flat Woods, Tenn., as part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected on a periodic basis at Toccoa River near Dial, Ga., in cooperation with the Georgia Geologic Survey.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
6481 Peachtree Industrial Blvd.
Suite B
Doraville, GA 30360

District Chief, WRD
U.S. Geological Survey
Suite 710, Federal Building
100 West Capitol Street
Jackson, MS 39269

District Chief, WRD
U.S. Geological Survey
Room 436, Century Postal Station
300 Fayetteville Street Mall
Raleigh, NC 27602

District Chief, WRD
U.S. Geological Survey
A-413 Federal Building
U.S. Courthouse
Nashville, TN 37203

District Chief, WRD
U.S. Geological Survey
Room 572, Federal Building
600 Federal Place
Louisville, KY 40202

District Chief, WRD
U.S. Geological Survey
200 West Grace St., Rm. 304
Richmond, VA 23220

TENNESSEE REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determination of sediment yields were made for work plans in the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Clinch River	Copper Creek	Copper Creek	Scott and Russell	Virginia

TENNESSEE VALLEY AUTHORITY

Notes on Sedimentation Activities for Calendar Year 1983

Tennessee River Basin

St. Charles, Virginia, Straight Creek Watershed Restoration Project

A 6-year rainfall-runoff sediment transport modeling study began in 1978 on the Straight Creek Watershed in St. Charles, Virginia conducted by the Tennessee Valley Authority under the supervision and administrative assistance of the Virginia Division of Mined Land Reclamation. Suspended-sediment data were collected with automatic samplers on an event basis and by manual methods, using a standard depth-integrating sampler, at the following stations:

Lower Straight Creek, Mile 2.37
Upper Straight Creek, Mile 4.64
Bailey's Trace Creek, Mile 1.35
Gin Creek, Mile 0.35

Bedload sediment data were collected at the stations and at 4 sediment trap structures by manual methods, which included use of the Helley-Smith sampler. Rainfall, streamflow, water quality, biological, flood hazard analysis, and floodplain management data were also collected. These data provide basic information for planning and monitoring the effect of flood reduction measures, sediment control structures, and reclamation work on the watershed.

Sediment Oxygen Demand

In situ measurements of sediment oxygen demand were performed at three locations in Boone Reservoir, two locations in Guntersville Reservoir, and two locations in Pickwick Reservoir. Laboratory measurements of sediment oxygen demand were performed for two locations in Waterville Reservoir, one location near the mouth of the Pigeon River, one location in the Nolichucky River, and the same locations in Guntersville and Pickwick Reservoirs were *in situ* measurements were performed. Samples collected for laboratory sediment oxygen demand measurements were also analyzed for particle size distribution, moisture contact, and loss on ignition.

UPPER MISSISSIPPI REGION

CORPS OF ENGINEERS

North Central Division

Chicago District

Chicago River, North Branch. A sediment sampling program was conducted on the Chicago River and North Branch during August 1983 in relation to proposed maintenance dredging. Sediment corings were made at fourteen (14) locations on the river in Chicago, Illinois and the sediment samples analyzed for polychlorinated biphenyls (PCBs). In addition, a series of probings were made at thirteen (13) transects across the river to determine the depth of soft-silty sediments. The results were presented in a report dated December 1983, and the PCB data is available on STORET.

Rock Island District

Suspended Sediment Sampling. Suspended load sampling is being conducted at 25 stations; 3 located on the Mississippi River and 22 on its tributaries, including 3 on the Illinois River and its tributaries. Sixteen long-term stations are operated and maintained directly by the district. Nine stations which began in conjunction with the GREAT II program are now being operated and maintained under a cooperative program with the U. S. Geological Survey.

Bedload Sampling. Bedload sampling is being conducted at 5 stations located on tributaries of the Mississippi River. Samples are collected during three peak flows for the year using the Helley Smith bedload sampler. All stations at which bedload samples are collected are operated and maintained in cooperation with the USGS. Records for the bedload stations are also maintained by the USGS.

Sedimentation Surveys. The survey of reservoir sedimentation ranges in Saylorville Lake are about 50 percent completed. The resurvey of reservoir sedimentation ranges in Coralville Lake are approximately 90 percent completed. The resurvey of reservoir sedimentation ranges in Bear Creek Reservoir at Hannibal, Missouri are also approximately 90 percent completed.

St. Paul District

Sediment load measurements were made at 9 stations (now 6) by the U. S. Geological Survey under the St. Paul District's sponsorship. Measurements made at these stations are published by the USGS in the Water Resources Data. The three sampling stations which were cancelled on 1 October 1983 were on the Chippewa and Wisconsin Rivers. The Wisconsin USGS is now preparing a final report on the sampling at these sites.

UPPER MISSISSIPPI REGION

GEOLOGICAL SURVEY

Mississippi Headwaters Subregion

1. Suspended-sediment data are being collected on a daily basis at Mississippi River near Anoka, Minn., in cooperation with the U.S. Corps of Engineers (COE).

2. Suspended-sediment data are being collected on a bimonthly basis at Mississippi River near Royalton, Minn., and at Mississippi River at Nininger, Minn., as a part of the National Stream Quality Accounting Network (NASQAN).

Minnesota Subregion

1. Suspended-sediment data are being collected on a daily basis at Minnesota River at Mankato, Minn. and on a daily basis March through August at Whetstone River near Big Stone City, S. Dak. and at Yellow Bank River near Odessa, Minn., in cooperation with the COE.

2. Suspended-sediment data are being collected on a bimonthly basis at Minnesota River near Jordon, Minn., as a part of NASQAN.

3. Suspended-sediment measurements were made for a specific study at the following sites:

Trib. to W. Br. Lac Qui Parle River above Webber Impoundment near Gary, Minn.
Trib. to N. Br. Yellow Medicine River above Dillion Syltie Impoundment near Porter, Minn.
Dillion Syltie Impoundment Outlet near Porter, Minn.
Trib to S. Fk. Yellow Bank River above LaBolt Impoundment at LaBolt, S. Dak.
LaBolt Impoundment Outlet at LaBolt, S. Dak.
Trib to Plum Creek above Lake Laura at North Inlet near Walnut Grove, Minn.
Trib to Plum Creek above Lake Laura at South Inlet near Walnut Grove, Minn.
Lake Laura Impoundment Outlet near Walnut Grove, Minn.
Flordia Cr. near Burr, Minn.
Lac Qui Parle River near Canby, Minn.
W. Br. Lac Qui Parle River at Gary, Minn.

St. Croix Subregion

1. Suspended-sediment data are being collected on a periodic basis at the following sites:

St. Croix River at CTH "T" near Dairyland, Wis.
Namekagon River at Hayward, Wis.
Namekagon River at Trego, Wis.
St. Croix River near Danbury, Wis.
Yellow River at Danbury, Wis.
Clam River at ice house bridge near Webster, Wis.
Kettle River near Cloverdale, Minn.
Snake River near Pine City, Minn.
Apple River near Somerset, Wis.

2. Suspended-sediment data are being collected on a monthly basis at St. Croix River at St. Croix Falls, Wis., as a part of NASQAN.

Upper Mississippi-Black-Root Subregion

1. Suspended-sediment data are being collected on a monthly basis at North Fork Whitewater River near Elba, Minn., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a daily basis at Mississippi River at Winona, Minn., in cooperation with the COE.

3. Suspended- and bed-material data are being collected on a periodic and storm-event basis for the COE, at Chippewa River at Durand, Wis., and at Black River at Galesville, Wis.

4. Suspended-sediment and bed material data are being collected on an intermittent basis for the COE at Chippewa River near Pepin, Wis.

Upper Mississippi-Maquoketa-Plum Subregion

1. Suspended-sediment data are being collected on a daily basis at Mississippi River at McGregor, Iowa, in cooperation with the COE, St. Paul District.

2. Suspended-sediment data are being collected on a periodic and storm-event basis to determine monthly suspended-sediment loads for the COE at the Grant River at Burton, Wis.

Wisconsin Subregion

1. Suspended-sediment and bed-material data are being collected on a periodic and storm-event basis for the COE at Wisconsin River at Muscoda, Wis.

Upper Mississippi-Iowa-Skunk-Wapsipinicon Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Mississippi River at Clinton, Iowa, and at Mississippi River at Keokuk, Iowa, as a part of NASQAN.

2. Suspended-sediment data are being collected on a daily basis at the following in cooperation with the Iowa Geological Survey:

Iowa River at Iowa City, Iowa
Ralston Creek at Iowa City, Iowa
Skunk River at Augusta, Iowa

3. Suspended-sediment data are also being collected on a bimonthly basis at Skunk River at Augusta, Iowa as part of NASQAN.

4. Suspended-sediment data are being collected on a daily basis at Iowa River at Wapello, Iowa, in cooperation with COE, Rock Island District. Susperded-sediment data are also being collected on a monthly basis as part of NASQAN.

Rock Subregion

1. Suspended-sediment data are being collected on a periodic and storm-event basis to determine monthly suspended-sediment loads for the COE, Rock Island District at Sugar River near Brodhead, Wis.

2. Suspended-sediment data are being collected on a storm-event basis in cooperation with Dane County, Wis., at:

Pheasant Branch Creek at Middleton, Wis., at U.S. Highway 12
Spring Harbor Storm Sewer at Madison, Wis.

3. Suspended-sediment data are being collected on a bimonthly basis at Rock River near Joslin, Ill., as part of NASQAN.

Des Moines Subregion

1. Suspended-sediment data are being collected on a daily basis at Des Moines River near Saylorville, Iowa, in cooperation with the Rock Island District, COE.

2. Suspended-sediment data are being collected on a daily basis at Des Moines River at St. Francisville, Mo., in cooperation with the COE, Rock Island District and bimonthly as part of NASQAN.

3. Suspended-sediment data are being collected on a daily basis at Middle Fork Raccoon River at Bayard, Iowa, and Middle Fork Raccoon River at Panora, Iowa. This study is a cooperative undertaking with the Engineering Research Institute, Iowa State University at Ames, Iowa.

Upper Mississippi-Salt-Subregion

1. Suspended-sediment data are being collected on a daily basis at Middle Fabius River near Monticello, Mo., in cooperation with the COE, Rock Island District.

2. Suspended-sediment data are being collected on a daily basis and partical-size data collected on a intermittent basis in cooperation with the COE:

North Fork Salt River near Hunnewell, Mo.
Middle Fork Salt River at Paris, Mo.

3. Suspended-sediment data are being collected on a daily basis at Salt River near New London, Mo. and Mississippi River below Alton, Ill., in cooperation with the COE, St. Louis District. Suspended-sediment data also are being collected on a quarterly basis at New London and a bimonthly basis at Alton as part of NASQAN.

Upper Illinois Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Illinois River at Marseilles, Ill., as a part of NASQAN.

Lower Illinois Subregion

1. Suspended-sediment data are being collected every other day, and more frequently during high flows, in cooperation with the Rock Island and St. Louis Districts, the COE, at Illinois River at Valley City, Ill., and Sangamon River near Oakford, Ill., additional samples are collected on a bimonthly basis as part of the NASQAN program.

Upper Mississippi-Kaskaskia-Meramec Subregion

1. Suspended-sediment data are being collected every other day, and more often during high flows, in cooperation with the St. Louis District of the COE, at the following sites:

Kaskaskia River at Cooks Mills, Ill.
Kaskaskia River at Venedy Station, Ill.
Big Muddy River at Murphysboro, Ill.

Suspended-sediment samples are also collected on a bimonthly basis at the above sites, except Kaskaskia River at Cooks Mills, Ill., as part of the NASQAN program.

2. Suspended-sediment data are being collected on a daily basis at Mississippi River at St. Louis, Mo., in cooperation with the COE, St. Louis District.

3. Suspended-sediment data are being collected on daily basis at Meramec River near Eureka, Mo., and at Mississsippi River at Thebes, Ill., in cooperation with the COE, St. Louis District. Suspended-sediment data also are being collected on a bimonthly basis at these two stations as a part of NASQAN.

4. Suspended-data are being collected on a daily basis at Mississippi River at Chester, Ill., in cooperation with the COE, St. Louis District.

Special Studies

1. Five stations were established in the Rochester area in cooperation with the St. Paul District, the COE, to determine changes in sediment yield from channelization. The stations Bear Creek on Belt Line, Minn., Cascade Creek at Rochester, Minn., Silver Creek at Rochester, Minn., Fk. Zumbro River on Belt Line, Minn., and S. Fk. Zumbro River near Rochester, Minn. are sampled during three storm events per year.

2. Suspended-sediment data are being collected every other day, and more frequently during high flows at Big Creek near Bryant, Ill., in cooperation with the Metropolitan Sanitary District of Greater Chicago. The sediment data collected are used to monitor changes in sediment transport during the reclamation of a strip-mined area by irrigating with digested sludge from sewage treatment facilities.

3. Suspended-sediment samples are being collected at several locations in the low-level radioactive-waste disposal site at Sheffield, Ill. The data will be used to determine the relation of sediment discharge to runoff for the site; the types and rates of geomorphic change; the potential for erosion and slumping; and to establish a data base to which changes caused by changing practices on the site can be compared.

4. Suspended-sediment data were being collected using stage-activated, automatic samplers in small drainage basins (less than 1 mi^2) in McDonough and Randolph Counties, Ill., as part of the Coal Hydrology Program. The data will be used to describe changes in the basins as surface mining progresses (discontinued September 30, 1983).

5. Water Resources Investigations Report 83-4136, entitled, "Measurement of Bedload Discharge in Nine Illinois Streams with the Helley-Smith Sampler" by Julia B. Graf, was published. The report compares measured bedload discharge with computed bedload discharge for selected flow conditions and channel characteristics which allows for the selection of an apporpriate indirect method for determining bedload discharge for the streams studies.

6. A report dealing with runoff, sediment transport, and water quality in a northern Illinois agricultural watershed prior to urban development by H. E. Allen, Jr. and John R. Gray was approved for publication.

7. A report estimating long-term sediment yields for Bay Creek at Nebo, Ill. was prepared by T. R. Lazaro, K. K. Fitzgerald, and L. R. Frost to be released to the WRI series.

Laboratory Activities

The Geological Survey laboratory in Iowa City, Iowa, analyzed suspended-sediment samples collected by the COE at:

Mississippi River at Hannibal, Mo.
Bay Creek at Nebo, Ill.
Wapsipinicon River at DeWitt, Iowa

Iowa River at Marengo, Iowa
Iowa River at Coralville Dam, Iowa
Mississippi River at Burlington, Iowa
Mississippi River at Keokuk, Iowa
Des Moines River near Stratford, Iowa
Raccoon River at Van Meter, Iowa
North River near Norwalk, Iowa
Middle River near Indianola, Iowa
South River near Ackworth, Iowa
Des Moines River near Tracy, Iowa
Des Moines River at Kedsauqua, Iowa
White Breast Creek near Dallas, Iowa
Mississippi River at East Dubuque, Ill.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Champaign County Bank Plaza
102 E. Main St., 4th floor
Urbana, IL 61801

District Chief, WRD
U.S. Geological Survey
6023 Guion Road, Suite 201
Indianapolis, IN 46254

District Chief, WRD
U.S. Geological Survey
P.O. Box 1230
Room 269 Federal Building
400 South Clinton Street
Iowa City, IA 52244

District Chief, WRD
U.S. Geological Survey
702 Post Office Building
St. Paul, MN 55101

District Chief, WRD
U.S. Geological Survey
1400 Independence Road
Mail Stop 200
Rolla, MO 65401

District Chief, WRD
U.S. Geological Survey
1815 University Avenue
Madison, WI 53705

UPPER MISSISSIPPI REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and/or determinations of sediment yields were made for the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Wapsipinicon	Buffalo Bill	Jones Creek	Scott	Iowa

b. River Basin Investigations

Major Basin	Basin Reported	State
Illinois River	Kankakee River	Indiana, Illinois
Mississippi River	Northern Loess Hills Soil Depletion Study	Wisconsin
Mississippi River	Des Moines	Iowa, Minnesota, Missouri

2. Reservoir Sedimentation Surveys

a. Reservoir sedimentation surveys were completed on the following:

Project Name	County	State
Rueg-Alberts	Dodge	Minnesota
Art Olin	Wabasha	Minnesota
Wohlfiel-Livingston	Wabasha	Minnesota
Crooked Creek R-2	Houston	Minnesota

LOWER MISSISSIPPI REGION

CORPS OF ENGINEERS

Lower Mississippi Valley Division

Memphis District

Sediment sampling continued at 20 stations in the St. Francis River Basin and at 3 stations on the L'Anguille River. Suspended sediment samplers DH76TM, DH78, D74-ALTM and bed sampler BMH60 were used. Samplers were collected on a monthly basis and types of records maintained are: discharge, observed suspended and bed sediment grain size distributions, observed suspended sediment concentrations, computed suspended sediment load and temperature.

New Orleans District

Sediment Load Measurements.

1. Suspended sediment and bed material samplings were continued at the following six ranges: Mississippi River at Coochie, LA, semimonthly; Mississippi River at Tarbert Landing, LA, semimonthly; Old River Outflow Channel near Knox Landing, LA, semimonthly; Atchafalaya River at Simmesport, LA, semimonthly; Wax Lake Outlet at Calumet, LA, monthly; and Lower Atchafalaya River at Morgan City, LA, monthly.

2. Suspended sediment samples were taken with a U. S. P-46, or U. S. P-61 sampler. Bed material samples were taken with a BM-54 sampler or drag bucket type sampler. Daily suspended sediment samplers were taken with a trap type sampler.

3. Sediment samplers are being collected at various crossings on the Mississippi River to determine the effects of dredging a 55 ft. navigation channel.

Office Investigations.

For the District WES is performing an investigation of the Atchafalaya Bay, incorporating both physical and mathematical models to study the bay hydrodynamics and the effects the Atchafalaya River will have in the future. Two sediment models are being used to forecast long term evolution of the delta, HAD-1 and STUDH. HAD-1 is a pseudo two dimensional sediment computations program using steady state hydraulics. STUDH is sediment transport program using unsteady two dimensional flows in the horizontal plane.

District is continuing development of a Flow Sediment Model of the Mississippi River throughout the district.

A computer Data Base System is being used to store hydrographic data for the period of record in the district.

A computer Data Base System is being used to analyze, store, and retrieve sediment data.

District has a contract with Louisiana State University to study the Atchafalaya delta. The task involves updating information on the historical growth of the delta, conducting a field data collection and monitoring programs to compute flow and sediment budgets and correlate suspended sediment concentrations with LANDSAT digital data in the area, and performing grain size analyses on suspended sediment and bed-material samples of the delta.

St. Louis District

A resurvey of upstream sediment and downstream retrogression ranges at Lake Shelbyville was initiated late in calendar year 1983. The resurvey should be completed by summer 1984. The data analysis will be completed and submitted either in late 1984 or early 1985.

The data concerning the resurvey of Carlyle Lake in 1982 and 1983 are still being analyzed and will be submitted in late 1984. The initial survey of the upstream sediment for Mark Twain Lake (Clarence Cannon Dam) is complete. The initial report will be submitted in 1984. Also, 21 retrogression ranges on the Salt River below Clarence Cannon Dam were surveyed during June 1983, before the dam was closed.

Sediment data pertaining to Lake Wappapello have just recently been obtained from Memphis District. A resurvey is planned for 1984 or 1985. The lake has not been resurveyed since 1964. A report will be submitted in 1985 or 1986.

Vicksburg District

Sedimentation Surveys.

1. Channel geometry data, such as cross sections and profiles, were made on many streams within the District during the year. This data, which is to be used in various hydrologic and hydraulic studies, was collected by surveying existing and new permanent ranges, temporary ranges, and fathometer spot surveys.

2. Some Yazoo River channel monitor sections were resurveyed to determine the effects of channel dredging operations on the downstream channel conveyance.

3. The Little Tallahatchie River monitor sections were resurveyed in 1983 to determine the effects of channel dredging operations.

Sediment Load Measurements.

1. Both bed sample and suspended sample measurements are being made weekly at three locations on the Mississippi River. These locations are Natchez, Mississippi; Vicksburg, Mississippi; and Arkansas City, Arkansas. Bed material samples are gathered using a BM-54 bed material sampler, and suspended material samples are collected using a P-61 suspended materials sampler.

2. An ongoing program in which the suspended material sample, bed material sample, temperature, discharge, and stage data are collected and computerized for many stations within the district has been continued. The Pearl River basin and the Red River basin were added to this program in 1983. Sedimentation data was collected at approximately 80 stations during 1983. Bed samplers are collected using either BM-54, BMH-60, or drag bucket bed material samplers while suspended samplers are collected using either D-48, D-57, D-61, or D-74 suspended materials samplers.

3. At the request of the district, an informal meeting was held between the district representatives and Waterways Experiment Station representatives to discuss sediment sampling techniques presently used by the district. Various improvements and updates to the suspended material and bed material sampling techniques were suggested by the Waterways Experiment Station representatives. These suggestions and updates have been incorporated into the district sediment sampling program.

Office Investigations.

1. The Mississippi River sediment data has been analyzed to determine sediment discharge curves at each of the three stations.

2. A sediment study was completed in 1983 on the Boeuf River project alternatives to determine project effects on sediment inflows and methods of minimizing sediment depositions. Sediment routing model HEC-6 was used for this analysis.

3. Analyzation of Arkabutla Lake silt ranges which were selected for resurveying during the latter part of 1981 to determine the sediment filling characteristics of the reservoir and its tributaries was completed during 1983.

4. The Yazoo Basin Sedimentation Study, initiated in 1979 by the district and Colorado State University, was completed in 1983. The study determined the effectiveness of the proposed flood control project (Upper Yazoo Projects) in the Yazoo Basin with respect to sedimentation problems and their influence on maintenance of flood control and navigation on the Yazoo Basin.

5. A comprehensive data collection program was continued for Goodwin Creek. This data collection program has been contracted with the Agricultural Research Service.

Southwestern Division

Little Rock District

Sediment sampling continued at Dam No. 2, L&D No. 3, L&D No. 4, L&D No. 5 and David D. Terry L&D on the Arkansas River. Samples were taken intermittently with USD-49 and the concentration in terms of the percent of weight were maintained.

LOWER MISSISSIPPI REGION

GEOLOGICAL SURVEY

Lower Mississippi - Hatchie Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Mississippi River at Memphis, Tenn., and on a monthly basis at Obion River at Obion, Tenn., and at Hatchie River at Bolivar, Tenn., as a part of NASQAN.

Lower Mississippi - St. Francis Subregion

1. Suspended-sediment data are being collected on a quarterly basis at St. Francis River at Parkin, Ark., and bimonthly at St. Francis Bay at Riverfront, Ark., as a part of NASQAN.

Lower Mississippi - Lower White Subregion

1. Suspended-sediment data are being collected on a quarterly basis at White River at Clarendon, Ark., as a part of NASQAN.

Lower Mississippi - Lower Arkansas Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Arkansas River at Dam 2 near Gillett, Ark., as part of NASQAN.

Lower Mississippi - Yazoo Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Mississippi River near Arkansas City, Ark., Yazoo River at Redwood, Miss., and Yazoo River near Shell Bluff, Miss., as a part of NASQAN.

Lower Red - Ouachita Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Ouachita River at Columbia, La., at Red River near Simmesport, La., and at Ouachita River at Camden, Ark., as a part of NASQAN. Sediment data are being collected on a quarterly basis at Big Creek at Pollock, La., as a part of the National Hydrologic Benchmark Network.

Boeuf - Tensas Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Tensas River at Tendal, La., and bimonthly at Boeuf River at Fort Necessity, La., as a part of NASQAN.

Lower Mississippi - Big Black Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Big Black River at Bovina, Miss., and quarterly at Homochitto Creek at Rosetta, Miss., and Mississippi River at Vicksburg, Miss., as part of NASQAN.

Lower Mississippi - Lake Maurepas Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Amite River at 4-H Camp near Denham Springs, La., Tangipahoa River at Robert, La., Lower Grand River at Bayou Sorrel, La., and at Tchefuncta River near Covington, La., as a part of NASQAN.

Louisiana Coastal Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Bayou Teche at Keystone Lock and Dam below St. Martinville, La., Mermentau River at Mermentau, La., and at Calcasieu River near Kinder, La., and bimonthly at Atchafalaya River near Melville, La., as a part of NASQAN.

2. Suspended-sediment data are being collected on a bimonthly basis at the following sites as a part of NASQAN.

Mississippi River at Belle Chasse, La.
Mississippi River near St. Francisville, La.

3. Suspended sediment and bed material data are collected at the following sites on a monthly basis in cooperation with the U.S. Corps of Engineers (COE):

Lower Atchafalaya River at Morgan City, La.
Wax Lake Outlet at Calumet, La.

Special Studies

1. Suspended-sediment data are being collected at 22 stations on the St. Francis River and selected tributaries for the Corps of Engineers. Eight sites are collected on a monthly basis and the remaining 14 sites are collected on a monthly basis from November through June. Monitoring is expected to continue from year to year as the need exists.

2. An interagency study is being conducted to quantify sediment transport to Reelfoot Lake. Four stations have been equipped with automatic samplers and five stations are sampled manually.

3. In cooperation with the Tennessee Department of Transportation a study of man-induced channel adjustments in the fluvial channels of western Tennessee is being conducted.

Laboratory Activities

The Geological Survey sediment laboratory located in Baton Rouge, La., analyzed suspended-sediment and bed-material samples collected by the COE at the following locations:

Red River at Alexandria
Old River Outflow near Knox Landing
Red River above Old River Outflow
Mississippi River at Coochie
Mississippi River at Tarbert Landing
Atchafalaya River at Simmesport
Bayou Chene above Bayou Crook Chene
East Access Channel above Lake Chicot
Lake Long below Bayou LaRompe
Little Tensas below Blind Tensas Cut

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Federal Office Building
Room 2301
700 West Capitol Avenue
Little Rock, AR 72201

District Chief, WRD
U.S. Geological Survey
P.O. Box 66492
Baton Rouge, LA 70896

District Chief, WRD
U.S. Geological Survey
Suite 710, Federal Bldg.
100 West Capitol Street
Jackson, MS 39269

District Chief, WRD
U.S. Geological Survey
A-413 Federal Building
U.S. Courthouse
Nashville, TN 37203

LOWER MISSISSIPPI REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determinations of sediment yields were made for work plans in the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Lower Mississippi	Cypress Ditch	Cypress Ditch	Clay	Arkansas
Lower Mississippi	Obion River	Cypress Creek	Madison	Tennessee

2. Reservoir sedimentation surveys were made in the following reservoirs:

Reservoir	County	State
Black Creek (Y-36-53) Yazoo River Watershed	Holmes	Mississippi

SOURIS-RED-RAINY REGION

CORPS OF ENGINEERS

North Central Division

St. Paul District

Sediment loads were measured by the U. S. Geological Survey at seven river stations (Wild Rice, two at Sheyenne, two at Pembina, Souris, and Little South Pembina Rivers) under the St. Paul District sponsorship.

SOURIS-RED-RAINY REGION

GEOLOGICAL SURVEY

Souris Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Souris River near Westhope, N. Dak., as part of the National Stream Quality Accounting Network (NASQAN).

2. Suspended-sediment data are being collected on a monthly basis at Souris River near Verendrye, N. Dak., as part of the Missouri River Basin program.

Red Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Sheyenne River at Kindred, N. Dak., Red River at the north at Halstad, Mn., and Red River at the north of Emerson, Manitoba, Canada as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at Beaver Creek near Finley, N. Dak., as a part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected on a quarterly basis at the Red Lake River at Crookston, Minn., and at Roseau River below State Ditch 51 near Caribou, Minn., as a part of NASQAN.

Rainy Subregion

1. Suspended-sediment data were collected on a bimonthly basis at Little Fork River at Littlefork, Minn., and at Rainy River at Manitou Rapids, Minn., as part of NASQAN.

For additional information about Geological survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
702 Post Office Building
St. Paul, MN 55101

District Chief, WRD
U.S. Geological Survey
821 East Interstate Avenue
Bismarck, ND 58501

SOURIS-RED-RAINY REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and/or sediment yields were made in the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Red River	Snake River	Snake River	Marshall, Polk	Minnesota

b. Conservation Operations

Erosion rates for the Souris River Basin were estimated for the Bottineau County Water Resource Board.

2. Reservoir Sedimentation Surveys

a. Reservoir sedimentation surveys were completed on the following:

Reservoir	County	State
Upper Turtle WS No. 6	Grand Forks	North Dakota

Bureau of Reclamation

The reservoir survey analyses was completed for Swanson Lake on the Republican River. A total of 7,720 acre-feet of storage has been lost to sediment deposition between closure of Trenton Dam and May 1982. The sediment yield rate for the period is 0.068 acre-foot per square mile per year.

A sediment distribution of the 100 year sediment inflow was completed for the reservior behind the proposed Davis Creek Dam by the empirical area reduction method. Distributing a total sediment yield of 1,235 acre-feet resulted in an estimated depth of sediment of 10 feet at the dam.

MISSOURI BASIN REGION

CORPS OF ENGINEERS

Missouri River Division

Kansas City District

Sediment Load Measurements. The measurement of suspended sediment was continued at 16 stations through the water year. At the end of the water year, 2 stations were discontinued. The discontinued stations were located at Frankfort, Kansas, on the Black Vermillion, an inflow tributary of Tuttle Creek Lake, and Fulton, Kansas, on the Little Osage River, an inflow tributary to Harry S. Truman Reservoir. Currently in operation are three main stem Missouri River stations and 12 tributary stations. The Missouri Office of the U. S. Geological Survey collects monthly points, depth integrated and bed material samples under the cooperative stream gaging program on the main stem of the Missouri River. The remaining stations are operated by contract observers or project personnel.

Lake and Reservoir Sediment Activities.

1. Kanopolis Lake. A resurvey of the lake area only has been performed by sounding all the aggradation ranges. This was the third resurvey of the lake ranges since completion. After a partial winter lake evacuation for construction activities, aerial photography of the lake was obtained. Each of the aggradation range monuments was flagged prior to the aerial flights. This flagging allows the identification of ranges for retrieval purposes and yields some horizontal and vertical controls if Kelsh plotting of the recent topographical changes is considered desirable. Core samples, for density and gradation, were collected initially in the delta and flood pool areas after the initial drawdown of the multipurpose pool and in the residual pool area later in the year. Undisturbed subsurface delta samples were obtained for comparison against surface samples to determine if a consolidation potential exists with time. Since this resurvey was for a specific study purpose, sustained water supply yields with extrapolated encroachment of sediment deposits in the multipurpose pool, no resurvey of the degradation ranges was performed. The collected data have been used to update the capacity tables for forecasting and determining the volume and distribution of the sediment deposits.

2. Tuttle Creek Lake. A resurvey of the Tuttle Creek Lake area was performed by sounding all the aggradation ranges. This was the second resurvey of the lake ranges since becoming operational. Core samples of the lake bed materials were collected at each aggradation range. The samples will be used for density and gradation of the deposited materials. This resurvey was also performed for a specific study purpose, sustained water supply yields with extrapolated encroachment of sediment deposits into the multipurpose pool. No resurvey of the degradation ranges was performed. The collected data have been used to update the capacity tables for forecasting and to determine the volume and distribution of the sediment deposits.

Special Studies.

1. The monitoring program below Harry S. Truman project, in the headwaters of the Lake of the Ozarks, is being continued. This program is monitoring the effects on degradation, deposition, changes in bank lines, suspended solids, recreational velocities, cove entrances, coves, boat docks, and/or any other related physical phenomena which may be due to hydropower generation. The reach being monitored is approximately 30 miles below the Harry S. Truman Damsite. Originally 12 erosion sites were located downstream at locations considered or which appeared to be vulnerable to attack. These sites are surveyed approximately once each month. Four suspended materials stations are sampled at least (minimum) once daily and upon demand by hired contractors. Intensive thalweg - timed depth integrated sediment samples and point velocities distributions at several sites have been collected for each increase in the incremental step-up of power generation. The data collected for CY 1982 were published and the CY 1983 data are in preparation. Data collected during the summer indicated an interflow approximately 1 mile below the breakpoint of the Lake of the Ozarks, Osage River arm delta topset and foreset slope. The interflow phenomena were still existing at a site approximately 3 miles below the topset - foreset breakpoint, and underflows were observed for 6 miles and below. Point samples and DI's were collected at the underflow sampling stations. Thermal profiling would have been beneficial in further explaining this physical phenomena.

2. Kanasa River. A contract was awarded to Simons, Li & Associates, Inc., Fort Collins, Colorado, to investigate the bed degradation and enlargement of the lower Kansas River channel. The primary cause and effects relationships to be investigated include the development of the Missouri River navigation channel, local protection projects at various locations along the Kansas River, imposed change in flow regime due to upstream lake controls, and the extraction of bed material by concentration of commercial dredges within a 10 mile reach in the lower Kansas River.

Omaha District

Sediment Load Measurements. The district operated six suspended sampling stations during the year. Two are Missouri River stations and four are major tributary stations. The U. S. Geological Survey operates the four stations under a cooperative stream gaging program which includes computation and publication of sediment load records. In addition, with the Corps' assistance, they collect suspended sediment samples, bed material samples, and flow velocity data in the Missouri River at Nebraska City, Nebraska; Omaha, Nebraska; and Sioux City, Iowa. Data collected include point-integrated samples and a bed sample at five vertical locations in the cross-section. Samples are obtained from a boat at each station at about six-week intervals during the open water season. This data will be used to document the bed material load being transported by the Missouri River.

Reservoir Sediment Activities.

1. Big Bend Project. A complete sediment resurvey was made of Lake Sharpe including the Bad River and the Oahe degradation reach. Observations included profiling all ranges by A-E contract and collection of bed surface samples by Corps personnel to determine reservoir volume change and define location and growth of the delta.

2. Tri Lakes Project. Due to above normal runoff from the Platte River and its tributaries, resurveys were begun at Cherry Creek, Bear Creek and Chatfield Reservoirs. Because of the early lake freeze-up and some unforeseen problems with the A-E contractor, the job was only about 80% completed in 1983. The remaining ranges are scheduled to be completed in the spring of 1984.

3. Salt Creek Reservoirs. A resurvey was made of Olive Branch Reservoir. All range cross-sections were sounded in order to update the area capacity tables scheduled to be completed in 1984.

4. Papillion Creek Project. Sediment ranges were established on Dam Site 20 which was completed during 1983.

5. Oahe Project. Sediment range monument recovery was completed on the reach of the Missouri River and its tributaries from Garrison Dam to Oahe Dam. All sediment range monuments were located and marked with a steel post with a two-foot by six-inch white steel post bolted to it. Monuments that were in danger of being lost, due to bank erosion and/or farm activities, were moved to a more permanent location.

6. Niobrara River. All existing sediment ranges were resurveyed and six new ranges were established by A-E contract. The data will be used in the Gavins Point Pool Raise Study.

Special Studies.

1. Aggradation Assessment. Gavins Point Pool Raise. A study is in progress on the effects of a proposed pool raise in Lewis and Clark Lake. It includes an assessment of aggradation trends on the Missouri River between Springfield, S.D., and Fort Randall Dam; and on the Niobrara River in the vicinity of Niobrara, Nebraska. Of special concern are increased ground water and flood levels. Part of the study concentrated on aggradation in the Springfield area, and how it would affect the city's water intake problem.

2. Bismarck Ground Water Study. Phase II of the Bismarck Ground Water Study was completed, and a draft report submitted. The study focused principally on using statistical and harmonic analyses as tools for predicting ground water levels from projected pool and stage levels. It was found that the ground water data is much more coherent with Bismarck stages than with Oahe pool levels. The existence of a phase lag between ground water and stage was verified and quantified.

3. A report entitled "Report on Sediment Investigation of Bed Sediment Segregation in a Degrading River," was published as MRD Sediment Series Report No. 30. This is a republication of a thesis by Alfred S. Harrison. It was prepared under the direction of H. A. Einstein in 1950 at the University of California, Institute of Engineering Research, Berkeley, California. Mr. Harrison's thesis is considered to be one of the earliest investigations on bed armoring in alluvial channel, but still reflects state-of-the-art. The investigation utilized laboratory experiments with three different bed material sizes to study the development of armoring in a degrading bed, and used Einstein's method to analyze the experimental data.

4. IALLUVIAL. A report was completed on the most recent work done on IALLUVIAL, the computer-based flow- and sediment-routing model being developed jointly by the district and the University of Iowa. This is a one-dimensional, quasi-steady model incorporating the current understanding of the sediment-transport and friction-factor characteristics of flow in alluvial streams. It is being developed to aid in predicting changes in riverbed elevation, flow depth and velocity, energy slope, and bed material composition in response to man-made structures or controls imposed on alluvial rivers. IALLUVIAL was developed for and applied to the 200-mile reach of the Missouri River downstream of Gavins Point Dam. The predicted values of changes in the water-surface elevation and median bed-material size (D50) after twenty years of simulation are in good agreement with the corresponding observed values.

5. Papillion Creek Depth-Area-Depletion Study. An assessment was made of the probable change with time of lake surface areas corresponding to depth below multipurpose pool elevations for proposed Papillion Creek Damsites 1, 2 and 3 near Omaha, Nebraska. The computer program used was a reservoir sediment distribution program which uses the Empirical Area-Reduction Method developed by Whitney Borland and Carl Miller (1958).

6. White River Ice Jam Study. A preliminary engineering assessment was made to provide data for a Litigation Report for Edward Byre vs. United States. This action has been brought against the United States for damages resulting from the alleged taking of flow easements across three separate ownerships in South Dakota Located from 15 to 25 miles upstream of the confluence of the White River and Fort Randall Reservoir on the Missouri River. The plaintiffs allege that aggradation and channel narrowing resulting from the backwater created by Lake Francis Case have aggravated ice jam flooding. The assessment supports the claim that the slope of the White River has been flattened and its channel narrowed as a direct result of Lake Francis Case. However, there is presently a lack of evidence to either prove or disprove that these effects have caused an increase in the frequency, severity, and duration of the ice jam flooding. Further studies have been initiated in cooperation with the Corps of Engineers Cold Regions Research and Engineering Laboratory to analyze more closely the ice jam problem and other possible contributing causes.

7. A report, "Missouri River Programmer's Manual Sediment Transport Program ODSET" was published as MRD Sediment Series Report No. 27. The manual was written to provide a complete listing of ODSET, to describe the internal structure of the program, and to briefly describe various subprograms included in ODSET. This information should be helpful in adapting ODSET to data obtained from other channels, to data types other than those used in the Omaha District, and in developing special purpose packages of limited scope of analysis. This manual is a follow-up to the ODSET user's manual published as MRD Sediment Series No. 26.

8. Conducted a study under contract with Dr. Khalid Mahmood of George Washington University to analyze sequential bed profile data obtained from the Missouri River at Omaha, Nebraska. The sequential profiles represent longitudinal soundings of the river bed, at three-hour intervals, using the Missouri River Division's 16-channel Bed Profiler. The study objectives are to establish criteria for developing a more economical sediment sampling and bed form monitoring program. Procedures consisted of statistically identifying individual and channel cross-wise bed-form shapes; utilizing the information gained to establish criteria for growing, maturing and decaying bed forms; and correlating this bed form information with bed-load computations derived from an analysis of field-measured point-integrated suspended sampling data.

9. Conducted a study under contract with Dr. H. W. Shen of Colorado State University to analyze the development of the channel bed armoring process in the Missouri River below Gavins Point Dam. The objectives, in addition to predicting future degradation, included developing a sub-routine (module) describing the bed armoring process developed mathematically by Dr. Hsieh W. Shen and Dr. Jau-Yau Lu, and published in the ASCE Journal of Hydraulic Division, April 1983. This sub-routine will then be used in an existing sediment routing model to assess armoring processes in the Gavins Point degradation reach. The study involved use of field measured bed material data, sampled periodically following closure of the dam in 1952, to describe the movements of different sediment sizes during the degradation process. It also includes use of a probabilistic approach to analyze incipient motion.

MISSOURI REGION

GEOLOGICAL SURVEY

Saskatchewan Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at St. Mary's River at Montana, U.S.A.--Alberta, Canada border, as a part of the National Stream Quality Accounting Network (NASQAN).

Missouri - Marias Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Missouri River at Tostom, Mont., and bimonthly at Missouri River at Fort Benton, Mont., and at Marias River near Chester, Mont., as a part of NASQAN.

Missouri - Musselshell Subregion

1. Suspended-sediment data are being collected on a daily basis at Missouri River near Landusky, Mont., and at Musselshell River at Mosby, Mont., in cooperation with the U.S. Corps of Engineers (COE).

2. Suspended-sediment data are being collected on a bimonthly basis at the following as a part of NASQAN:

Missouri - Musselshell Subregion
Missouri River below Fort Peck Dam, Mont.

3. Suspended-sediment data are being collected on a quarterly basis at Halfbreed Creek near Klein, Mont., as part of the Federal CBR program

Milk Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Milk River at Nashua, Mont., as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at Little Peoples Creek near Hays, Mont., as part of the Federal CBR program.

3. Suspended-sediment data are being collected on a quarterly basis at Rock Creek below Horse Creek at the international boundary, as a part of the National Hydrologic Benchmark Network.

Missouri - Poplar Subregion

1. Suspended-sediment data are being collected on a quartely basis at Redwater River at Circle, Mont., and Redwater River near Vida, and monthly at Redwater Creek near Rickey, Mont., as a part of the Federal CBR program.

2. Suspended-sediment data are being collected on a monthly basis at the following sites to define water quality characteristics of the Poplar River Basin:

Poplar River at international boundary
East Poplar River at international boundary
East Fork Poplar River near Scobey, Mont.

3. Suspended-sediment data are being collected on a monthly basis at West Fork Poplar River near Baedette, Mont., in cooperation with the Bureau of Indiar Affairs.

4. Suspended-sediment data are being collected on a bimonthly basis at Missouri River near Culbertson, Mont., as a part of NASQAN.

5. Suspended-sediment data are being collected on a monthly basis and quarterly basis respectively at Big Muddy Creek near Antelope, Mont., and at Beaver Creek at international boundary as part of the Federal CBR program.

Upper Yellowstone Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Yellowstone River near Livingston, Mont., and quarterly at Yellowstone River at Billings, Mont., as part of NASQAN.

Big Horn Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Bighorn River at Bighorn, Mont., as a part of NASQAN.

2. Suspended-sediment data are being collected on a monthly and storm-evert basis at East Fork Wind River near Dubois, Wyo, as part of the Missouri River basin Program.

3. Suspended-sediment data are being collected on a daily basis at Fifteenmile Creek near Worland, Wyo., in cooperation with the Wyoming Department of Environmental Quality.

4. Suspended-sediment data are being collected on a monthly basis at Bighorn River at Kane, Wyo., as a part of the Missouri River Basin Program.

5. Suspended-sediment data are being collected on a weekly basis during irrigation season at Wyoming Canal near Lenore, Wyo., and at Wyoming Canal below Pilot Wasteway near Morton, Wyo., in cooperation with the U.S. Bureau of Reclamation (BR), Upper Missouri Region.

6. Suspended-sediment data are being collected on a monthly and storm-event basis at Fivemile Creek near Shoshoni, Wyo., as a part of the Missouri River Basin program.

7. Suspended-sediment data are being collected on a bimonthly and storm-event basis at Wind River below Boysen Reservoir, Wyo., as part of NASQAN.

8. Suspended-sediment data are being collected on a monthly basis (from April to September) at Willwood Canal near Willwood, Wyo., in cooperation with the BR, Upper Missouri Region.

9. Suspended-sedment data are being collected on a monthly basis at Shoshone River below Willwood Dam, Wyo., in cooperation with the BR, Upper Missouri Region.

Powder-Tongue Subregion

1. Suspended-sediment data are being collected on a daily basis at Tongue River at Miles City, Mont., in cooperation with the Montana Department of State Lands.

2. Suspended-sediment data are being collected March through September at Powder River at Moorhead, Mont., at Powder River at Broadus, Mont., and at Power River at Locate, Mont., as part of the Federal CBR program.

3. Suspended-sediment data are being collected on a monthly and storm-event basis at the following sites as part of the Federal CBR program:

Powder River near Sussex, Wyo.
Clear Creek near Arvada, Wyo.
Little Powder River below Corral Creek, near Weston, Wyo.

4. Suspended-sediment data are being collected on a monthly basis in cooperation with the Bureau of Land Management (BLM) at Otter Creek near Otter, Mont., and East Fork Otter Creek near Ashland, Mont.

5. Suspended-sediment data are being collected on a monthly basis in cooperation with the Montana Department of State Lands at the following stations:

Squirrel Creek near Decker, Mont.
Hanging Woman below Horse Creek, near Birney, Mont.
Otter Creek at Ashland, Mont.
Otter Creek below Fifteen Mile Creek, near Otter, Mont.
Pumpkin Creek near Miles City, Mont.

6. Suspended-sediment data are being collected on a monthly basis as part of the Federal CBR program at the following stations:

Tongue River at Birney Day School near Birney, Mont.
Otter Creek at Ashland, Mont.
Mizpah Creek near Mizpah, Mont.

7. Suspended-sediment data are being collected on a monthly basis at Muddy Creek near Shoshoni, Wyo., in cooperation with the BR, Upper Missouri Region.

8. Suspended-sediment data are being collected on a daily basis by automatic pumping sampler at South Fork Powder River near Kayee, Wyo., at Salt Creek near Sussex, Wyo., and at Powder River at Arvada, Wyo., in cooperation with the BLM.

9. Suspended-sediment data are being collected on a daily basis during periods of flow by an automatic pumping sampler at Dugout Creek tributary near Midwest, Wyo., as part of the U. S. Geological Survey (USGS) basis data collection program.

Lower Yellowstone Subregion

1. Suspended-sediment data are being collected on a daily basis at Yellowstone River near Sidney, Mont., in cooperation with the COE.

2. Suspended-sediment data are being collected on a monthly basis at East Fork Armelles Creek near Colstrip, Mont., and Cow Creek near Colstrip, Mont., and quarterly at Rosebud Creek near Colstrip, Mont., in cooperation with the Montana Department of State Lands.

3. Suspended-sediment data are being collected on a quarterly basis at Rosebud Creek at mouth near Rosebud, Mont., and Burns Creek near Sevege, Mont., in cooperation with the BLM.

4. Suspended-sediment data are being collected on a monthly basis at the following sites as part of the Federal CBR program:

Sarpy Creek near Hysham, Mont.
O'Fallon Creek near Ismay, Mont.
Yellowstone River near Miles City, Mont.
Beaver Creek at Wibaux, Mont.

5. Suspended-sediment data are being collected on a quarterly basis at Rosebud Creek at Reservation Boundary, near Kirby, Mont., in cooperation with the Bureau of Indian Affairs.

6. Suspended-sediment data are being collected on a monthly basis at Armells Creek near Forsyth, Mont., in cooperation with the Montana Department of Natural Resources.

Missouri-Little Missouri Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Bear Den Creek near Mandaree, N. Dak., as part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a quarterly basis at Little Missouri River near Watford City, N. Dak., as part of NASQAN.

3. Suspended-sediment data are being collected on a quarterly basis at the following sites as part of the Coal Hydrology program:

Deep Creek near Amidon, N. Dak. (discontinued September 30, 1983).

Missouri-Oahe Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Knife River at Hazen, N. Dak., at Heart River near Mandan, N. Dak., and at Cannonball River at Breien, N. Dak., as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at Buffalo Creek Tributary near Gascoyne, N. Dak., and Brush Creek near Beulah, N. Dak., as part of the cooperative program with the North Dakota Public Service Commission, PSC.

3. Suspended-sediment data are being collected on a quarterly basis during periods of flow at the following sites as part of the Coal Hydrology program (discontinued September 30, 1983):

Coyote Creek near Zap, N. Dak.
West Branch Antelope Creek near Hazen, N. Dak.
Buffalo Creek near Washburn, N. Dak.
S Branch Heart River near South Heart, N. Dak.
Heart River near South Heart, N. Dak.
Coal Bank Creek near Havelock, N. Dak.

4. Suspended-sediment data are being collected on a quarterly basis at Grand River at Little Eagle, S. Dak., as a part of NASQAN.

5. Suspended-sediment data are being collected on a bimonthly basis at Moreau River near Whitehorse, S. Dak., as a part of NASQAN.

Cheyenne Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Belle Fourche River near Elm Springs, S. Dak., and on a quarterly basis at Cheyenne River at Cherry Creek, S. Dak, as a part of NASQAN.

2. Suspended-sediment data are being collected on a storm event basis in cooperation with the South Dakota Department of water and natural resources at the following sites:

Cheyenne River near Wasta, S. Dak.
Belle Fourche River near Fruitdale, S. Dak.
Belle Fourche River above mouth of Whitewood Creek, S. Dak.
Whitewood Creek above Lead, S. Dak.
Whitewood Creek above Whitewood, S. Dak.
Whitewood Creek near Whitewood, S. Dak.
Whitewood Creek above Vale, S. Dak.
Belle Fourche River at Vale, S. Dak.
Belle Fourche River near Sturgis, S. Dak.
Belle Fourche River near Elm Springs, S. Dak.
Cheyenne River near Plainview, S. Dak.
Cheyenne River at Cherry Creek, S. Dak.

3. Suspended-sediment data are being collected on a bimonthly basis at Castle Creek above Deerfield Dam, near Hill City, S. Dak., as a part of the National Hydrologic Benchmark Network.

4. Suspended-sediment data are being collected on a monthly and event basis at Belle Fourche River below Moorcroft, Wyo., as a part of the USGS basic data collection program.

5. Suspended-sediment data are being collected on a daily basis at Belle Fourche River below Rattlesnake Creek, near Poney, Wyo., and at Belle Fourche River above Dry Creek, near Piney, Wyo., and at Coal Creek near Piney, Wyo., as part of the Federal Energy program.

6. Suspended-sediment data are being collected on a monthly and storm-event basis at the following sites as part of the Federal Energy program:

Lance Creek near Riverview, Wyo.
Caballo Creek at mouth, near Piney, Wyo.
Raven Creek near Moorcraft, Wyo.

Missouri- White Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Missouri River at Pierre, S. Dak., and at Missouri River below Ft. Randall Dam, S. Dak., as a part of NASQAN.

2. Suspended-sediment data are being collected on a daily basis at Bad River near Ft. Pierre, S. Dak., in cooperation with the COE.

3. Suspended-sediment data are being collected on a daily basis at White River near Ocoma, SD in cooperation with the COE.

Niobrara Subregion

1. Suspended-sediment data are being collected on approximately a bimonthly basis at Niobrara River near Verdel, Nebr., as a part of NASQAN.

James Subregion

1. Suspended-seiment data are being collected on a bimonthly basis at James River at LaMoure, N. Dak., as part of the Missouri River program.

2. Suspended-sediment data are being collected on a bimonthly basis at James River near Columbia, S. Dak., as a part of NASQAN.

3. Suspended-sediment data are being collected on a daily basis at the following stations in cooperation with the Lower James Conservency Sub-District (discontinued September 30, 1983):

James River near Forestburg, S. Dak.
Enemy Creek near Mitchell, S. Dak.
Plum Creek near Milltown, S. Dak.
Lonetree Creek at Olivet, S. Dak.
James River near Scotland, S. Dak.
James River near Yankton, S. Dak.
Beaver Creek near Yankton, S. Dak.

3. Suspended-sediment data are being collected on a bimonthly basis at James River at LaMoure, N. Dak., as part of the Missouri River Basin program.

Missouri - Big Sioux Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Big Sioux River at Akron, Iowa, as a part of NASQAN.

2. Suspended-sediment data are being collected on a monthly basis at Big Sioux River near Dell Rapids, S. Dak.

North Platte Subregion

1. Suspended-sediment data are being collected on a daily basis at Canadian River near Lindland, Colo., and at Canadian River near Brownlee, Colo., in cooperation with the BLM.

2. Suspended-sediment data were collected on a monthly basis through September, 1981 and are being collected on a bimonthly basis at North Platte River near Lisco, Nebr., as a part of NASQAN.

3. Suspended-sediment data are being collected on a monthly basis at Encampment River above Hog Park Creek, near Encampment, Wyo, as a part of the National Hydrologic Benchmark Network.

4. Suspended-sediment data are being collected on a daily basis with an automatic pumping sampler during periods of flow at Stinking Creek above Lawn Creek, near Alcova, Wyo., and at North Platte River above Poison Spider Creek, near Goose Egg, Wyo., in cooperation with the BLM.

5. Suspended-sediment data are being collected on a monthly and storm-event basis at North Platte River at Alcova, Wyo., as part of NASQAN.

South Platte Subregion

1. Suspended-sediment data are being collected on a monthly basis at South Platte River at Julesburg, Colo., as a part of NASQAN.

Platte Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Platte River near Duncan, Nebr., as a part of NASQAN.

2. Suspended-sediment data are being collected on a bimonthly basis at Platte River at Louisville, Nebr., basis and as a part of NASQAN.

Loup Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Loup River near Genoa, Nebr., as a part of NASQAN.

Elkhorn Subregion

1. Suspended-sediment data are being collected at Elkhorn River at Waterloo, Nebr., on a bimonthly basis as a part of NASQAN.

Missouri - Little Sioux Subregion

1. Suspended-sediment data which includes bed-material, suspended-sediment samples, and velocities at several points in a vertical, are being collected at the following stations in cooperation with the COE, Omaha District:

Missouri River at Sioux City, Iowa
Missouri River at Omaha, Nebr.
Missouri River at Nebraska City, Nebr.

2. Suspended-sediment data are being collected at Missouri River at Sioux City, Iowa, and Missouri River at Omaha, Nebr., as a part of NASQAN.

Missouri - Nishnabotna - Subregion

1. Suspended-sediment data are being collected on a daily basis at Nodaway River at Clarinda, Iowa, in cooperation with the Iowa Geological Survey.

2. Suspended-sediment data are being collected on a quarterly basis at Nishnabotna River above Hamburg, Iowa, as a part of NASQAN.

3. Suspended-sediment data are being collected on a quarterly basis at Platte River at Sharps Station, Mo., and bimonthly at Missouri River at St. Joseph, Mo., as a part of NASQAN.

Republican Subregion

1. Suspended-sediment data are being collected on a 6-week basis at Beaver Creek at Cedar Bluffs, Kans., South Fork Sappa Creek near Brewster, Prairie Dog Creek above Keith Sebelius Lake, and White Rock Creek near Burr Oak, Kans., in cooperation with the Kansas Water Office.

2. Suspended-sediment data are being collected on a 6-week basis at Republician River near Clay Center, Kans., and part of NASQAN.

Smoky Hill Subregion

1. Suspended-sediment data are being collected on a 6-week basis at Smoky Hill River at Enterprise, Kans., Saline River at Tescott, Kans., North Fork Smoky Hill River near McAllaster, Kans., Big Creek near Hays, Kans., North Fork Big Creek near Victoria, Kans., Saline River near Russell, Kans., North Fork Solomon River at Glade, Kans., and South Fork Solomon River above Webster Reservoir, Kans., in cooperation with the Kansas Water Office.

2. Suspended-sediment data are being collected on a 6-week basis at Solomon River at Niles, Kan., in cooperation with Kansas Department of Health and Environment.

Kansas Subregion

1. Suspended-sediment data are being collected on a 6-week basis at Kansas River at Wamego, Kans., Little Blue River near Barnes, Kans., and Stranger Creek near Tonganoxie, Kans., in cooperation with the Kansas Water Office, and at Big Blue River near Manhattan, Kans., as part of NASQAN.

2. Suspended-sediment data are being colected on a 6-week basis at Kings Creek near Manhattan, Kans., as part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected on a 6-week basis at Kansas River at DeSoto, Kans., as part of NASQAN.

4. Suspended-sediment data were collected on a monthly basis on at West Fork Big Blue River near Dorchester, Nebr., in cooperation with the Nebraska Department of Environmental Control (discontinued September 30, 1982).

Chariton-Grand Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Elk Creek near Decatur City, Iowa, as part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a quarterly basis at Grand River near Summer, Mo., and at Chariton River near Prairie Hill, Mo., as a part of NASQAN.

Gasconade-Osage Subregion

1. Suspended-sediment data are being collected on a 6-week basis at Dragoon Creek near Burlingame, Kans., and Pottawatomie Creek near Garnett, Kans., in cooperation with the Kansas Water Office.

2. Suspended-sediment data are being collected on a bimonthly basis at Osage River below St. Thomas, Mo., and at Gasconade River above Jerome, Mo., as a part of NASQAN.

3. Suspended-sediment data are being collected on a bimonthly basis at Osage River near Schell City, Mo., as a part of NASQAN.

Lower Missouri Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Missouri River at Hermann, Mo., as a part of NASQAN.

2. Suspended-sediment data are being collected on a bimonthly basis at Lamine River near Blackwater, Mo., as part of NASQAN.

Special Studies

1. PS-69 pumping sediment samplers are operating at Lower Hay Creek Trib. near Wilbaux, Mont., discontinued September 30, 1981, and at West Branch Antelope Creek Trib. No. 4 near Zap, N. Dak., as part of EMERIA studies. Sediment data are collected at these and several other sites in the study basins.

2. A project which will relate sediment yield to rainfall and runoff to determine if surface mining has any significant effect on quantity and which will also determine the relative importance of channel erosion and slope wash as sediment sources, was continued in 1983 on Dugout Creek Tributary near Midwest, Wyoming.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Bldg. 53, Denver Federal Center
Mail Stop 415, Box 25046
Lakewood, CO 80225

District Chief, WRD
U.S. Geological Survey
P.O. Box 1230
Rm. 269 Federal Building
400 South Clinton St.
Iowa City, IA 52244

District Chief, WRD
U.S. Geological Survey
1950 Constant Ave., Campus West
University of Kansas
Lawrence, KS 66044

District Chief, WRD
U.S. Geological Survey
1400 Independence Road
Mail Stop 200
Rolla, MO 65401

District Chief, WRD
U.S. Geological Survey
Federal Building, Drawer 10076
Helena, MT 59626

District Chief, WRD
U.S. Geological Survey
Room 406 Federal Building &
U.S. Courthouse
100 Centennial Mall, North
Lincoln, NE 68508

District Chief, WRD
U.S. Geological Survey
821 East Interstate Avenue
Bismarck, ND 58501

District Chief, WRD
U.S. Geological Survey
Room 317 Federal Building
200 4th Street SW
Huron, SD 57350

District Chief, WRD
U.S. Geological Survey
P.O. Box 1125
Cheyenne, WY 82003

MISSOURI BASIN REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and/or determinations of sediment yields were made in the following watershed:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Little Nemaha River	Upper Little Nemaha	Little Nemaha River	Lancaster, Cass, Otoe	Nebraska
Nemaha River	Middle Big	Nemaha River	Johnson	Nebraska
Nemaha River	Big Muddy	Nemaha River	Johnson, Nemaha, Richardson	Nebraska
Nemaha River	Turkey Creek	Turkey Creek	Pawnee, Johnson	Nebraska
Grand River	Big Creek-Hurricane	Big Creek	Carroll	Missouri

b. River Basin Investigations

Major Basin	Basin Reported	State
Missouri River	Upper Missouri Tributaries	Nebraska
Missouri River	White River-Hat Creek	Nebraska
Grand River	Locust Creek Area	Missouri, Iowa
Grand River	Yellow-Turkey Creek Area	Missouri
Grand River	Medicine-Parsons Creek Area	Missouri, Iowa

c. Conservation Operations

Name	County	State
Deschler Structure	Thayer	Nebraska
Kaup Structure	Dawes	Nebraska
Cash Creek	Holt	Nebraska

d. Resource Conservation and Development

Project Name	County	State
Red Willow	Morrill	Nebraska
Long Pine	Brown	Nebraska

2. Reservoir Sedimentation Surveys

a. Reservoir sedimentation surveys were completed on the following:

Reservoir	County	State
Wild Rice WR-3	Marshall	South Dakota
Wild Rice WR-5	Marshall	South Dakota
Lake Pahoja	Lyon	Iowa
Big Horn River	Big Horn	Wyoming
Tongue River	Sheridan	Wyoming
North Platte	Larimer	Colorado

3. Special Studies

a. Studies of erosion, sediment yields, and sediment damages were made in the Mission Creek watershed in Platte County, Missouri.

ARKANSAS-WHITE-RED REGION

CORPS OF ENGINEERS

Southwestern Division

Arcadia Lake DM No. 28, Sedimentation and Degradation Ranges, was approved by the Division.

Albuquerque District

Sediment Load Measurements. Suspended sediment measurements were made daily (more frequent when sediment content varies noticeably) at two stations (Arkansas River below John Martin Reservoir and Purgatoire River below Trinidad Lake near Trinidad) in this region.

Other Investigations.

1. Trinidad and John Martin Dams continued to be operated to control sediment flow in the Arkansas River Basin.

2. In December of 1983 a survey was initiated to re-establish damaged or missing range monuments at Conchas Dam. The survey is scheduled to be completed by March 1984.

Little Rock District

Sedimentation Surveys. Sediment ranges in Clearwater Lake and Pool 7 were resurveyed with Motorola automated hydrographic survey equipments.

Sediment Load Measurements. Measurements continued at 34 stations during the year on Arkansas River, Mulberry, Spadra Creek, Little Piney Creek, Piney Creek, Petit Jean, Fourche LaFave, White River, Taylor Bay, James River, Bryant Creek, North Fork, Current River, Black River, Piney Fork, Strawberry River and Little Red River. 82 sediment measurements were obtained and the concentration in percent of weight records maintained.

Tulsa District

Sedimentation Surveys. The original survey of Copan Lake was complete in May 1983 and new elevation-area-capacity data was developed. Detailed resurveys of Marion Lake and John Redmond Reservoir, both in Kansas, were completed. Pole monument installation contracts for Marion, Fall River and Toronto Lakes in Kansas and Waurika Lake in Oklahoma, were awarded during 1983. The contracts for Marion and Waurika Lake are complete. The Fall River and Toronto Lakes contract had to be reprocured and completion is scheduled for April 1984. Resurvey of the sediment ranges and analysis of inflowing and deposited sediments in Big and Little Sallisaw Creeks, Robert S. Kerr Reservoir were conducted to aid in the study of possible navigation from the Kerr pool to Sallisaw, Oklahoma. A hydrographic reconnaissance survey was

performed on the Canadian River below Eufaula Dam to the confluence with the Arkansas River.

Sediment Load Measurements. The suspended sampling program consists of 45 stations. Presently, there are 37 operational stations in the Arkansas River Basin and 8 operational stations in the Red River Basin. Buffalo Creek, Lovedale, Oklahoma was deleted as a cost reduction measure; Candy Creek, Wolco, Oklahoma was shut down due to repeated vandalism of the station; and Mingo Creek, Tulsa, Oklahoma was turned over to the City of Tulsa and will remain in operation. Samplers DH 48 and DH 49 were used.

Other Investigations. Preliminary Reservoir Sediment Data Summaries (ENG Form 1787) have been prepared and submitted for approval on Heyburn and Eufaula Lakes. The historical suspended sediment data for the district that has been compiled over the last five years for the U.S.G.S WATSTORE data system has been completed and published. The publication is titled Sediment Data for Mid-Arkansas and Upper-Red River Basins Through 1980, U. S. Geological Survey, Open-File Report 83-692. The Canton Lake Model using a Strip Version of HEC-6 to analyze the sediment movements through the reservoir in a quasi two-dimensional method is completed and usage is currently delayed due to the conversion of the computer programs from the Boeing System to the Cybernet System. Completion is expected prior to the close of FY 1984.

ARKANSAS-WHITE-RED REGION

GEOLOGICAL SURVEY

Upper White Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at North Sylamore Creek near Fifty Six, Ark., as part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a bimonthly basis at White River at Newport, Ark., as a part of the National Stream Quality Accounting Network (NASQAN).

3. Suspended-sediment data are being collected on a daily basis at the following stations in cooperation with the Soil Conservation Service:

Little Black River near Grandin, Mo.
Little Black River below Fairdealing, Mo.
Logan Creek at Oxly, Mo.
Little Black River at Success, Ark.

4. Suspended-sediment data are being collected periodically at Little Black River ditch 2 near Sinsabaugh, Mo., in cooperation with the Soil Conservation Service.

Upper Arkansas Subregion

1. Suspended-sediment data are being collected on a monthly basis at Badger Creek, Upper station near Howard, Colorado, and Badger Creek, Lower station near Howard, Colorado in cooperation with the U.S. Bureau of Land Management.

2. Suspended-sediment data are being collected on a twice monthly basis at Arkansas River at Portland, Colo., in cooperation with the U.S. Bureau of Reclamation (BR), Lower Missouri River Basin Region.

3. Suspended-sediment data are being collected on a monthly basis at Halfmoon Creek near Malta, Colo., as a part of the National Hydrologic Benchmark Network.

4. Suspended-sediment data are being collected on a daily basis at the following stations, in cooperation with the U.S. Army:

Van Bremer Arroyo near Model, Colo.
Purgatoire River near Thatcher, Colo.
Taylor Arroyo blw. Rock Crossing near Thatcher, Colo.
Chacauco Creek at mouth near Timpas, Colo.
Bent Canyon Creek at mouth near Timpas, Colo.
Purgatoire River at Rock Crossing near Timpas, Colo.

5. Suspended-sediment data are being collected on a daily basis at Purgatoire River below Trinidad Dam, Colo., in cooperation with the U.S. Corps of Engineers (COE), Albuquerque District.

Middle Arkansas Subregion

1. Suspended-sediment data are being collected on a 6-week basis at the following sites in cooperation with the Kansas Water Office:

Arkansas River at Syracuse, Kans.
Whitewoman Creek near Leoti, Kans.
Mulberry Creek near Dodge City, Kans.
Arkansas River near Kinsley, Kans.
Pawnee River near Larned, Kans.
Walnut Creek at Albert, Kans.
Rattlesnake Creek near Macksville, Kans.
Cow Creek near Claflin, Kans.
Cow Creek near Lyons, Kans.
Arkansas River near Hutchinson, Kans.
Little Arkansas River at Alta Mills, Kans.
North Fork Ninnescah River above Cheney Reservoir, Kans.
South Fork Ninnescah River near Pratt, Kans.
South Fork Ninnescah River near Murdock, Kans.
Ninnescah River near Peck, Kans.
Slate Creek at Wellington, Kans.
Whitewater River at Towanda, Kans.
Arkansas River at Arkansas City, Kans.
Walnut River at Winfield, Kans.

2. Suspended-sediment data are being collected in a 6-week basis at Arkansas River near Collidge, Kans., as part of NASQAN.

3. Suspended-sediment data are being collected on a 6-week basis at Little Arkansas River at Valley Center, Kans., in cooperation with the COE.

Upper Cimarron Subregion

1. Suspended-sediment data are being collected on a 6-week basis at Bear Creek near Johnson, Kans., Cavalry Creek at Coldwater, Kans., North Fork Cimarron River at Richfield, Kans., and Crooked Creek near Nye, Kans., in cooperation with the Kansas Water Office.

Lower Cimarron Subregion

1. Suspended-sediment data are being collected from Cimarron River near Buffalo, Okla., as a part of NASQAN.

2. Suspended-sediment data are being collected at Cimarron River at Perkirs, Okla., in cooperation with the Oklahoma Conservation Commission, and as a part of NASQAN.

3. Suspended-sediment data are being collected at Cottonwood Creek near Navina, Okla., in cooperation with the BR.

Arkansas-Keystone Subregion

1. Suspended-sediment data are being collected at Arkansas River near Ponca City, Okla., Salt Fork Arkansas River Near Jet, Okla., and Salt Fork Arkansas River at Alva, Okla., in cooperation with the COE.

2. Suspended-sediment data are being collected at Arkansas River at Ralston, Okla., as a part of NASQAN, and in cooperation with the COE and the Oklahoma Conservation Commission.

Neosho-Verdigris Subregion

1. Suspended-sediment data are being collected on a 6-week basis at Lightning Creek near McCune, Kans. and at Neosho River near Parsons, Kans., in cooperation with the Kansas Water Office.

2. Suspended-sediment data are being collected on a 6-week or periodic basis at the following sites in cooperation with the COE:

Otter Creek at Climax, Kans.
Elk River at Elk Falls, Kans.
Big Hill Creek near Cherryvale, Kans.
Neosho River at Council Grove, Kans.
Neosho River near Americus, Kans.
Cottonwood River below Marion Lake, Kans.
Cottonwood River near Plymouth, Kans.

3. Suspended-sediment data are being collected at Newt Graham Lock and Dam (Verdigris River) near Inola, Okla., and at Neosho River below Fort Gibson Lake near Fort Gibson, Okla., as a part of NASQAN.

4. Suspended-sediment data are being collected at Neosho River near Commerce, Okla., in cooperation with the COE.

Upper Canadian Subregion

1. Suspended-sediment data are being collected at the following station at this indicated frequency in cooperation with the New Mexico Interstate Stream Commission:

Una de Gato Creek near Raton, N. Mex. (semiannual)
Vermejo River near Dawson, N. Mex. (bimonthly)
Cimmaron River below Eagle Nest, N. Mex. (annual)
Cimmaron River near Cimmaron, N. Mex. (semiannual)
Ponil Creek near Cimmaron, N. Mex. (bimonthly)
Rayado Creek near Cimmaron, N. Mex. (bimonthly)
Mora River at La Cueva, N. Mex. (bimonthly)

Ute Reservoir near Logan, N. Mex. (annual)
Revuelto Creek near Logan, N. Mex. (bimonthly)

2. Suspended-Sediment data are being collected on a bimonthly basis at the Canadian River near Sanchez, N. Mex., in conjunction with the Water Quality Surveillance Program in cooperation with NMISC.

3. Suspended-sediment data are being collected on a bimonthly basis at the Canadian River above New Mexico - Texas State line as a part of NASQAN.

4. Reservoir sedimentation survey was made on UTR Reservoir in Quay County, N. Mex., in cooperation with NMISC.

Lower Canadian Subregion

1. Suspended-sediment data are being collected at Canadian River near Whitefield, Okla., and at Canadian River near Canadian, Tex., as part of NASQAN.

2. Suspended-sediment data are being collected at Little River near Bowlegs, Okla., and at Canadian River at Bridgeport, Okla., in cooperation with the BR.

3. Suspended-sediment are being collected at Canadian River at Calvin, Okla., as a part of NASQAN and in cooperation with the COE and the Oklahoma Conservation Commission.

4. Suspended-sediment data are being collected at Canadian River at Purcell, Okla., in cooperation with the COE.

North Canadian Subregion

1. Suspended-sediment data are being collected at North Canadian River at Woodward, Okla. and at Beaver River at Beaver, Okla., as a part of NASQAN.

2. Suspended-sediment data are being collected at North Canadian River near Wetumka, Okla., in cooperation with the Oklahoma Conservation Commission and as a part of NASQAN.

3. Suspended-sediment data are being collected at the following sites in cooperation with the COE:

Beaver River near Guymon, Okla.
Beaver River near Hardesty, Okla.
North Canadian River near Seiling, Okla.
North Canadian River below Lake Overholser near Oklahoma City, Okla.
Deep Fork near Arcadia, Okla.

4. Suspended-sediment data are being collected at Deep Fork near Beggs, Okla., for NASQAN and in cooperation with the COE and the Oklahoma Conservation Commission.

5. Suspended-sediment data are being collected at North Canadia River near Harrah, Okla., in cooperation with the Oklahoma Conservation Commission.

Lower Arkansas Subregion

1. Suspended-sediment data are being collected on a monthly basis at Arkansas River at Tulsa, Okla., and on a bimonthly basis at Arkansas River at Dam 13 near Van Buren, Ark., and at Arkansas River at David D. Terry Lock and Dam below Little Rock, Ark., as a part of NASQAN.

2. Suspended-sediment data are being collected at Illinois River near Tahlequah, Okla., in cooperation with the COE.

Red Headwaters Subregions

1. Suspended-sediment data are being collected periodically at North Fork Red River near Headrick, Okla., at Salt Fork Red River near Elmer, Okla., at Prairie Dog Town Red River near Wayside, Tex., and at Prairie Dog Town Fork Red River near Childress, Tex., as a part of NASQAN.

2. Suspended-sediment data are being collected on a periodic basis at Little Red River near Turkey, Tex., in cooperation with the COE.

Red-Washita Subregion

1. Suspended-sediment data are being collected periodically at Red River near Burkburnett, Tex., at Red River at Denison Dam near Denison, Tex., and at Red River near Gainesville, Tex., as a part of NASQAN.

2. Suspended-sediment data are being collected at Washita River near Dickson, Okla., in cooperation with the Oklahoma Conservation Commission and as a part of NASQAN.

3. Suspended-sediment data are being collected on a periodic basis at the following sites in cooperation with the COE:

Red River near Quanah, Tex.
Middle Pease River near Paducah, Tex. (discontinued September 30, 1982)
Peace River near Childress, Tex. (discontinued September 30, 1982)
North Wichita River near Truscott, Tex.
Red River near DeKalb, Tex.

4. Suspended-sediment data are being collected at Blue Beaver Creek near Cache, Okla., as part of the National Hydrologic Benchmark Network.

Red-Sulphur Subregion

1. Suspended-sediment data are being collected at Kiamichi River near Big Cedar, Okla., as a part of the National Hydrologic Benchmark Network and in cooperation with the COE.

2. Suspended-sediment data are being collected on a quarterly basis at Little River at Millwood Dam, near Ashdown, Ark., and at Sulphur River south of Texarkana, Ark., and bimonthly at Red River at Index, Ark., as a part of NASQAN.

3. Suspended-sediment data are being collected quarterly basis at Twelvemile Bayou near Dixie, La., as a part of NASQAN.

4. Suspended-sediment data are being collected on a daily basis at Bayou Pierre near Lake End and on a monthly basis at Grand Bayou near Coushatta, La., as a part of a lignite study for the Louisiana Office of Public Works.

5. Suspended-sediment data are being collected on a monthly basis at Loggy Bayou near East Point, La., as a part of a lignite study in cooperation with the Louisiana Office of Public Works.

Laboratory Activities

1. The Geological Survey sediment laboratory located in Baton Rouge, La., analyzed suspended-sediment and/or bed-material samples collected by the COE at the following locations:

Red River at Fulton, Ark.
Red River at Shreveport, La.
Red River at Colfax, La.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Federal Office Building
Room 2301
700 West Capitol Avenue
Little Rock, AR 72201

District Chief, WRD
U.S. Geological Survey
P.O. Box 66492
Baton Rouge, LA 70896

District Chief, WRD
U.S. Geological Survey
215 Dean A. McGee Avenue
Room 621
Oklahoma City, OK 73102

District Chief, WRD
U.S. Geological Survey
Bldg. 53, Denver Federal Center
Mail Stop 415, Box 25046
Lakewood, CO 80225

District Chief, WRD
U.S. Geological Survey
1950 Constant Avenue - Campus West
University of Kansas
Lawrence, KS 66044

District Chief, WRD
U.S. Geological Survey
505 Marquette NW, Room 720
Western Bank Building
Albuquerque, NM 87102

District Chief, WRD
U. S. Geological Survey
649 Federal Building
300 East 8th Street
Austin, TX 78701

ARKANSAS-WHITE-RED REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determination of sediment yields were made for work plans in the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Cimarron River	Fairview FPM	Sand Creek	Major	Oklahoma
Arkansas River	Garrison Creek	Garrison	Sequoyah	Oklahoma
	South Canadian	Buckhead	Cleveland	Oklahoma
Red River	Waterfall-Gilford	Waterfall-Gilford	McCurtain	Oklahoma
	Lower Bayou	Simon Walnut Bayou	Carter Love	Oklahoma
Salt Forks of Arkansas River	Bois d'Arc Cowskin	Bois d'Arc & Cowskin Creeks	Kay	Oklahoma
Grand River	Big & Little Cabin Creek	Big Cabin	Craig Little Cabin Fraizer Branch West Fork Middle Fork Thompson White Oak Cool	Oklahoma
Arkansas River	Walnut-West	Verdigris River	Greenwood	Kansas

b. CO-01 Project

South Canadian River Seminole Urban Study	Seminole	Oklahoma

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoirs:

Reservoir	County	State
Sandstone Creek, Site No. 3	Roger Mills	Oklahoma
Sandstone Creek, Site No. 10A	Beckham	Oklahoma
Cavalry Creek, Site No. 1	Washita	Oklahoma
Lower Bayou Creek, Site No. 13	Love	Oklahoma
Barnitz Creek, Site No. 14	Dewey	Oklahoma
Saddle Mountain Creek, Site No. 2	Kiowa	Oklahoma
Cobb Creek, Site No. 3	Washita	Oklahoma
Little Deep Fork Creek, Site No. 10	Creek	Oklahoma
Tramperos Creek Watershed, Site No. 2	Union	New Mexico

TEXAS-GULF REGION

CORPS OF ENGINEERS

Southwestern Division

Sedimentation activities of the Division office for the year were as follows:

1. Approval of Ray Roberts Lake DM No. 21, Clearing and Sedimentation and Degradation Ranges.

2. Approval of Joe Poole Lake DM No. 23, Clearing and Sedimentation and Degradation Ranges.

3. The Southwestern Division Laboratory received 1906 bottled samples for determination of percent sediment. There were 90 bed load material samples received for testing.

Fort Worth District

There were no sedimentation activities during CY 83. However, sedimentation survey is scheduled at Stillhouse Hollow for FY 84.

Galveston District

A total of 244 inplace samples were obtained from six navigation projects. These samples were analyzed to determine the quality of the sediment relative to chemical constituents which would be resuspended during dredging, dispcsal activities and construction. The projects sampled and number of samples taken are as follows:

Navigation Project	No. of Samples Taker
Gulf Intracoastal Waterway	153
Houston Ship Channel	34
Miscellaneous	22
Brazos Island Harbor	15
Sabine-Neches Waterway	8
Corpus Christi Ship Channel	6
Freeport Harbor	6
TOTAL	244

TEXAS-GULF REGION

GEOLOGICAL SURVEY

Sabine Subregion

1. Suspended-sediment data are being collected at Sabine River near Ruliff, Tex., as a part of the National Stream Quality Accounting Network (NASQAN).

2. Suspended-sediment data are being collected on a daily basis at Bayou Grand Cane near Stanley, La., Bayou Castor near Logansport, Tex., and Bayou San Patricio near Benson, La., as a part of a lignite study for the Louisana office at Public works. Suspended-sediment data is also being collected at Bayou Grand Cane near Stanley, La., and Bayou Castor near Logansport, Tex. on an event basis with a PS-69.

Neches Subregion

1. Suspended-sediment data are being collected on a periodic basis at Neches River at Evadale, Tex., as a part of NASQAN.

Trinity Subregion

1. Suspended-sediment data are being collected on a periodic basis at Mountain Creek near Cedar Hill, Tex., Duck Creek near Garland, Tex., and at Kings Creek near Kaufman, Tex., as a part of the Federal CBR program (discontinued September 30, 1982).

2. Suspended-sediment data are being collected on a periodic basis at Trinity River at Trinidad, Tex., as a part of NASQAN.

3. Suspended-sediment data are being collected on a periodic basis at Trinity River at Romayor, Tex., and at Chocolate Bayou near Alvin, Tex., as a part of NASQAN.

Galveston Bay - San Jacinto Subregion

1. Suspended-sediment data are being collected on a periodic basis at West Fork San Jacinto River near Conroe, Tex., and at Buffalo Bayou at West Belt Dr. Houston, Tex., as part of NASQAN.

Middle Brazos Subregion

1. Suspended-sediment data are being collected at Double Mountain Fork Brazos River at Justiceburg, Tex., and at Stinking Creek near Aspermont, Tex., as a part of the Federal CBR program (discontinued September 30, 1982).

2. Suspended-sediment data are being collected on a periodic basis at Salt Fork Brazos River near Aspermont, Tex., Double Mountain Fork Brazos River

near Aspermont, Tex., Brazos River near Highbank, Tex., and at Brazos River near South Bend, Tex., as a part of NASQAN.

Lower Brazos Subregion

1. Suspended-sediment data are being collected on a daily basis at Brazos River at Richmond, Tex., as part of the Federal CBR program and also as part of NASQAN.

2. Suspended-sediment data are being collected four times a year at South Fork Rocky Creek near Briggs, Tex., as a part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected on a periodic basis at Berry Creek near Georgetown, Tex., as a part of the Federal CBR program (discontinued September 30, 1982).

4. Suspended-sediment data are being collected on a periodic basis at Little River near Cameron, Tex., as a part of NASQAN.

Upper Colorado Subregion

1. Suspended-sediment data were being collected on a periodic basis at Colorado River above Silver, Tex., as a part of NASQAN.

Lower Colorado-San Bernard Coastal Subregion

1. Suspended-sediment data are being collected on a periodic basis at Walnut Creek at Webberville Road, Austin, Tex., and at Onion Creek at US Hwy 183, Austin, Tex., as a part of the Federal CBR program (discontinued September 30, 1982).

2. Suspended-sediment data are being collected on a periodic basis at Colorado River at Austin, Tex., Colorado River at Wharton, Tex., Colorado River near San Saba, Tex., and at San Bernard River near Boling, Tex., as a part of NASQAN. The collection of suspended-sediment data at Llano River at Llano, Tex., began April 1, 1979, as part of NASQAN.

3. Suspended-sediment data for total-load determination is being collected on a periodic basis at Colorado River above Columbus, Tex., in cooperation with the Lower Colorado River Authority beginning October 1, 1982.

Central Texas Coastal Subregion

1. Suspended-sediment data are being collected on a periodic basis at Guadalupe River at Victoria, Tex., San Antonio River at Goliad, Tex., Lavaca River near Edna, Tex., and at Mission River at Refugio, Tex., as a part of NASQAN.

Nueces-Southwestern Texas Coastal Subregion

1. Suspended-sediment data are being collected on a periodic basis at San Miguel Creek near Tilden, Tex., as a part of the Federal CBR program (discontinued September 30, 1982).

2. Suspended-sediment data are being collected on a periodic basis at Nueces River near Three Rivers, Tex., as a part of NASQAN.

For additional information about Geological Survey activities within this region, contact the following office:

District Chief, WRD
U.S. Geological Survey
649 Federal Building
300 East 8th Street
Austin, TX 78701

TEXAS GULF REGION

SOIL CONSERVATION SERVICE

1. Reservoir sedimentation surveys were made in the following reservoirs during 1983:

Major Drainage	Major Drainage	County	State
Site 11, Escondido Creek	San Antonio River	Karnes	Texas
Site 31, Lower Plum Creek	San Marcos River	Caldwell	Texas
Site 8, Upper Brushy Creek	San Gabriel River	Williamson	Texas
Site 9, Upper Brushy Creek	San Gabriel River	Williamson	Texas

RIO GRANDE REGION

Bureau of Reclamation

A revised elevation vs. storage relationship was developed for Caballo Reservoir, based on the February 1981 resurvey. The results of the survey show a loss in reservoir storage of 15,266 acre-feet in the 43-year period since closure. This represents a basin yield of 354 acre-feet of sediment per year and a yield rate of 0.286 acre-foot per square mile per year.

Plans were made and some field work begun toward a resurvey of Heron Reservoir on Willow Creek and El Vado Reservior on the Rio Chama to be completed in FY 1984.

RIO GRANDE REGION

CORPS OF ENGINEERS

Southwestern Division

Albuquerque District

Sedimentation Surveys.

1. Reservoir sedimentation resurveys were conducted in 1983 at Jemez and Galiseto Dams. Also, a series of river cross-sections located below Cochiti Dam were surveyed in November and December 1983. The purpose of the survey is to continue to monitor the response of the Rio Grande to the operation of Jemez, Galiseto, and Cochiti Lake. Thirty six cross-sections were field surveyed and bed material samples were collected and measured for grain size distribution. These data, in conjunction with data from other pre-dam and post-dam surveys have documented geomorphic process such as channel degradation, bankline instability, armoring and tributary sediment load influences.

2. Attempts to rectify erroneous reservoir cross-section data collected by aerial photographic methods at Jemez Canyon Dam (1981) were unsuccessful. Jemez Canyon Reservoir was resurveyed by aerial photographic methods in December 1983. In addition to determining changes in overall reservoir storage, these data will provide evidence of the effectiveness of a 2000 acrefoot permanent pool established at Jemez Canyon in 1979 for the purpose of increasing the project's sediment trap efficiency.

3. A field survey of Galisteo Reservoir was completed in September 1983. The survey provided data used to determine changes in overall storage of the reservoir.

4. The two reports describing and analyzing the reservoir sedimentation resurveys are scheduled for completion in July 1984.

Sediment Load Measurements: Suspended sediment measurements were made at five stations. These stations are located on Rio Chama above Abiquiu Dam, below Abiquiu Dam, near Chamita, NM; on Rio Grande below Cochiti Lake; and on Jemez River below Jemez Canyon Dam. All samples are secured by the DH-48, DH-59, or DH-49 according to flow conditions.

Other Investigations: Abiquiu, Cochiti, Galiseto and Jemez Canyon Dams continued to be operated to control flow in the Rio Grande.

RIO GRANDE REGION

GEOLOGICAL SURVEY

Rio Grande Headwaters Subregion

1. Suspended-sediment data are being collected on a daily basis at San Luis Creek near Poncha Springs, Colorado, and San Luis Creek above Villa Grove, Colorado in cooperation with the U.S. Bureau of Land Management (BLM).

2. Suspended-sediment data are being collected on a monthly basis at Rio Grande near Lobatos, Colo., as a part of the National Stream Quality Accounting Network (NASQAN).

Rio Grande - Elephant Butte Subregion

1. Suspended-sediment data are being collected on a semiannually basis at Red River below Fish Hatchery near Questa, N. Mex. and Embudo Creek at Dixon, N. Mex., in cooperation with the New Mexico Interstate Streams Commission (NMISC) and the BLM.

2. Suspended-sediment data are being collected on a bimonthly basis at Rio Chama above Abiquiu Reservoir, N. Mex., Rio Chama below Abiquiu Dam, N. Mex., and at Rio Chama near Chamita, N. Mex., in cooperation with the U.S. Corps of Engineers (COE).

3. Suspended-sediment data are being collected on a daily basis at Rio Grande at Otowi Bridge near San Ildefonso, N. Mex., and at Rio Grande near Albuquerque, N. Mex., as a part of the Federal CBR program.

4. Suspended-sediment data are being collected on a daily basis at Rio Grande below Cochiti Dam, N. Mex., in cooperation with the COE.

5. Suspended-sediment data are being collected on a daily basis at Arroyo Chico near Guadalupe, N. Mex., at Rio Puerco above Arroyo Chico near Gaudalupe, N. Mex., and at Rio Puerco near Bernardo, N. Mex., in cooperation with the BLM, NMISC, and COE.

6. Suspended-sediment data are being collected on a bimonthly basis at Rio Grande at San Felipe, N. Mex., and at Rio Grande at Isleta, N. Mex., in conjunction with the Water Quality Surveillance Program and financed cooperatively by NMISC.

7. Suspended-sediment data are being collected at Santa Fe River above Cochiti Dam, N. Mex. (quarterly), Cochiti Lake, N. Mex. (semiannually), and Jemez River near Jemez, N. Mex. (semiannually), in cooperation with the NMISC.

8. Suspended-sediment data are being collected on a daily basis at Rio Grande near Bernardo, N. Mex., at Rio Grande at San Acacia, N. Mex., and at Rio Grande at San Marcial, N. Mex., in cooperation with NMISC.

9. Suspended-sediment data for total-load determinations are being collected on a monthly basis at Rio Grande at Albuquerque, N. Mex., at Rio Grande near Bernardo, N. Mex., at Rio Grande at San Acacia, N. Mex., and Rio Grande at San Marcial, N. Mex., in cooperation with NMISC.

10. Suspended-sediment data are being collected on an intermittent basis at Rio Salado near San Acacia, N. Mex., in cooperation with NMISC.

11. Suspended-sediment data are being collected on a quarterly and storm-event basis at Rio Mora near Terrero, N. Mex., as a part of the National Hydrologic Benchmark Network.

12. Suspended-sediment data are being collected on a bimonthly basis at Pecos River above Santa Rosa Lake, N. Mex. and Pecos River near Acme, N. Mex., in cooperation with NMISC.

13. Suspended-sediment data are being collected on a bimonthly and intermittent basis at Pecos River below Sumner Dam, N. Mex. (formerly called Alamagordo Dam), in cooperation with NMISC, and as a part of NASQAN.

14. Suspended-sediment data are being collected on a daily basis at Pecos River at Santa Rosa, N. Mex., and at Pecos River near Artesia, N. Mex., as part of the Federal CBR program.

15. Suspended-sediment data were collected on a bimonthly basis at Pecos River near Puerto de Luna, N. Mex., in conjunction with the Water Quality Surveillance Program and in cooperation with NMISC.

16. Suspended-sediment data are being collected on a bimonthly basis at Pecos River at Red Bluff, N. Mex., at Rio Grande at El Paso, Tex., and at Rio Grande at Fort Quitman, Tex., as a part of NASQAN.

Rio Grande - Amistad Subregion

1. Suspended-sediment data are being collected on a periodic basis at Rio Grande at Foster Ranch, near Langtry, Tex., and at Devils River at Pafford Crossing, near Comstock, Tex., as a part of NASQAN.

Rio Grande Closed Basins Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Rio Tularosa near Bent, N. Mex., and at Mimbres River near Mimbres, N. Mex., as a part of NASQAN.

Lower Pecos Subregion

1. Suspended-sediment data are being collected on a periodic basis at Pecos River near Langtry, Tex., as a part of NASQAN.

Rio Grande - Falcon Subregion

1. Suspended-sediment data are being collected on a periodic basis at Rio Grande at Laredo, Tex., as a part of NASQAN.

Lower Rio Grande Subregion

1. Suspended-sediment data are being collected on a periodic basis at Rio Grande River near Brownsville, Tex., as part of the Federal CBR program as part of NASQAN (daily sampling discontinued September 30, 1983).

2. Suspended-sediment data are being collected on a weekly or more frequent basis at North Floodway near Sebastion, Tex., and at Arroyo Colorado Floodway at El Fuste Siphon, south of Mercedes, Tex., as part of the Federal CBR program (discontinued September 30, 1983).

Special Studies

A water quality monitoring plan for the Rio Grande and Red River in Taos County, N. Mex., was initiated in October 1978 by the U.S. Bureau of Land Management. The study objectives are to monitor long-term changes in water quality (chemical and sediment) at 12 selected sampling sites. BLM personnel collect monthly samples and the Geological Survey analyzes the samples and publishes the data.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Bldg. 53, Denver Federal Center
Mail Stop 415, Box 25046
Lakewood, Colorado 80225

District Chief, WRD
U.S. Geological Survey
505 Marquette NW, Room 720
Western Bank Building
Albuquerque, NM 87102

District Chief, WRD
U.S. Geological Survey
649 Federal Building
300 East 8th Street
Austin, TX 78701

RIO GRANDE REGION

SOIL CONSERVATION SERVICE

1. Sedimentation Surveys were made on the following reservoirs:

Reservoir	County	State
Santa Cruz 3A	Rio Arriba	New Mexico
Acomita Lake	Cibola	New Mexico

2. Sedimentation rates were updated and revised for final design on the following planned Public Law-566 structures:

Watershed	Structure No.	County	State
Eagle-Tumbleweed	1	Eddy	New Mexico
Torc-Williamsburg	3-C	Sierra	New Mexico

3. Sedimentation rates were determined on the following Public Law-566 flood water retarding structures in Dona Ana County, New Mexico:

Watershed	Structure Name and Number
Appache-Brazito-Mesquite Arroyo	Apache No. 1 Pena Blanca No. 2 Mossman No. 3 Bishop's Cap No. 4
Caballo Arroyos	Underwood No. 1 Wasson No. 2 South Salem No. 3 Wardy-Hedgecock No. 4 Hammett No. 5
Fillmore Arroyos	Fillmore No. 1 Salopek No. 2 Lower Fillmore No. 3
Hatch Valley Arroyos	Velarde No. 1 North Salem No. 2 Reed Thurman No. 3 Ralph No. 4 Rodey No. 5 Garfield No. 6

UPPER COLORADO REGION

Bureau of Reclamation

A special study was completed to estimate the amount of sand-sized material that will be diverted from the Spanish Fork River into the Power Canal at the proposed site of the Spanish Fork Diversion Structure Replacement. A yearly sediment load of 3.3 acre-feet of sand-sized material was estimated to be diverted under normal operating conditions. During an extreme or high flow month, the sand-sized sediment load computed for an entire year, on the average, could be diverted into the Power Canal.

A hydrographic survey was completed in the tailrace area below Glen Canyon Dam using an automated survey system to determine tailrace configuration following the 1983 high discharge conditions. Twelve degradation range lines were also surveyed between the tailrace area and Lee's Ferry.

An inspection was made of the spillway tunnel damage at Glen Canyon Dam due to cavitation during recent releases. A sonar sounding of the left tunnel and tape soundings of the right spillway were taken to assess extent of cavitation and determine scour hole depths.

A sediment deposition analysis was completed for the moss screen structure on the Government Highline Canal - Stage I. Using suspended sediment samples collected from 1974-76, incoming sediment concentrations and loads were estimated on an average monthly basis. An annual estimate of 3.2 acre-feet of sediment can be expected to deposit in the forebay of the moss screen structure.

An 8-day raft trip was made through the Grand Canyon from Lee's Ferry to Pierce Basin in Lake Mead to assess changes which have occurred near river level in the canyon as a result of the high discharge from Glen Canyon Dam in 1983. Information gathered during the trip will be used to give future direction to the Glen Canyon Dam environmental studies. River depth was charted through the canyon for 276 miles by means of a Raytheon depth recorder. A strip map was used to determine location within the canyon. Comparative photos were taken of camping beach areas photographed in 1980.

Environmental studies were begun for the purpose of evaluating the historical impacts of Glen Canyon Dam operations on the physical and biological environment within the Grand Canyon and to provide basic information for determining future effects due to uprating powerplant generators and changes in operations. Because of the high releases of 1983, the studies were expanded to include examining the possibility of altering the flow patterns to optomize the relationship between flow releases and downstream natural resources. A sediment data collection program was carried out in 1983 at five river locations between Lee's Ferry and Diamond Creek and on three tributaries. These data are to be used to define sediment transport characteristics, by specific reach, within the canyon and as an aid in determining the future stability or regeneration of the sand covered camping beaches within the canyon. The program of data collection, which is to continue through 1984 into 1985, is a cooperative effort of Reclamation and the U.S. Geological Survey.

UPPER COLORADO REGION

GEOLOGICAL SURVEY

Colorado Headwaters Subregion

1. Suspended-sediment data are being collected on a daily basis at East Middle Fork Parachute Creek near Rio Blanco, Colo., and East Fort Parachute Creek near Rulison, Colo., in cooperation with the U.S. Navy.

2. Suspended-sediment data are being collected on a once-a-week basis at Colorado River near Cameo, Colorado in cooperation with the Colorado River Water Conservation District.

3. Suspended-sediment data are being collected on a monthly basis at Colorado River near Colorado-Utah State line as a part of the National Stream Quality Accounting Network (NASQAN).

Gunnison Subregion

1. Suspended-sediment data are being collected on a monthly basis at Gunnison River near Grand Junction, Colo., as a part of NASQAN.

Upper Colorado-Dolores Subregion

1. Suspended-sediment data are being collected on a comprehensive level at Colorado River near Cisco, Utah.

2. Suspended-sediment data are being collected on a bimonthly basis at Dolores River near Cisco, Utah., as a part of NASQAN

Great Divide-Upper Green Subregion

1. Suspended-sediment data are being collected on a daily basis at Green River near Green River, Wyo. as a part of the Federal CBR program.

2. Suspended-sediment data are being collected on a monthly basis at Green River near Greendale, Utah., as a part of NASQAN.

White-Yampa Subregion

1. Suspended-sediment data were obtained on a monthly basis at Yampa River near Maybell, Colo., and at Little Snake River near Lily, Colo., as a part of NASQAN.

2. Suspended-sediment data are being collected on a daily basis at Yampa River near Maybell, Colo., and on a weekly basis at Little Snake River near Lily, Colo., in cooperation with the Colorado River Water Conservation District.

3. Suspended-sediment data are being collected at several sites in the coal mining region of the Yampa River basin. The following stations are operated on a monthly basis:

Middle Creek near Oak Creek, Colo.
Foidel Creek near Oak Creek, Colo.
Foidel Creek at mouth near Oak Creek, Colo.

These stations are operated in cooperation with the U.S. Bureau of Land Management (BLM).

4. Suspended-sediment data are being collected at several stations in the Piceance Creek basin to monitor the potential impact of the oil shale development project. Five stations are equipped with pumping sediment samplers and where the flow is continuous, daily samples are collected. Intermittent stations are designed to sample all significant peaks and low flow samples are collected when possible. The following stations are operated at the indicated frequency:

Piceance Creek below Rio Blanco, Colo.	Daily
Stewart Gulch above West Fork, Colo.	Peaks
Piceance Creek tributary near Rio Blanco, Colo.	Peaks
Willow Creek near Rio Blanco, Colo.	Peaks
Piceance Creek above Hunter Creek, Colo.	Daily
Piceance Creek below Ryan Gulch, Colo.	Daily
Piceance Creek at White River, Colo.	Daily
Corral Gulch below Water Gulch, Colo.	Peaks
Corral Gulch near Rangely, Colo.	Daily

These stations are operated in cooperation with the Colorado River Water Conservation District.

5. Suspended-sediment data are being collected on a comprehensive level at White River near Colorado-Utah State line in cooperation with the Utah Department of Natural Resources.

6. Suspended-sediment data are being collected on a comprehensive level at White River near mouth near Ouray, Utah, in cooperation with the BLM.

Lower Green Subregion

1. Suspended-sediment data are being collected on a monthly basis in cooperation with the BLM at the following sites:

Cottonwood Creek near Orangeville, Utah
Ferron Creek below Paradise Ranch, near Clawson, Utah
San Rafael River at San Rafael Bridge Campground, near Castle Dale, Utah

2. Suspended-sediment data are being collected on a monthly basis at San Rafael River near Green River, Utah, in cooperation with the U.S. Bureau of Reclamation.

3. Suspended-sediment data are being collected on a monthly basis at Price River near Woodside, Utah, in cooperation with the U.S. Environmental Protection Agency.

4. Suspended-sediment data are being collected on a comprehensive level at Green River at Green River, Utah.

Upper Colorado - Dirty Devil Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Colorado River at Lees Ferry, Ariz., as part of NASQAN.

2. Suspended-sediment data are being collected on a monthly basis at Muddy Creek at Delta Mine, near Hanksville, Utah, in cooperation with the BLM.

San Juan Subregion

1. Suspended-sediment data are being collected on a monthly basis at Vallecito Creek near Bayfield, Colo., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a daily basis at Animas River at Farmington, N. Mex., as a part of NASQAN.

3. Suspended-sediment data are being collected on a intermittent basis at Chaco River near Waterflow, N. Mex. and on a daily basis at San Juan River at Shiprock, N. Mex., as aa part of the U.S. Geological Survey Coal Hydrology Program.

4. Suspended-sediment data are being collected on a monthly basis at La Plata Creek at Colorado-Utah state line and a McElmo Creek at Colorado-Utah state line as a part of the USGS Coal Hydrology Program.

5. Suspended-sediment data are being collected on a quarterly basis at San Juan River near Bluff, Utah, as part of NASQAN.

Special Studies

An energy project "Hydrologic Surveillance of Coal Lease Areas in Northwestern New Mexico" was continued. Sediment stations were established throughout the coal lease areas and are financed by Federal CBR and BLM. funds.

As part of the Federal program for the determining baseline conditions in the areas of potential oil-shale development in the White River basin, Utah, suspended-sediment data are being obtained on a comprehensive level at 4 sites and monthly at 12 sites.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Federal Building
301 West Congress, FB-44
Tucson, AZ 85701

District Chief, WRD
U.S. Geological Survey
505 Marquette NW, Room 720
Western Bank Building
Albuquerque, NM 87102

District Chief, WRD
U.S. Geological Survey
P.O. Box 1125
Cheyenne, WY 82003

District Chief, WRD
U.S. Geological Survey
Bldg. 53, Denver Federal Center
Mail Stop 415, Box 25046
Lakewood, CO 80225

District Chief, WRD
U.S. Geological Survey
Rm 1016 Admin. Bldg.
1745 West 1700 South
Salt Lake City, UT 84104

UPPER COLORADO REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment yield and erosion rates were made in the following watershed:

a. Public Law PL-46, Conservation Operations

Major Drainage	Watershed	County	State
Home Fork of Green River	Alkali	Lincoln	Wyoming

LOWER COLORADO REGION

Bureau of Reclamation

A field examination of lower Santa Margarita River was made for the purpose of determining a data acquisition program to supply input to a sedhent transport model for evaluating the beach sand contribution of the river. The sediment transport analysis to be supplied by a contractor will be used in planning project operations.

Sediment studies were completed for cross drainages in Reach 2, Tucson Aqueduct. The 50-year sediment inflow estimates for the four cross-drainage reservoir areas impounded by protective dikes were completed and summarized. Trap efficiencies were included for the case where the invert of the cross-drainage structure is placed at the top of the sediment pool and for the case where the invert is placed at the original ground surface.

A scour study was made for the two drainage crossings of Reach 2, Tucson Aqueduct, where siphon structures were proposed. The recommended scour depths at the McCellan Wash station 608+60 and station 886+50 are 19 and 15 feet, respectively. The recommended scour depths are greater than normal for sand bed streams due to the high percentage of erodible silts and clays observed in the channel bed material of both washes.

Sediment distribution studies for feasibility designs for Buttes Reservoir, Middle Gila River, were completed for four alternative size structures for the 50- and 100-year sediment inflow. The structures considered were: (1) the 50-year sediment structure, (2) the 100-year sediment structure, (3) the lower dual purpose structure, and (4) the higher dual purpose structure.

LOWER COLORADO REGION

GEOLOGICAL SURVEY

Lower Colorado-Lake Mead Subregion

1. A comprehensive study of sediment transport through the Grand Canyon, Arizona was begun in July and ended in December. The study, in cooperation with the U.S. Bureau of Reclamation (BR), is to determine effects of Glen Canyon Dam on the river environment through the Grand Canyon National Park. Suspended-sediment, bed material and bed load were collected on a twice daily basis at the following sites:

Colorado River at Lees Ferry, AZ
Paria River at Lees Ferry, AZ
Colorado River above Little Colorado River near Desert View, AZ
Little Colorado River at Cameron, AZ
Colorado River near Grand Canyon, AZ
Kanab Creek near Fredonia, AZ
Colorado River above National Canyon near Supai, AZ
Colorado River above Diamond Creek near Peach Springs, AZ

2. Suspended-sediment data are being collected on a bimonthly basis at the following sites as part of the National Stream Quality Accounting Network (NASQAN):

Virgin River above Halfway Wash near Riverside, Nev.
Muddy River above Lake Mead near Overton, Nev.

3. Suspended-sediment data are being collected on a monthly basis at the following sites in cooperation with the U.S. Bureau of Land Management.

Las Vegas Wash near Henderson, Nev.
Las Vegas Wash near Boulder City, Nev.

4. Suspended-sediment data are being collected at North Fork Virgin River above Zion Narrows, near Glendale, Utah, in cooperation with the Utah Department of Natural Resources.

5. Suspended-sediment data are being collected monthly at Las Vegas Wash near Henderson, Nev., and twice-monthly at Las Vegas Wash near Boulder City, Nev., in cooperation with the BR.

Little Colorado Subregion

1. Suspended-sediment data are being collected on a daily basis in cooperation with the U.S. Corps of Engineers (COE) at Little Colorado River near Joseph City, Ariz.

2. Suspended-sediment data are being collected on a flow event basis at Leroux Wash near Holbrook, Ariz. in cooperation with the COE.

3. Suspended-sediment data are being collected on a bimonthly basis at Little Colorado River at Cameron, Ariz., as a part of NASQAN. Additional samples were collected from July to December as described in Item 1 of the lower Colorado-Lake Mead Subregion.

4. Suspended-sediment data are being collect on a monthly basis at Zuni River above Black Rock Res., N. Mex., in cooperation with the BR and at Rio Puerco at Gallup, N. Mex., on a semi-annual basis in cooperation with the New Mexico Interstate Stream Commission (NMISC).

Lower Colorado Subregion

1. Suspended-sediment data are being collected on a bimonthly basis as part of NASQAN at:

Colorado River below Hoover Dam, Ariz.
Bill Williams River near Planet, Ariz.

Upper Gila Subregion

1. Suspended-sediment data are being collected on a quarterly and storm-event basis at Mongollon Creek near Cliff, N. Mex. as a part of the National Hydrologic Benchwork Network.

2. Suspended-sediment data are being collected on a bimonthly basis at Gila River near Redrock, N. Mex., as part of NASQAN, and at San Francisco River near Glenwood, N. Mex. in cooperation with NMISC.

3. Suspended-sediment data are being collected on a bimonthly basis at Gila River at Calva, Ariz., as a part of NASQAN.

Middle Gila Subregion

1. Suspended-sediment data are being collected on a bimonthly basis as a part of NASQAN at the San Pedro River below Aravaipa Creek, near Mammoth, Ariz.

2. Suspended-sediment data are being collected on a monthly basis at Gila River at Kelvin, AZ. and San Pedro River below Aravaipa Creek, near Mammoth, Ariz. incooperation with the BR.

Salt Subregion

1. Suspended-sediment data are being collected on a monthly basis at Wet Bottom Creek near Childs, Ariz., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a bimonthly basis as a part of NASQAN at:

Gila River above diversions, at Gillespie Dam, Ariz.
Gila River near mouth, near Yuma, Ariz.

Sonora Subregion

1. Suspended-sediment data are being collected on a monthly basis as a part of NASQAN at the Vamori Wash at Kom Vo, Ariz.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
Federal Building
301 West Congress Street, FB-44
Tucson, AZ 85701

Nevada State Office Chief
Idaho-Nevada District
U.S. Geological Survey
Federal Building, R. 227
705 North Plaza Street
Carson City, Nevada 89701

District Chief, WRD
U.S. Geological Survey
505 Marquette NW, Room 720
Western Bank Bldg.
Albuquerque, NM 87102

District Chief, WRD
U.S. Geological Survey
Room 1016 Administration Building
1745 West 1700 South
Salt Lake City, UT 84104

LOWER COLORADO REGION

SOIL CONSERVATION SERVICE

1. Reservoir Sedimentation Surveys.

A reservoir sedimentation survey was made on the following reservoir:

Reservoir	County	State
Upper Gila Valley Arroyo, Watershed No. 1, Site 3	Grant	New Mexico

GREAT BASIN REGION

GEOLOGICAL SURVEY

Bear Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Bear River near Corinne, Utah, as a part of NASQAN.

Great Salt Lake Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Red Butte Creek at Fort Douglas, near Salt Lake City, Utah, as part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a quarterly basis at Weber River near Plain City, Utah and at Jordan River at Salt Lake City, Utah, as a part of NASQAN.

Escalante - Sevier Lake Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Sevier River near Lynndyl, Utah and at Beaver River at Adamsville, Utah, as a part of NASQAN.

Black Rock Desert-Humboldt Subregion

1. Suspended-sediment data are being collected bimonthly at the following sites as part of NASQAN:

Humboldt River near Carlin, Nev.
Humboldt River near Imlay, Nev.
Humboldt River near Rye Patch, Nev.
Quinn River near McDermitt, Nev.

2. Suspended-sediment data are collected periodically at Mahala Creek near Tuscarora, Nev., and Gance Creek near Tuscarora, Nev., as part of a cooperative program with U.S. Bureau of Land Management.

Central Lahontan Subregion

1. Suspended-sediment data are being collected at the following sites as part of NASQAN:

Walker River near Wabuska, Nev. (bimonthly)
Carson River near Fort Churchill, Nev. (quarterly)
Truckee River near Nixon, Nev. (quarterly)

2. Suspended-sediment data are being collected twice-yearly at the followirg sites in cooperation with the U.S. Army Corps of Engineers:

Martis Creek at Highway 267 near Truckee, Calif.
Martis Creek Lake near Truckee, Calif.
Martis Creek near Truckee, Calif.

Central Nevada Desert Basins Subregion

1. Suspended-sediment data are being collected quarterly at Steptoe Creek near Ely, Nev., and South Twin River near Round Mountain, Nev. as part of the National Hydrologic Benchmark Network.

Special Studies

1. A two-year study of the relationships between fluvial-sediment transport and planned erosion-control measures in Edgewood Creek, Lake Tahoe Basin began in October 1980. Data include streamflow, sediment, and plant nutrients.

2. A two-year study of the relations between fluvial-sediment transport and engineered rehabilitation of erosion in the First Creek basin of Incline Village, north Lake Tahoe, was begun in October 1979. Numerous data are being collected to evaluate effects of planned erosion-control measures in this urbanized basin. Data include sediment and nutrient concentrations and particle-size distribution of transported sediment.

3. A long-term, on-going statewide program of investigations of sediment and debris transport by flash floods continued during 1983. An intense flood on Ophir Creek near Carson City (Western Nevada) occurred on May 30, 1983. Sediment transport was probably the outstanding hydrologic characteristic of this flood. An interpretative report of this event is being prepared.

Several additional flash floods in Nevada were investigated, and data on sediment transport were obtained.

A long-term investigation of sediment and debris hazards related to flooding is in the second investigative year at the Nevada Test Site. Data were obtained for several runoff events in 1983; paleohydrologic studies of past floods are in integral part of this investigation. One report of findings is in preparation and more are planned.

For additional information about Geological Survey activities within this region, contact the following offices:

Nevada State Office Chief
Idaho - Nevada District
U.S. Geological Survey
Federal Building, Room 227
705 N. Plaza Street
Carson City, NV 89701

District Chief, WRD
U.S. Geological Survey
P.O. Box 1125
Cheyenne, WY 82003

District Chief, WRD
U.S. Geological Survey
1016 Administration Building
1745 West 1700 South
Salt Lake City, UT 84104

PACIFIC NORTHWEST REGION

Bureau of Reclamation

A sediment distribution was made for the 100-year sediment inflow to proposed Phipps-Meadows Reservoir resulting in an anticipated elevation of 4231 at the dam distributing the inflow estimate of 735 acre-feet by the Empirical Area Reduction Method.

A partial resurvey was completed on Black Canyon Reservoir on the Payette River near Emmett, Idaho. The purpose of the survey was to assess the sediment encroachment within the recreational area of the reservoir. The information gathered will be used to plan changes in structures and/or reservoir operations for preserving the recreational use of the reservoir. Twelve sediment ranges were resurveyed by means of an electronic depth sounder and a tethered-wire distance measuring device.

The delta and entrance channel to Spangler Reservoir on Mann Creek were examined following the large spring runoff which damaged recreational facilities in the delta area. Recommendations were made for some reshaping and riprap bank protection adjacent to the recreational area.

PACIFIC NORTHWEST REGION

CORPS OF ENGINEERS

North Pacific Division

Portland District

Mt. St. Helens, Cowlitz and Toutle Rivers Sedimentation Investigation. Sediment data collection/studies are being continued to define scour and deposition of debris from the eruption of the Mt. St. Helens volcano on 18 May 1980. The objectives are to provide guidelines for maintenance dredging for flood control and navigation purposes, and to provide basic sediment yield-transport data for possible sediment control projects.

a. A status report of sediment activities to 30 Sep 83 was written by the Sediment Section of the Portland District.

b. "Cowlitz River Sediment Sump Study, October 1983" was published (by Ogden Beeman & Associates for Portland District).

c. Sediment Studies on North Fork Toutle River continued with report due in June 1984 (by Oregon State University for Portland District).

d. "A Comprehensive Plan" for responding to the long-term threat created by the eruption of Mount St. Helens, Washington, was published 31 October 1983 by the Portland District.

Other Investigations. A limited number of bed material samples were obtained from various locations in the District to assist in planning navigation dredging projects.

Reservoir Sediment Ranges. The preparation of reports describing the sediment ranges established at Lost Creek and Applegate Reservoirs has been delayed due to the urgency of the Mt. St. Helens work. The date these reports will be completed is not known at this time.

Sediment Sampling. For flood control and dredging planning, suspended sediment and bed material were obtained at three sediment stations supported by the District for Mt. St. Helens debris monitoring purpose. At Kelso, WA on Cowlitz River, samples were taken weekly and the records on concentration, particle size, temperature maintained. At highway 99 bridge near Castle Rock, WA on Toutle River, samples were taken intermittently and the records on concentration, particle size, temperature maintained. At Castle Rock, WA on Cowlitz River, samples were taken weekly and the records on daily sediment discharge were maintained. This station is operated by U. S. Geological Survey.

Walla Walla District

Report on sedimentation activities in the District is as follows:

1. Willow Creek Lake. Sediment range surveys and monumentation were substantially completed by the end of the calendar year. Design Memorandum No. 6, Lake Sediment Ranges, was published in March.

2. Lower Granite Lake.

a. The HEC-6 computer sediment transport model was used to determine the long-term effect of sedimentation on the adequacy of the Lewiston Levee system. An interim report covering the results of this study will be released in early 1984. Studies are continuing on possible solutions and control measures for the sedimentation problems.

b. Lower Granite pool sedimentation ranges were resurveyed in 1983.

c. Hellsgate Marina. A gate at the downstream end of the marina was tested this spring and it appears to be reducing the sediment deposition in the marina. About 7,500 cubic yards of sediment were excavated from the marina in 1983. A condition survey was performed inside the marina in August.

3. Ice Harbor. About 12,500 cubic yards of sediment and debris were excavated from the Charbonneau Basin.

PACIFIC NORTHWEST REGION

GEOLOGICAL SURVEY

Kootenai-Pend Oreille-Spokane Subregion

1. Suspended-sediment data are being collected on a periodic basis from Pend Orielle River at international boundary and at Spokane River at Long Lake, Wash., as a part of the National Stream Quality Accounting Network (NASQAN).

2. Suspended-sediment data are being collected on a daily basis by a PS-69 at Kootenai River at Porthill, Idaho, as part of the U.S. Geological Survey waterways-treaty program.

3. Suspended-sediment data are being collected on a quarterly basis at Hayden Creek below North Fork, near Hayden Lake, Idaho, as part of the National Hydrologic Benchmark Network.

Upper Columbia Subregion

1. Suspended-sediment data are being collected on a bimonthly basis in cooperation with the Bureau of Indian Affairs at the following stations:

Teepee Creek near Polson, Montana
Mill Creek above Gassco Creek, near Niarada, Montana
Cromwell Creek near Niarada, Montana
South Fork Crow Creek near Ronan, Montana
Mission Creek above Reservoir, near St. Ignatius, Montana
South Fork Jocloo River near Arlee, Montana
Big Knife Creek near Arlee, Montana
Valley Creek near Arlee, Montana
Revais Creek below West Fork, near Dixon, Montana
Camas Creek near Hot Springs, Montana

2. Suspended-sediment data are being collected on a periodic basis at Columbia River at Northport, Wash., at Columbia River at Vernita Bridge, near Priest Rapids Dam, Wash., and at Okanogan River at Malott, Wash., as a part of NASQAN.

3. Suspended-sediment data are being collected on a periodic basis at Andrews Creek near Mazama, Wash., as a part of the National Hydrologic Benchmark Network.

4. Suspended-sediment data are being collected at the following sites as part of NASQAN:

Clark Fork below Missoula, Mont. (Bimonthly)
Flathead River at Flathead, British Columbia, Canada (Quarterly)
Flathead River at Columbia Falls, Mont. (Quarterly)

5. Suspended-sediment data are being collected on a quarterly basis at Columbia River at Richland, Wash., in cooperation with the U.S. Department of Energy.

Yakima Subregion

1. Suspended-sediment data are being collected periodically at Yakima River near Union Gap, Wash., and at Yakima River at Kiona, Wash., as part of NASQAN.

Upper Snake Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Cache Creek near Jackson, Wyo., as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a bimonthly basis at Snake River near Heise, Idaho, as a part of NASQAN.

Middle Snake Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Snake River at King Hill, Idaho, and Snake River at Weiser, Idaho, as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at Big Jacks Creek near Bruneau, Idaho, as a part of the National Hydrologic Benchmark Network.

Lower Snake Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Salmon River near White Bird, Idaho, and Clearwater River at Spalding, Idaho, as part of NASQAN.

2. Suspended-sediment data are being collected at Snake River at Burbank, Wash., as a part of NASQAN.

3. Suspended-sediment data are being collected on a periodic basis from M'nam River at Minam, Oreg., as a part of the National Hydrologic Benchmark Network, and from Owyhee River near Owyhee, Oreg., as part of NASQAN.

Middle Columbia Subregion

1. Suspended-sediment samples are being collected on a periodic basis at John Day River near McDonald Ferry, Oreg., and at Deschutes River near Biggs, Oreg., and bimonthly at Klickitat River near Pitt, Wash., as a part of NASQAN.

2. Suspended-Sediment data are being collected on a daily basis at White River below Tygh Valley, Oreg., in cooperation with Northern Wasco County Peoples Utility District.

Lower Columbia Subregion

1. Suspended-sediment data are being collected on a periodic basis at Columbia River at Warrendale, Oreg., and monthly at Lewis River at Ariel, Wash., and at Cowlitz River at Kelso, Wash., as a part of NASQAN.

2. Suspended-sediment data are being collected on a daily basis at Bull Run River near Multnomah Falls, Oreg., South Fork Bull Run River near Bull Run, Oreg., North Fork Bull Run River near Multnomah Falls, Oreg., and at Fir Creek near Brightwood, Oregon, in cooperation with the city of Portland, Oreg., to provide needed information to define the effects of activities in the basin.

Willamette Subregion

1. Suspended-sediment data are being collected on a periodic basis from Tualatin River at West Linn, Oreg., and at Willamette River at Portland, Oreg., as a part of NASQAN.

2. Suspended-sediment data are being collected on a periodic basis from Tualatin River near Dilleg, Oreg., in cooperation with the U.S. Bureau of Reclamation.

Oregon-Washington Coastal Subregion

1. Suspended-sediment data are being collected on a periodic basis at Rogue River near Agress, Oreg., Umpqua River near Elkton, Oreg., Siuslaw River near Mapleton, Oreg., Alsea River near Tidewater, Oreg., Nehalam River near Foss, Oreg., Chehalis River at Porter, Wash., Willapa River near Willapa, Wash., and at Queets River near Clearwater, Wash., as a part of NASQAN.

2. Suspended-sediment data are being collected on a quarterly basis at North Fork Quinault River near Amanda Park, Wash., as part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected on a biweekly basis from Applegate River near Copper, Oreg., in cooperation with the U.S. Corps of Engineers.

Puget Sound Subregion

1. Suspended-sediment data are being collected on a periodic basis at Elwha River at McDonald Bridge near Port Angeles, Wash., Skagit River near Mount Vernon, Wash., Snohomish River near Monroe, Wash., and at Puyallup River at Puyallup, Wash., as a part of NASQAN.

Oregon Closed Basins Subregion

1. Suspended-sediment data are being collected on a periodic basis at Donner and Blitzen River near Frenchglen, Oreg., as a part of NASQAN.

Special Studies

1. Collection of suspended-sediment data in streams near Mount St. Helens has continued since May 1980. Sediment data are presently collected at six sites in the Toutle River Basin, three in the Lewis River Basin, and one in the Cowlitz River, with the goal of quantifying and understanding the sediment system of many streams impacted by the 1980 eruption of Mount St. Helens. A network of automatic pumping sediment samplers has been installed at most sites along with conventional sampling equipment.

For additional information about Geological Survey activities within this region, contact the following offices:

District Chief, WRD
U.S. Geological Survey
230 Collins Road
Boise, Idaho 83702

District Chief, WRD
U.S. Geological Survey
847 NE 19th Avenue
Suite 300
Portland, Oregon 97232

District Chief, WRD
U.S. Geological Survey
P.O. Box 1125
Cheyenne, WY 82003

District Chief, WRD
U.S. Geological Survey
Federal Building
Drawer 10076
Helena, MT 59626

District Chief, WRD
U.S. Geological Survey
1201 Pacific Avenue, Suite 600
Tacoma, WA 98402

PACIFIC NORTHWEST REGION

SOIL CONSERVATION SERVICE

1. A determination of erosion and sedimentation yields was made in the following watersheds:

a. Public Law 566.

Major Drainage	Watershed	Stream	County	State
Snake River	Upper Sand Creek	Sand Creek	Bonneville	Idaho

2. Erosion and sediment delivery rates were estimated for the following river basins:

Major Basin	Basin Reported	State
Snake River	Clearwater River	Idaho
Columbia River	SE Washington (Snake River)	Washington

Measurements and estimates of roadside, gully and streambank erosion were made in the Washington study.

3. Non-Point Pollution Studies (PL-08).

a.

Subregion	County	State
Lower Snake	Malheur	Oregon

Demonstration plots were studied for erosion and sediment from furrow irrigated cropland in Malheur County, Oregon. The data are being evaluated and the study is being continued.

b.

Subregion	County	State
Mid-Columbia	Wasco, Sherman, Gilliam, Morrow, Umatilla	Oregon

Case studies are being carried out on at least two individual farms in each SWCD within the five-county area. These studies are for determination of erosion and subsequent impact of sediment on water quality by farming operations. These studies are ongoing.

c.

Subregion	County	State
Lower Columbia	Columbia	Oregon

RCWP-Solutions to Environmental and Economic Problems - STEEP (PL-08)

A study by Oregon State University was started in Columbia County, Oregon, in 1981 to evaluate the effects of tile drainage systems on erosion and sediment yields from croplands. This study was terminated in March 1983.

d.	Subregion	County	State
	Coastal	Tillamook	Oregon

RCWP - Tillamook Bay Drainage Basin (PL-08)

Effects of Best Management Practices (BMP's) are being monitored and evaluated for the basin. Evaluation of sediment yield and reduction from agricultural lands was completed for the basin in CY 1983.

Bureau of Reclamation

An analysis was made of the efficiency of the Tehama-Colusa Canal Settling Basin. The settling basin is trapping about 35 percent of the incoming sediment, including all sand size material. The existing deposits are not now affecting the basin trap efficiency nor are they expected to for several years. An 8-10 year period between basin dredgings would be typical for average hydrologic conditions. Average annual deposits of 12 acre-feet appear normal. The apparent reduction in deposit volume from spring to fall is most probably due to sediment compaction.

Cross drainage studies were completed for the crossings in Section 2 of the Hollister Conduit, San Felipe Dam, CVP. Water surface elevations were computed and plotted for the three computed flood discharges at each of the crossings. Using the hydraulic data and sampled sediment size gradations, scour depths were computed for the 100-year flood peak discharges.

CALIFORNIA REGION

CORPS OF ENGINEERS

South Pacific Division

Los Angeles District

Cooperative Stream Gaping Program. The following sediment stations are operated by the U. S. Geological Survey and supported by the district: Mill Creek near Yucaipa, CA; Santa Ana River at Mentone, CA; Santa Ana River at South of San Bernardino, CA; Little Colorado River near Joseph City and Holbrook, AZ. San Jose Creek at Goleta, CA is funded by contract with the USGS.

Office Activities

1. Completed Arizona Canal Diversion Channel (ACDC) Sedimentation Study. The sedimentation analysis will be included in the Phase II General Design Memorandum - Technical Appendixes report.

2. Completed short feasibility sediment transport studies for Loma Alta Creek and Los Coches Creek. The sedimentation analysis will be included as part of the hydraulic appendix in the San Diego County Streams Feasibility report.

3. Completed Hansen Dam Reservoir Sediment Yield Study. The sedimentation report is entitled "Hansen Dam Sediment Modeling Study - Impact of Water Supply Versus Flood Control Operational Modes on Sediment Deposition in Reservoir Area:". dated June 1983.

4. Completed Reservoir Sedimentation Study for proposed Mentone Dam as part of the Santa Ana River Phase II GDM. The sedimentation report is entitled, "Watershed Sedimentation Investigation for the Mentone Dam", dated September 1983.

5. Currently in progress on sediment transport studies for the Lower Santa Ana River as part of the Santa Ana River Phase II GDM and for the Little Colorado River near Holbrook, Arizona.

6. Initiated Plan of Study for Sedimentation Analysis in support of the Coast of California Storm and Tidal Study.

7. Initiated design of mitigation measures for sedimentation basins on Arizona Canal Diversion Channel.

Reservoir Sedimentation. "Sedimentation Data Summary" sheets for Prado Flood Control Basin and Auburn, Brace, Bradbury, Childs, Cloud Creek, Deer, Eagle, Fair Oaks, Fern, Gould, Hay, Lannan, La Tuna, Limekiln, Lincoln, Little Dalton, Morgan, Nichols, Rawley, Rubio, Santa Anita, Sawpit, Shields, Snover, Sunset (Lower) and Sunset (Upper) Debris Basins were completed.

Sacramento District

Suspended Sediment Sampling. Routine samples were collected and analyzed at locations below Black Butte, Pine Flat, Kaweah, Success and Isabella Lakes. Discharge record are maintained and published by U. S. Geological Survey. Periodic samples were collected from the Sacramento River at Bend Bridge including flow and temperature. Samples were also collected at three sites in Cottonwood Creek Basin.

Sediment Studies

1. Berryessa Creek, CA - Section 205 Project. The Berryessa Creek, California Project is a Section 205 (Small Projects) Flood Control Channel Project. Sediment Engineering (S.E.) activity included evaluating the impact of the project features on the sediment transport regime of the Creek and sizing of a sediment basin at the headwater of the proposed project channel.

2. Cache Creek, CA - C,P & E Study. The proposed project involves enlarging the outlet channel of Clear Lake in the upper part of the basin and enlarging an existing sediment basin in the lower basin. An S.E. investigation was initiated to evaluate project impacts on the Creek's channel morphology through Capay Valley, downstream of Clear Lake. A sediment monitoring program was initiated, including streamflow sediment gages at the upstream and downstream boundaries of Capay Valley and channel surveys and bed material sampling through the study reach.

3. Cottonwood Creek, CA - Phase I Studies. S.E. activity included an aerial photogrammetric survey of the confluence of Cottonwood Creek and the Sacramento River and a ground reconnaissance, both a continuation of annual monitoring of sediment inflows (particularly fish spawning gravels) into the River from Cottonwood Creek under "preproject" (before closure of the proposed dams) conditions.

4. Dry Creek (Sonoma County), CA - Construction. S.E. activity included drafting of a Scope-of-Work (S.O.W.) for an S.E. Investigation of Dry Creek, between the (recently closed) Warm Springs Dam and its confluence with the Russian River. This reach has a history of bank erosion and other sediment transport related problems. Before dam closure, some bank and bed stabilization works were authorized and constructed. The purpose of the S.E. Investigation is to determine project impacts on the sediment transport and channel morphology of the study reach and how best to proceed with future (if necesary) bank and/or bed stabilization works.

5. Morrison Creek, CA - Phase I/II GDM. An S.E. Investigation was intitiated to determine impacts of proposed flood control channels on channel morphology and sediment transport in project area, and to determine if any modifications are necessary to alleviate potential problems.

6. Sacramento River and Tributaries Bank Protection and Erosion Control Investigation (GI). Additional work and analyses were performed on the Sediment Budget of the Sacramento River in order to estimate project (comprehensive bank protection program) impacts on delivery of sediments to

the Delta area. A draft of the report on Sediment Transport Studies of the General Investigation was finalized.

7. Sacramento River Deep Water Ship Channel. An S.E. Investigation was initiated to determine the impacts on sediment transport and on shoaling in the ship channel of deepening of the channel from 30' to 35'.

San Francisco District

All stream gaging sedimentation activities in the District were conducted through mid-Calendar Year 1983 and were related to the construction of the Warm Springs Dam and Lake Sonoma Project on Dry Creek, a tributary to the Russian River. After July 1983, these activities became the responsibility of the Sacramento District as a result of re-organization within the Division. Activities consisted of collecting and analyzing sediment transport data at three locations of Warm Springs Dam. Sedimentation data, as well as turbidity levels, collected downstream of Warm Springs Dam are published in the U. S. Geological Survey water supply papers.

The sediment data which have been collected from Dry Creek and the lower Russian River were used to estimate impacts which may be attributable to the Warm Springs Dam Project. A draft report presenting the results of the study has been prepared. A final report will be completed when funds are made available.

The initial sedimentation range survey for the Warm Springs Dam and Lake Sonoma Project was conducted during Calendar Year 1983. A total of 43 survey ranges were established in the reservoir area, including permanent monumentation.

CALIFORNIA REGION

GEOLOGICAL SURVEY

North Coastal Subregion

1. Suspended-sediment and bedload data are being collected in Redwood National Park to evaluate the sediment transport rates caused by both natural processes and logging activities within the park. Data collection began in 1973 in cooperation with the National Park service. The Park Service is using this data to develop management practices that will reduce erosion rates. The current sampling network includes the following stations:

Redwood Creek near Blue Lake	(daily)
Redwood Creek above Panther Creek	(monthly)
Panther Creek near Orick	(monthly)
Coyote Creek near Orick	(monthly)
Redwood Creek above Harry Weir Creek	(storm-event)
Redwood Creek near Orick	(storm-event)
Redwood Creek at Orick	(daily)

2. Suspended-sediment data are being collected on the Hoopa Indian Reservation to determine the variation in sediment transport rates within the reservation and to use as a data base for comparison of transport rates with the forest areas adjacent to the reservation. The transport comparisons will be used by the Bureau of Indian Affairs to evaluate the impact of the timber harvesting and management practices within the reservation on the local fisheries. Estimates of bedload discharge are included in this study. Data collection began in the 1982 water year and includes the following stations:

Supply Creek at Hoopa	(daily)
Supply Creek near Hoopa	(storm-event)
Mill Creek at Hoopa	(storm-event)
Mill Creek near Hoopa	(storm-event)
Soctish Creek at Hoopa	(storm-event)
Pine Creek near Weitchtec	(storm-event)

3. Suspended-sediment data are being collect on a daily basis and bedload data on a periodic basis at Grass Valley Creek at Fawn Lodge near Lewiston and at Trinity River below Limekiln Gulch near Douglas City, in cooperation with Califronia Department of Water Resources and the Bureau of Reclamation, respectively.

4. Suspended-sediment data are being collected on a quarterly basis at Elder Creek near Branscomb, as part of the National Hydrologic Benchmark Network, and at Smith River near Crescent City, as part of NASQAN.

5. Suspended-sediment data are being collected on a bimonthly basis at Klamath River near Klamath and at Eel River at Scotia, as part of NASQAN.

Sacramento Basin Subregion

1. Suspended-sediment data are being collected on a daily basis and bedload data on a periodic basis at Thomes Creek at Paskenta and Stony Creek above Black Butte Lake near Orland, in cooperation with California Department of Water Resources (discontinued May 1983).

2. Suspended-sediment data are being collected on a daily basis at Feather River near Gridley, in cooperation with California Department of Water Resources, and at Sacramento River at Freeport, in cooperation with the Corp of Enginneers (COE).

3. Suspended-sediment data are being collected on a periodic basis in the Cottonwood Creek drainage basin to determine the sediment discharge rates at two perspective dam sites and near the mouth of Cottonwood Creek. Data collection began in the 1977 water year, in cooperation with the COE, and includes the following stations:

Cottonwood Creek near Orlinda	(discontinued)
Cottonwood Creek SF near Orlinda	(discontinued)
Cottonwood Creek near Cottonwood	

4. Suspended-sediment data are being collected on a periodic basis at Sacramento River above Bend Bridge near Red Bluff, in cooperation with the COE (discontinued).

5. Suspended-sediment data are being collected on a bimonthly basis at Sacramento River at Keswick, as part of NASQAN.

North Lahontan Subregion

1. As part of the Tahoe Monitoring Program, suspended-sediment data are being collected from eight streams that drain into Lake Tahoe. The relation of sediment discharge to algae growth in the lake is being studied by the University of California at Davis. The sediment data collection program is in cooperation with the California Department of Water Resources and includes the following daily sediment stations:

Upper Truckee River at South Lake Tahoe
General Creek near Meeks Bay
Blackwood Creek near Tahoe City
Ward Creek at Highway 89
Snow Creek at Tahoe Vista
Third Creek near Crystal Bay, Nev.
Edgewood Creek near Stateline, Nev.
Trout Creek near Tahoe Valley

2. Suspended-sediment data is being collected on a periodic basis at Martis Creek at Highway 267 near Truckee, Martis Creek Lake near Truckee and Martis Creek near Truckee, in cooperation with the COE; and at Sagehen Creek near Truckee, in cooperation with the University of California at Davis.

3. Suspended-sediment data is being collected on a bimonthly basis at Susan River at Susanville, as part of NASQAN.

San Francisco Bay Subregion

1. Suspended-sediment and bedload data are being collected in the Cull Creek and San Lorenzo Creek Basins to document sediment transported into Cull Creek and San Lorenzo Creek Basins to document sediment transported into Cull Creek and Don Castro Reservoirs, respectively, and to test erosion control procedures. Data collection began in the 1979 water year, in cooperation with Alameda Country Flood Control and Water Conservation District, and includes the following stations:

San Lorenzo Creek above Don Castro Reservoir near Castro Valley	(daily)
Cull Creek above Cull Creek Reservoir near Castro Valley	(daily)
Cull Creek Tributary No. 4 above CC Reservoir	(storm-event)

2. Suspended-sediment data is being collected on a daily basis and bedload data on a periodic basis at Pena Creek near Geyserville and Dry Creek near Geyserville, in cooperation with the COE.

3. Suspended-sediment data are being collected on a daily basis at Russian River near Guerneville, in cooperation with the COE.

4. Suspended-sediment data are being collected on a bimonthly basis at Napa River near Napa, as part of NASQAN.

San Joaquin Basin Subregion

1. Suspended-sediment data are being collected on a daily basis at San Joaquin River at Vernalis, in cooperation with the California Department of Water Resources.

2. Suspended-sediment data are being collected on a daily basis at Mokelumne River at Woodbridge, as part of NASQAN, and at Merced River at Happy Isles Bridge near Yosemite, as part of the National Hydrologic Benchmark Network.

Central Coastal Subregion

1. A resurvey of Loch Lomond Reservoir in the San Lorenzo River Basin in Santa Cruz County was completed in August 1982. The survey was undertaken following landslides and sediment deposition related to the January 1982 storm events. Results of the survey and bed core samples that were taken during the survey will be completed in 1984.

2. Suspended-sediment data are being collected on a daily basis at Arroyo Seco near Greenfield, in cooperation with Monterey County Flood Control and Water Conservation District, and at San Jose Creek at Goleta, in cooperation with the COE. Monthly estimates of bedload discharge are also made at San Jose Creek.

3. Suspended-sediment and bedload data are being collected on a periodic basis at San Antonio River near Lockwood, in cooperation with Monterey County Flood Control and Water Conservation District.

4. Suspended-sediment data are being collected on a periodic basis at Nacimiento River near Bryson, in cooperation with Monterey County Flood Control and Water Conservation District.

5. Suspended-sediment data are being collected on a bimonthly basis at Salinas River near Chular and on a quarterly basis at Pajaro River at Chittenden, as part of NASQAN.

Tulare Basin and South Lahontan Subregions

1. Suspended-sediment data are being collected on a bimonthly basis at Kings River below NF near Trimmer and Kern River at Kernville, and on a quarterly basis at Owens River near Big Pine, as part of NASQAN.

South Coastal Subregion

1. Previously existing sediment data are being used to estimate long-term sediment discharge in the Ventura River Basin. The role which major flood events play in determining the magnitude and frequency of sediment transport in this basin is of particular interest to the California Department of Boating and Waterways, who are cooperators on this project. This project is expected to be completed in 1984.

2. Suspended-sediment data are being collected on a daily basis at San Diego Creek at Culver Drive near Irvine, San Diego Creek at Campus Drive near Irvine and at Peters Canyon Wash near Irvine to test the trap efficiency of two siltation basins located in the lower reaches of San Diego Creek Basin. Estimates of bedload discharge at the San Diego Creek at Campus Drive and Peters Canyon Wash stations and periodic surveys of the siltation basins are included in this study. The sediment discharge and survey data along with an assessment of factors controlling sediment yield within the basin will be used by the cooperator, City of Newport Beach, to effectively manage factors which may have detrimental impacts on the physical and biological habitat of Newport Bay. Data collection began in the 1983 water year.

3. Suspended-sediment data are being collected on a daily basis and monthly estimates of bedload discharge are made at Santa Clara River at Montalvo, in cooperation with Ventura County PWA and California Department of Boating and Waterways, and at Santa Ana River at Santa Ana, in cooperation with Orange County Environmental Management Agency.

4. Suspended-sediment data are being collected on a daily basis at San Juan Creek at San Juan Capistrano, in cooperation with Orange County Environmental Management Agency, and at Santa ana River near Mentone and Santa Ana River near San Bernardino, in cooperation with the COE.

5. Suspended-sediment data are being collected on a twice-monthly and storm event basis at Mill creek near Yucaipa, in cooperation with the COE, and at Santa Ana River below Prado Dam, in cooperation with Orange County Environmental Management Agency.

6. Suspended-sediment data are being collected on a periodic basis, in cooperation with California Department of Boating and Waterways, at the following stations:

Ventura River near Ventura	
San Luis Rey River at Oceanside	
Las Flores Creek near Oceanside	(discontinued)
Santa Margarita River at Ysidora	(discontinued)
Los Penasquitos Creek near La Jolla	(discontinued)
San Diequito River near Del Mar	
San Onofre Creek at San Onofre	(discontinued)
San Marcos Creek near La Costa	(discontinued)
San Mateo Creek at San Onofre	

7. Suspended-sediment are being collected on a quarterly basis at Los Angeles River at Long Beach and Santa Clara River at Los Angeles-Ventura County Line, as part of NASQAN.

Colorado Desert Subregion

1. Suspended-sediment data are being collected on a quarterly basis at Alamo River near Calipatria and on a bimonthly basis at New River near Calexico, as part of NASQAN.

For additional information about Geological Survey activities within this region, contact the following office:

District Chief, WRD
U.S. Geological Survey
2800 Cottage Way
Sacramento, CA 95825

CALIFORNIA REGION

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determinations of sediment yields were made in the following watersheds:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
St. Johns and Kaweah River	Woodlake-Antelope	Antelope Creek	Tulare	California
Calleguas Creek	Lower Calleguas Creek	Calleguas	Ventura	California
San Lorenzo Creek	Cull Canyon	Cull Canyon	Alameda	California

b. River Basin Investigations

Spanish Grant Drainage District - Stanislaus County, California:

The study to determine effects of conservation practices on erosion was completed.

Northern Monterey County

A short duration study to determine erosion and sedimentation rates on agricultural lands located on steep hillsides comprised of weakly indurated, shallow soils on ancient sand dunes was completed.

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were completed on the following reservoirs:

Reservoir	County	State
Mustang	Merced and Stanislaus	California
Matanzas	Sonoma	California

ALASKA REGION

GEOLOGICAL SURVEY

Arctic Slope Subregion

1. Suspended-sediment data are being collected on a periodic basis at the Kuparuk River near Deadhorse, Alaska, as part of the National Stream Quality Accounting Network (NASQAN).

Yukon Subregion

1. A cooperative study with U.S. Corps of Engineers (COE) to collect and evaluate sediment-transport and river hydraulic data in the Tanana River near Fairbanks, Alaska, was completed in 1983. Suspended-sediment and bedload data were collected in the Tanana River at six sites near Fairbanks, Alaska. The COE has used these data in the design and operation of engineering structures on the Tanana River and the regulation of the quarrying of gravel from the river in the vicinity of Fairbanks, Alaska.

Report: Burrows, R. L., and Harrold, P. E., 1983, Sediment Transport in the Tanana River near Fairbanks, Alaska, 1980-81: U.S. Geological Survey (USGS), Water Resources Investigation Report 83-4064, 116 p. Harrold, P. E., and Burrows, R. L., 1983, Sediment transport in the Tanana River near Fairbanks, Alaska, 1982: USGS Water Resources Investigations Report 83-4213, 52 p.

2. As part of the Federal Program Energy Water Resources Division, a study to determine the Concentration and distribution of trace metals in the Healy Creek and Lignite Creek basins was completed in 1982. Suspended-sedimert and bed-material samples were collected at the following sites:

Healy Creek near Usibelli, Alaska
Healy Creek 0.1 mile above French Gulch near Usibelli, Alaska
Healy Creek near Suntrana, Alaska
Sanderson Creek 0.8 miles above Lignite Creek near Usibelli, Alaska
Frances Creek 100 feet above Lignite Creek near Suntrana, Alaska
Lignite Creek 0.5 miles above mouth near Healy, Alaska

Report: Parks, Bruce, 1983, Trace Metals in Surface Waters and Stream Sediments of Healy and Lignite Creek Basins, Alaska, USGS Survey Water Resources Investigation Report 83-4173, 26 p.

3. A cooperative study with the Alaska Department of Natural Resources and the U.S. National Park Service was initiated in 1983. The objectives of the study are to document the hydraulics of flow, channel-bed composition, and channel morphology downstream from placer-mined areas.

Data were collected on several streams in the Kantishna Hills area of Denali (formerly Mt. McKinley) National Park and Preserve, on Birch Creek near Fairbanks, and on Sixmile Creek near Hope, on the Kenai Peninsula.

4. Suspended-sediment data are being collected on a periodic basis at the Yukon River at Pilot Station, Alaska, as a part of NASQAN.

5. Suspended-sediment data are being collected periodically at the Tanana River at Nenana, Alaska, as part of NASQAN.

Southwest Subregion

1. Suspended-sediment data are being collected on a periodic basis at Nushagak River at Ekwok, Alaska, and at Kuskokwim River at Crooked Creek, Alaska, as part of NASQAN.

South-Central Region

1. A suspended-sediment data program funded by Alaska Power Authority, as part of their evaluation of the proposed Watana and Devil's Canyon hydroelectric power sites, was continued through 1982. Suspended-sediment data are being collected on a periodic basis at Chulitna River near Talkeetna, Alaska, Susitna River near Denali, Alaska, Susitna River near Gold Creek, Alaska, Susitna River near Talkeetna, Susitna River near Cantwell, Alaska, and at Susitna River at Sunshine, Alaska. Bedload data were obtained at various sites on the Chulitna, Susitna and Talkeetna Rivers near Talkeetna and the Susitna River at Sunshine.

2. As part of the continuing program with the Municipality of Anchorage, the collection of suspended-sediment samples was initiated in 1982 at the sites in the Chester Creek basin.

These data will be used in the identification of water-quality problems and calibration of existing water-quality runoff models which the Municipality of Anchorage developed during the "208" water quality management program.

3. Suspended-sediment data are being collected on a periodic basis at Talkeetna River near Talkeetna, Alaska, as part of the National Hydrologic Benchmark Network.

4. Suspended-sediment data are being collected on a periodic basis at Susitna River at Susitna Station, Alaska, and at Copper River near Chitina, Alaska, as a part of NASQAN.

5. Suspended-sediment data are being collected on a miscellaneous basis at the following sites:

Willow Creek near Willow, Alaska
Deception Creek near Willow, Alaska
Yentna River near Susitna Station, Alaska

Southeast Subregion

1. As part of the cooperative program with the U.S. Forest Service, suspended-sediment data are being collected on a periodic basis at the following sites:

Hamilton Creek near Kake, Alaska
Rocky Pass Creek near Point Baker, Alaska
Greens Creek near Juneau, Alaska
Kadashan River above Hook Creek near Tanakee, Alaska

2. The cooperative study with the Alaska Department of Environmental Conservation on the hydrology and water quality of the Keta River basin near Ketchikan was continued in 1982. Suspended-sediment data are being collected at the following sites:

Keta River below Red Creek near Ketchikan
Hill Creek above White Creek near Ketchikan
White Creek near Ketchikan
Hill Creek near mouth near Ketchikan
Keta River near Ketchikan
Beaver Creek near Ketchikan
Blossom River near Ketchikan

3. Suspended-sediment data are being collected on a periodic basis at the Stikine River near Wrangell, Alaska, and at Skagway River at Skagway, as part of NASQAN.

4. A cooperative study with the Alaska Department of Natural Resources, to describe the hydrologic system of the Chilkat River basin near the Tsirkn River fan, was begun in 1981. Suspended-sediment samples are being collected at the following sites:

Chilkat River near Klukwan, Alaska
Klehini River near Klukwan, Alaska
Tsirken River below fan near Klukwan, Alaska

For additional information about Geological Survey activities within this region, contact the following office:

District Chief, WRD
U.S. Geological Survey
1515 East 13th Avenue
Anchorage, AK 99501

HAWAII REGION

GEOLOGICAL SURVEY

Hawaii Subregion

1. Suspended-sediment data are being collected on a bimonthly at Honolii Stream near Papaikou, Hawaii, as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected bimonthly at Wailuku River at Hilo, Hawaii, as a part of NASQAN.

Maui Subregion

1. Suspended-sediment data are being collected on a bimonthly at Kahakuloa Stream near Honokohau, Maui, as a part of NASQAN.

Molokai Subregion

1. Suspended-sediment data are being collected bimonthly basis at Halawa Stream near Halawa, Molokai, as a part of NASQAN.

Oahu Subregion

1. Suspended-sediment data are being collected at the following sites:

Waikele Stream, Waipahu, Oahu, on a daily basis as part of the Federal CBR program.

Kalihi Stream, at Kalihi, Oahu, bimonthly as a part of NASQAN.

Kamooalii Stream near Kaneohe, Oahu, on a daily basis in cooperation with the U.S. Corps of Enginners.

Moanalua Stream near Aiea, Oahu, on a periodic basis in cooperation with the City and County of Honolulu, Department of Public Works.

Right Branch of Kamooalii Stream near Kaneohe, Oahu, on a daily basis in cooperation with Hawaii State Department of Transportation.

North Haiawa Stream near Honolulu, Oahu, on a daily basis in cooperation with Hawaii State Department of Transportation.

Kauai Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Waimea River at Waimea, Hawaii, as a part of NASQAN.

For additional information about Geological Survey activities within this region, contact the following office:

District Chief, WRD
U.S. Geological Survey
P.O. Box 50166
300 Ala Moana Boulevard, Room 6110
Honolulu, HI 96850

CARIBBEAN REGION

GEOLOGICAL SURVEY

Puerto Rico Subregion

1. Suspended-sediment data are being collected on a bimonthly basis when flow is above normal at 54 sites in cooperation with the Puerto Rico Environmental Quality Board (PREQB).

2. Suspended-sediment data are being collected on a bimonthly basis at the following sites as a part of NASQAN:

Río de la Plata at Toa Alta, P.R.
Río Grande de Manatí near Manatí, P.R.
Río Grande de Anasco near San Sebastián, P.R.
Río Grande de Patillas near Patillas, P.R.

3. Suspended-sediment are being collected on a weekly basis and during high flows near Utuado, P.R., in cooperation with PREQB.

4. Suspended-sediment are being collected on a daily basis at Río Fajardo near Fajardo, P.R., in cooperation with the Army Corps of Engineeers (COE).

Special Studies

1. Suspended-sediment are being collected on a weekly basis and during high flows at the following sites in cooperation with PREQB, COE, P.R. Department of Natural Resources (PRDNR), and P.R. Aqueduct and Sewer Authority (PRASA) in order to estimate the sediment load contribution from some sub-basins to Lago Loíza, a water supply reservoir:

Quebrade Salvatierra near San Lorenzi, P.R.
Quebrade Caimito near Juncos, P.R.
Quebrada Maney near Guarbo, P.R.
Río Turabo Borinquen, P.R.

2. Suspended-sediment are bing collected on a daily basis at the following sites in cooperation with PREQB, PRASA, PRDNR, and COE in order to determine the sediment load at these three proposed dam sites:

Río Cayaguas at Cerro Gordo, P.R.
Río Valenciano near Juncos, P.R.
Río Grande de Loíza at Quebrada Arenas, P.R.

3. Suspended-sediment are being collected daily at the following sites in cooperation with PREQB, PRDNR, PRASA, and COE in order to estimate the total sediment input to Lago Loí reservoir:

Río Grande de Loí at Caguas, P. R.
Río Gurabo at Gurabo, P.R.

For additional information about Geological Survey activities within this region, contact the following office:

District Chief, WRD
U.S. Geological Survey
G. P. O. Box 4424
San Juan, P.R. 00936

LABORATORY AND OTHER RESEARCH ACTIVITIES

ARIZONA

Research activities at the Southwest Rangeland Watershed Research Center in Tucson, Arizona include the following:

1. Sediment samples collected at a headcut on Walnut Gulch were compared to headcut volume changes determined from periodic topographic surveys. Data indicated that upland areas and headcut each contributed about 25% of the total sediment load, with channel banks contributing the remaining 50%. Erosion data from rangeland plots were used to develop a rangeland cover-management factor for the USLE, which is based on a subfactor approach, and quantified important seasonal changes. Water erosion and control methods, including detachment by raindrops and transport in runoff, have been described. Physically-based analytic processes involved in water erosion and methods to control or alleviate such problems are presented. For a specified flow rate, properties of channel width, depth, velocity, gradient, and roughness often are related to discharge by empirically developed power functions. Equations differ from previously derived power functions by incorporating variable exponents dependent on shear-stress distribution along the channel section. Variable exponents permit consideration of an entire range of natural channel geometries, including those of very wide braided channels that otherwise could not be described adequately by power functions. Derivation of these exponents is based on the continuity equation, Manning equation, and equation for shear-stress distribution expressed in terms of channel width-depth ratios employed as surrogates for channel sediment characteristics and shear-stress distribution.

2. Estimating soil erosion effect on soil productivity is essential for agricultural decision making and resource utilization planning from individual fields to the national level. In the process of making assessments of the status of soil, water, and air resources, one of the most difficult tasks has involved assessing erosion effect on long-term soil productivity. A simulation model, EPIC (Erosion Productivity Impact Calculator), has been developed which considers physically-based components for simulating hydrology, erosion, plant growth, and related processes and economic components for assessing erosion cost with optimal management strategies. The hydrology model portion includes the CN runoff model of SCS. The CN are made dynamic by considering soil root zone moisture changes. The model was used to make comparisons for a rangeland area in Arizona, as well as on most of the 11 major crops encountered in geographic areas of the U.S. Upland and lowland arroyo development, livestock population reductions, abandoned farmland acreages, and shrub invasions indicate that land abuse has had a major effect on rangeland and cropland productivity, especially in southestern Arizona. Physically-based models which describe processes known to affect soil productivity have promise for quantifying how erosion affects soil productivity. Research planned and conducted in concert with such models can greatly reduce the number of sites upon which experiments are needed to quantify spatial variability encountered in rangelands.

For additional information contact Kenneth G. Renard, Research Leader, USDA-ARS, Western Region, 2000 E. Allen Road, Tucson, AZ 85719.

GEORGIA

Research activities at the Southern Piedmont Conservation Research Center, Watkinsville, Georgia include the following:

1. A cooperative agreement was established between the Soil Conservatior Service, University of Georgia's Geography Department and the Agricultural Research Service. The project involves the development and testing of photogrammetric techniques for monitoring soil erosion, especially ephemeral gully erosion. The possibilities for using photogrammetric procedures to make accurate measurements on sequential photographs of small study sites subject to channel, bank, and gully erosion have been demonstrated. Recently the research has concentrated on mapping study sites of 1 to 10 acres from aerial photographs obtained at very low altitudes with 70 mm format non-metric cameras and 23 cm format metric cameras. Flights were made over a 10-acre study site and maps were constructed with both analog and analytical platters. Results to date indicate the feasibility of plotting large scale maps with contours intervals of 15 to 30 cm. The methodologies being developed show considerable promise for a range of applications, including the development of quantitative information on soil erosion, which can be utilized in the establishment of predictive models.

2. High residue producing crops that include a cool season legume provide potential to reduce runoff and soil erosion in the Southeast. Grain sorghum has been no-tilled into Crimson clover residues on the Southern Piedmont Conservation Research Center's P-1 Watershed for the past 3 years. The Crimson clover provided a dense canopy during winter-spring months when rainfall exceeded evapotranspiration and supplies adequate quantities of biologically fixed nitrogen to produce economic, unirrigated, grain sorghum yields. Runoff was less than 1% annually, and this usually occurs only during February and March. No runoff occurred during the vulnerable high energy rainfall season experienced on the Southern Piedmont.

For additional information contact Adrian W. Thomas, Research Leader, USDA-ARS, Southern Piedmont Conservation Research Center, P. O. Box 555, Watkinsville, GA 30677.

USDA-ARS, Southeast Watershed Research Laboratory

South Atlantic Area, Tifton, Georgia

Research activities at the USDA-ARS Southeast Watershed Research Laboratory in Tifton, Georgia include the following:

1. Sediment deposition in the riparian zone of a Coastal Plain agricultural watershed was estimated for the last 100 years, the period of agricultural development within this region. Sediment deposition was estimated by (1) measuring depth to argillic horizon on transects from fields to streams; (2) estimating 100-year upland erosion using the Universal Soil Loss Equation (USLE) and climatic, as well as historic land use and cropping information; (3) radiometric dating to estimate the age of deposited materials. Using these techniques, the average annual rate of sediment deposition in the riparian zone of this Coastal Plain watershed was estimated at 35 to 52 $Mg \cdot ha^{-1} \cdot yr^{-1}$. This amounts to an annual deposition rate of 0.22 to 0.32 cm per year within the riparian zone over the last 100 years.

2. Total solids (dissolved plus suspended components) in streamflow from Coastal Plain watersheds averaged 91.5 mg/l for 1974-1978. Concentrations were lowest during the December-May high streamflow period. Mean suspended sediment concentrations were 15-30 mg/l (1978-1981). Available data indicate that suspended sediment is a minor component of total solids in streamflow from Coastal Plain watersheds, with dissolved solids being the major component (approximately two-thirds) of total solids transported in streamflow.

For additional information contact Loris E. Asmussen, USDA-ARS, Southeast Watershed Research Laboratory, P. O. Box 946, Tifton, GA 31793

IDAHO

Research activities at the Northwest Watershed Research Center, Boise, Idaho, include the following:

1. The Reynolds Creek Outlet station (3660 ft. elevation) runoff in 1983 was 7.04 inches, the second highest of record, compared with the 1964-82 mean of 3.14 inches. However, the peak streamflow was only 335 ft^3/sec, compared with a mean of 836 ft^3/sec. The water year suspended sediment yield was about 22,000 tons or 0.38 tons/acre, compared with a mean of nearly 14,000 tons or 0.24 tons/acre. Suspended sediment yields from Reynolds Tollgate and Reynolds Mountain watersheds were 0.57 and 0.15 tons/acre, respectively, about 75 percent above average.

2. Erosion and sediment yield studies on the Reynolds Creek Experimental Watershed were reviewed and 1967-82 data were summarized for a Comprehensive Report on ARS-BLM cooperative studies.

3. Results of 1982 rainfall simulator studies for application of the USLE on Reynolds Creek, Idaho, and Saval Ranch, Nevada, sagebrush rangelands were prepared for publication. Also, data were analyzed for preparation of a paper on the Modified Universal Soil Loss Equation for Reynolds Creek watersheds.

4. A Measuronics System II was used to analyze aerial photos for determining USLE 'C' factor values on study areas. The density slicing techniques provided estimates of percent bare ground and vegetation cover by identifiable species. Experimentation with different filters, film types, and photo scales is continuing. Research is needed in calibrating digital data from photographs to field vegetation transect data for a wide range of conditions.

5. Stream channels on three small watersheds in Reynolds Creek were sampled and surveyed to determine sediment particle sizes and bed slope, width, depth, and roughness; as required for testing the sediment component of SPUR (Simulation of Production and Utilization of Rangelands) on these sagebrush rangeland watersheds.

For additional information contact Clifton W. Johnson, Hydraulic Engineer, USDA-ARS, 270 South Orchard, Boise, ID 83705

INDIANA

Research activities at the National Soil Erosion Laboratory, West Lafayette, Indiana include the following:

1. Since the cost of surface mining coal is now divided about 40% for mining and 60% for reclamation, miners consider it essential that regulations both state and government are realistic. They feel that undue restrictions on their methods of reclaiming soil can add to the cost and make coal non-competitative with other fuels. A rainfall simulator was used to determine how erosion from these disturbed soils compares to that from undisturbed ones, and whether similar predictive methods can be used, namely the Universal Soil Loss Equation (USLE). It was found that the nature of the soil material and some of its characteristics (silt content, stoniness) gave a good indication of whether or not its erodibility could be predicted by criteria used in the USLE. High silt soils usually exceed the predicted erodibility. Above 10%, the USLE slope factors predicted higher erosion than that found in the study. Below 10%, they compared favorably.

2. The uplands in the Iowa and Missouri Deep Loess Hills are characterized by loess-mantled hills and loess-derived alluvial fill drainageways. Because of the differences in mode of deposition and particle size, the mechanical behavior of the upland, loessial soils and the bottomland, alluvial soils differs. The loess had a lower clay content, a lower plastic index, greater conpressibility, and lower cohesion than the loess-derived alluvium. Fabric studies revealed that clay in the loess occurred predominately as grain coatings, while in the alluvium, it had been redistributed in the erosion/sedimentation process and served to bind the particles together. These differences in mechanical properties and soil fabric are manifested in the rate of gully growth in loess which greatly exceeds the rate in alluvium for equal amounts of water flow over the gully headcut.

3. Although soil loss from the nearly level, high clay soils of portions of the Maumee River Basin is low, and well within soil loss tolerence limits, the resulting fine sediments are a major source of pollution both the Maumee River and Lake Erie. Although ridge-tillage systems on these heavy, poorly drained soils provide a warmer, dryer seedbed improved crop production and allow more timely equipment operation soil loss apppears to be higher than on conventionally tilled fields. A rainfall simulator study was run in the summer of 1983 to measure relative soil loss from moldboard plow and disk, no-till ridges and a bare ridge system. Soil loss, runoff rates, and total and soluble phosphorous were measured for each tillage system. Soil loss from newly formed bare ridges was approximately 35% larger than for moldboard plow and disk. However, soil loss from no-till ridges formed 2 years earlier was one fifth of that for moldbord plow and disk. Soil loss from ridges where corn residue was placed only in the furrow area was approximately the same as that where corn residue covered both the ridge and furrow area. Ridge tillage, where crop residue is left uncovered by soil in the furrow area, appears to be a useful method to extend the erosion control benefits of no-till to nearly flat, poorly-drained soils.

4. Generalized natural and regional assessments show that erosion is excessively degrading some U.S. cropland. In a particular field, erosion is often so spatially nonuniform that on local areas it can be several times the average for the field. Furthermore, deposition occurs in many fields, though on much smaller areas than does erosion, maintaining or perhaps improving yield to offset losses on the eroding areas. Since yield loss is nonlinearly related to erosion and deposition, average erosion rate for a field may poorly indicate yield loss for the field as a whole. This exploratory study showed that landform, spatial variation in the erosion and deposition, and nonlinearity between yield loss and erosion and deposition do significantly affect the accuracy of erosion/crop yield assessments. Future analytical assessment methods need to estimate and integrate erosion, deposition, and yield over the landscape. Also, research data are needed on how deposition areas tend to offset yield losses on eroding areas and how long the benefits of deposition continue as quality of the deposited sediment degrades over time with upslope erosion.

5. Only a fraction of the soil eroded from sloping lands is transport flowing water into lakes or streams. The rest is deposited at the of slopes, in terrace channels, grassed waterways, or at the edge fields. Since almost no data are available for shallow flow conditions, river sediment transport theory has been used to predict transport and deposition within field-sized areas. To test the adequacy of current theory and generate data sets suitable for a shallow flow transport equation development, a laboratory experimeent was constructed in which deposition of sediment eroded from cohesive soil was studied on a concave-shaped bed under overland flow-like conditions. Several findings differ from conventional concepts of river transport theory: rainfall increased transport capacity and reduced deposition, more fine sediment was deposited, and more large soil aggregates were transported. These data will be quite useful for developing and testing methods used in productivity, sediment yield and off-site damage and water quality impact studies to estimate deposition and sediment yield on field sized areas.

6. USDA-Agricultural Research Service is developing the second generation of CREAMS, (Chemical Runoff & Erosion from Agricultural Management Systems), a model widely used by USDA-Soil Conservation Service and others to evaluate nonpoint source pollution from fiel sized areas. The new model, called CREAMS2, will be more powerful easier to use, more accurate, and in general, a better model than the original CREAMS. New erosion equations were developed for CREAMS2 that allow erosion, sediment transport, deposition, and sediment yield to be computed at several points in space and time during a runoff event. Also, equations were developed for the erosion/sediment yield component of CREAMS2 to allow tracking of daily soil and plant conditions to significantly improve erosion estimates on a storm by storm basis and allow easier input of data into the model. The structure of CREAMS2 was developed for application to a broad range of topographies and surface configurations. CREAMS2 is nearing completion, and is almost ready for extensive testing.

7. The Universal Soil Loss Equation is widely used by the USDA-Soil Conservation Service and other action and regulatory agencies to estimate erosion to evaluate the impact of erosion on soil productivity, nonpoint source pollution, and downstream sedimentation. It's last major update was published in 1978. Since then, much new information on estimating erosion related to conservation tillage, forest land, terracing, topography, soil-plant factors, and rainfall erosivity in the West has been developed and should be included in guideline manuals for application of the USLE (Universal Soil Loss Equation). The USDA-Agricultural Research Service (ARS) in close cooperation with USDA-Soil Conservation Service (SCS) has begun updating the USLE and Agriculture Handbook 537, the main USLE guideline manual. This work is being done by an ARS erosion prediction committee with assistance from several ARS and university scientists. Specific areas of improvement and development of the USLE have been identified, and work has started on the update. Also, SCS has provided a liaison position at the ARS National Soil Erosion Laboratory, West Lafayette, Indiana. An initial draft of the revised handbook is planned for Fall, 1984

8. To evaluate the influence of erosion on soil productivity, a project was initiated to develop a procedure by which yields and other data could be collected by field people and processed at a central location. This procedure has been developed and will give the oportunity for people such as Soil Conservation Service technicians to collect data from a large number of sites across the U.S. The data base so developed can be used to verify models assessing the effect of erosion on soil productivity. Data has been collected during the years of 1981, 1982, and 1983 on three Indiana soils. These show considerable reduction in yields of sites treated exactly the same but with severe erosion compared to slight and moderate. Individual differences in corn yield were 40 bushels in several cases, soybean yield reductions were on the order of 7 or 8 bushels.

For additional information, contact William C. Moldenhauer, Research Leader, USDA-ARS, National Soil Erosion Laboaratory, Purdue University, West Lafayette, IN 47907.

U. S. DEPARTMENT OF AGRICULTURE-ARS

IOWA

Research activities at the Watershed Research Unit in Treynor, Iowa, include the following:

1. Soil erosion and sediment yield measurements and associated hydrologic investigations were continued on 4 field-size watersheds near Treynor, 2 fifteen-acre subwatersheds, and six fractional-acre areas. The erosion effectiveness of a till-plant system of continuous corn has been conclusively demonstrated; sediment yields from till-plant fields of 150 and 107 acres in western Iowa average less than 10 percent of soil movement from fields with minimal conservation practices such as field contouring.

For additional information contact Allen T. Hjelmfelt, Jr., Research Leader, USDA-ARS-NCR, Watershed Research Unit, 207 Business Loop 70 East, Columbia, MO 65203.

MARYLAND

Research activities at the Hydrology Laboratory in Beltsville, Maryland include the following:

1. The determination of sediment accumulation rates of the last 30 years is important in understanding how these materials are affecting lakes and reservoirs ecosystems. In this study three methods were used to estimate sediment accumulation rates along the upper Mississippi River. The three methods were: 1) a "spud" survey; 2) a survey of bottom contours; and 3) the use of fallout cesium-137. The field use of these three methods of determining sediment accumulation and the potential errors and merits involved in each method are discussed. The results from the field study in backwater areas along the upper Mississippi River showed the survey of bottom contour method gave the lowest rate of sediment deposition and the ^{137}Cs method gave the highest rates. Sediment accumulation rates between 0 to 7.8 cm per year were measured in the study area. All three methods are useful and have unique characteristics for determining rates and patterns of sediment accumulation, thus the choice of a method to be used in a sediment survey is dependent on the type of information needed and the time available.

2. Suspended sediments are a major problem in agricultural impoundments around the world. The increased spatial resolution of Landsat-4 Thematic Mapper (TM) can provide conservation agencies a means to monitor water quality in small agricultural impoundments and thus to determine watersheds with erosion problems. This study was made to determine if Landsat TM data could be used to estimate surface suspended sediment loads in lakes. A comparison was made between TM and ground data collected from Lake Chicot, Arkansas. The anaylses indicates that TM bands 1,2,3, and 4 contained information related to the surface suspended sediment concentrations. TM band 3 data had the highest linear correlation with surface suspended sediments. TM bands 4,5, and 7 can be used to discriminate water from land. These preliminary analyses of limited TM and ground data would indicate that a system could be developed to monitor small agricultural impoundments and determine if there were suspended sediment problems. This study also indicated that quantitative estimates of surface suspended sediments should be possible from TM data.

For additional information contact Albert Rango, Chief, Hydrology Laboratory, USDA-ARS, Bldg. 007, BARC-West, Beltsville, MD 20705

MINNESOTA

NORTH CENTRAL SOIL CONSERVATION RESEARCH LABORATORY

1. Sediment size and density analyses continue as part of all erosion studies. Aggregate stability of soils under forces of impacting drops compared to flowing water is being measured. High speed photography is being used to relate drop impact on vegetative canopy to changes in drop velocity, kinetic energy, and water intake properties of soil beneath the canopy.

2. Effects of microbial activity and soil OM on aggregate stability and soil and nutrient losses are being studied on corn-soybean and wheat-sunflower rotations. Total and water soluble OM and microbial respiration rates are being measured. Residue bags were placed at depths of 0, 4, and 8 inches for biweekly retrieval for 6 months to study rate of residue decomposition.

3. Depressional storage volumes were calculated from microrelief data for over 1000 plots. Equations were developed relating volume and surface area of depressions to slope steepness and random roughness. A relation was developed between precipitation excess and slope steepness and random roughness.

3. A total of 15.2 cm of water was applied without raindrop impact energy to 4 freshly tilled soils. Random roughness degraded to a relatively constant value about 0.5 cm below initial values. Bulk density increased 0.1 g/cm^3 to 0.2 g/cm^3. Hydraulic conductivity decreased from 3.0 cm/hr to 8.9 cm/hr. Regression equations were developed to predict these changes.

4. Two models to assess the water quality impacts of agricultural watersheds are approaching the final stages of development. One is designed for watersheds from 500-23,000 acres in size, while the other deals with 1 to 500 acre watersheds.

For additional information contact Charles A. Onstad, Director, USDA-ARS-NCR, North Central Soil Conservation Research Laboratory, North Iowa Avenue, Morris, Minnesota 56267 (Phone 612/589-3411).

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

MISSISSIPPI

1. Cropping and management (C) values for use in the USLE were derived by cropstage and annual periods for no-till, no-till plant and cultivate, and conventional-till cotton. Soil loss from conventional-till averaged over 90 t/ha/yr in contrast to previously measured soil loss of 19 and 16 t/ha/yr from soybeans and corn, respectively. Conservation tillage reduced soil loss about one-seventh of that from continuous conventional tillage for cotton.

2. Beneficial effects of conservation tillage were seen in the comparison of plots conventionally tilled after 11-yr of no-till and conventionally tilled after 11-yr of conventional-till. The no-till history reduced erosion by 47%, reduced runoff from 48% to 35% of the rainfall, and increased seed cotton yield about 20 percent.

3. C-factors for use in the USLE were measured from no-till (NT), no-till plant and cultivate (RT), NT and RT soybean-wheat double-crop, and conventional till (CT) soybeans. Compared to conventional till: NT reduced soil loss 92% for monocrop soybeans and 97% for double-crop; and RT reduced soil loss 57% for monocrop soybeans and 87% for double-crop. Computed C factors for the treatments were about one-fifth of those computed using soil loss ratios given in Agricultural Handbook 537.

4. Sediment yield from a 259-ha watershed in the Mississippi Delta was 5.3 t/ha/yr. Sixty-seven percent of the sediment yield occurred during March, April and May. Particle size of the sediment yield was 98% less than 0.016 mm; most of the sediment lost from the watershed was clay.

5. Wheat straw residue in 1.0 m^2 pans was subjected to simulated rainfall. Leachate (runoff) was sampled as a function of time, and analyzed for PO_4-P, NH_4-N, NO_3-N and TOC. In one study, the straw loading rate was held constant at 4.5 $t \cdot ha^{-1}$. In another study, the straw loading rate varied from 2 to 9 $t \cdot ha^{-1}$ and rain intensity held constant at 25 $mm \cdot h^{-1}$. At each intensity and loading rate, 25.4 mm of rain was applied. As the straw loading rate increased the concentrations and losses of PO_4-P, NH_4-N, and TOC increased; in contrast, as rain intensity increased, the concentrations and losses of these nutrients decreased. During individual rainfall events, nutrient concentrantions increased relatively rapidly to maximum concentrations in runoff and then decreased with time on runoff. For both the intensity and loading rate studies the runoff weighted concentrations of PO_4-P, NH_4-N, NO_3-N, and TOC ranged from 0.56 to 3.52, 0.10 to 0.46, 0.11 to 0.51, and 32.48 to 105.20 $mg \cdot L^{-1}$, respectively. The quantity of nutrients ($mg \cdot m^{-2}$) leached from the

wheat straw followed the order TOC > PO_4-P > N (NH_4-N + NO_3-N). One percent or less of N or TOC were leached from the straw compared with 8 to 43% for P. Knowledge of nutrients leached from crop residues will aid in understanding nutrient cycling in agricultural systems, and in developing small watershed chemical transport models.

6. A comprehensive study of the Karman coefficient in open-channel flow is being started. This research will be a collaborative effort between the USDA Sedimentation Laboratory and the Center for Computational Hydroscience and Engineering of the University of Mississippi. In this research, numerical magnitudes of Karman coefficients and other velocity profile characteristics will be investigated in open-channel flows over boundaries of many different roughness magnitudes and types.

7. Hydraulic model studies are being continued to develop more economical designs for low drop structure stilling basins. Results from these studies have shown that rectangular shaped straight sides for the stilling basin is as effective as circular shapes. Length of the stilling basin has the most pronounced influence upon effective energy dissipation and width of basin has little effect. Field structures with these new design criteria will be evaluated.

8. Studies of the valley-fill sequence were continued. These units comprise most of the channel bed and bank materials in the study area and full definition of their properties and distribution is prerequisite to understanding channel behavior. Seven lithologic units of Holocene age have been identified including: (1) post-settlement alluvium, (2) meander-belt alluvium, (3) channel fill, (4) massive silt, (5) bog-type materials, (6) unconsolidated gray silt, and (7) channel lag deposits. In addition, several pre-Holocene deposits have been sampled, but at this time are poorly defined. The chronology and relative lithologies of these units from the loess region are consistent with the valley-fill deposits over most of northern Mississippi. This valley-fill sequence is comparable with sequences for other sections of the United States and is coherent with Holocene paleoclimatic conditions. The strength characteristics of individual units of this sequence are being evaluated using down-hole shear test equipment.

9. Channel morphology in Goodwin Creek is extremely variable. There are narrow, completely canopied reaches; there are wide, straight reaches with more or less braided flow; narrow and wide, slightly sinuous reaches; and a few reaches with sinuous, greatly enlarged and rapidly growing bendways. In the long run, erosion of the bed and banks throughout the system is largely controlled by properties of the boundary materials and vegetation, and in the short run, flow characteristics and sediment transport are largely controlled by event

size and conveyance morphology. In an effort to determine whether or not these apparent controls are systematic, and therefore somewhat predictable, 94 flood stage crest gages were installed in 1981 in a 3.86 km reach of lower Goodwin Creek. Reach input is measured by four supercritical flumes and reach hydrographs are recorded by two other such flumes. The channel topography has been mapped in detail and 30 cross-sections in the reach are being resurveyed quarterly. Because damage to the system from winter and spring flood events prevented system repair until late May 1983, and because near drought conditions prevailed throughout the summer and fall, records obtained in 1983 were minimal. Earlier preliminary data analysis, however, indicates progressive increases of mean average velocity with stage in straight reaches but in bends the mean average velocity peaks and then decreases up to 60% as stages continue to rise.

10. Selected channel cross sections of a 3.86 km reach of Goodwin Creek in southeastern Panola County, Mississippi, were periodically resurveyed from November 1977 through June 1983. Rates of channel enlargement were strongly correlated with bank and bed material lithology, but short-term changes were highly stochastic. Banks composed of early-Holocene deposits were relatively stable but often failed in polygonal blocks after bank toe removal. Banks composed of late-Holocene deposits were more erodible and gravity-induced slab-failures followed loading and tension-crack development. Within individual reaches, channel changes were highly variable. Extremes ranged from scour of 116 metric tons per meter of channel length to fill of 23.7 metric tons per meter. However, on the average, the net erosion of the channel bed and banks in the study reach during the 5.5 year period produced the equivalent of about 21.5 metric tons of sediment from every meter of channel length in the reach.

For additional information contact Neil L. Coleman, Laboratory Director, P. O. Box 1157, Oxford, Mississippi 38655; telephone 601-234-4121.

U. S. DEPARTMENT OF AGRICULTURE-ARS

MISSOURI

Research activities at the Watershed Research Unit in Columbia, Missouri, include the following:

1. Differences in soil and water losses between continuous corn and continuous soybean cropping for conventional, field cultivation, and no-till methods of tillage were evaluated from a 7-year study conducted on a claypan soil in north-central Missouri. Differences between measured cropping and management (C) factors as used in the Universal Soil Loss Equation and the C factors in Agricultural Handbook 537 were also evaluated. Cropping differences in soil and water losses were evaluated for five seasonal periods based upon cultural operation dates and amount of ground cover. Average annual soil loss from soybeans was significantly higher ($p < 0.05$) than that of corn for each of the three tillage methods. Seasonal periods having the largest cropping differences in soil loss were period F (rough fallow), period P12 (30 to 60 days after planting), and period P4 (fall harvest to spring tillage). Annual C factors for soybeans were about 2-fold higher than those for corn. Measured C factors were consistently lower than those presented in Agricultural Handbook 537.

2. Methods for estimating concentrations of soil-derived dissolved and labile P in runoff were proposed and tested. Methods are based on the assumption that most labile P contributed by soil to runoff is derived from soil particles that are detached and transported with runoff water. Effects of erosive selectivity are accounted for by dividing soil and sediment into five undispersed size fractions and separately treating the movement of each. Methods of estimation were tested with runoff from 14 natural rainstorms occurring on 10 fallow plots. For most events, estimated concentrations agreed well with observed values.

3. Cropping and tillage effects on runoff, soil, and P losses were investigated on a set of instrumented erosion plots on a claypan soil. Crops investigated were corn and soybeans, and tillage methods used were conventional, chisel plow, and no-till. Results for four rainfall events during May and June, 1983, generally showed greater soil loss for soybeans than corn for all tillage methods. However, the majority of differences among treatments could be explained by differences in surface residue cover. The mean weight diameter of eroded aggregates was lower for no-till and chisel plow corn than for conventional corn in most cases. No effect of tillage method on the size of eroded aggregates was observed for soybeans. Dissolved P losses in runoff were higher for no-till than for chisel plow and conventional treatments. Differences in labile P losses among treatments paralleled those for soil losses except for no-till treatments. The latter showed disproportionately greater labile P loss, suggesting enrichment of sediments due to a finer size distribution of eroded soil particles and/or P contributions from residues. Treatment effects on runoff were inconsistent.

For additional information contact Allen T. Hjelmfelt, Jr., Research Leader, USDA-ARS-NCR, 207 Business Loop 70 East, Columbia, MO 65203.

NEBRASKA

Research activities of the Soil and Water Conservation Research Unit at Lincoln, Nebraska, include the following:

1. Eight water- and sediment-control basins at two locations with design capacities for 24-hour, 2-, 5-, and 10-year frequency events were evaluated for water volume and sediment trapped on a Crofton-Nora soil in northeast Nebraska. These observations were for 6 years of corn, 2 years of sorghum, and 1 year of oats. Samples of the sediment discharged from the basins through the riser and underground outlet compared to the amount trapped in the basin showed as much as 98% sediment-trapping efficiency. Generally, the basin structures were overdesigned. Basin design capacity could probably be decreased if appropriate management practices were used to minimize runoff and thereby decrease sediment movement into the basins. A maintenance program to remove sediment is required to maintain the design capacity.

2. The statistical performance of several raindrop detachment relations was evaluated using data available from the literature. The rainfall parameter which provided the best statistical fit was found to be kinetic energy times unit of drop circumference. This relationship incorporates both raindrop diameter and velocity as variables. For the case of raindrops falling at terminal velocity, impact velocity was written as a function of raindrop diameter and, therefore, eliminated in the detachment equation. From information available in the literature on the drop size distribution of natural rainfall at varying rainfall intensities, an equation relating soil detachment to rainfall intensity was obtained.

For additional information, contact James F. Power, Research Leader, USDA-ARS, University of Nebraska, Keim Hall, Lincoln, NE 68583-0915.

OHIO

Research activities at the North Applachian Experimental Watershed near Coshocton, Ohio include small reclamation and erosion plot studies, and the study of the impacts of surface mining on sediment concentrations.

1. Erosion plots having topsoil and no topsoil (spoil), four slopes, and supporting no vegetation showed that the plots with the spoil surface generally yielded higher runoff volumes, peak flows, and soil losses than topsoil plots. Runoff volume was not statistically significantly affected by soil type or slope. The effect of soil type on peak flow was of borderline significance, but slope did not affect peak flow. Soil loss from these plots was significantly affected by soil type, spoil plots yielding more soil. Slope was not found to be significant in explaining the variation in soil losses.

2. Reclamation plots (0, 1, 2, tons/acre of mulch, and vegetated) showed that 1 and 2 tons/acre of mulch significantly reduced soil losses as compared to vegetated plots without mulch. The decrease in soil loss from the 2 tons/acre plots was of borderline significance when compared to the 1 ton/acre plots.

3. Three small watersheds (each about 40 acres in size) were monitored for hydrologic and sediment parameters before and during mining, and after reclamation. The sediment data showed drastically increased erosion on the watersheds during active mining and reclamation. At one site, erosion control measures were effective enough to return the concentrations back to premine levels. At two of the watersheds, "final" reclamation not completed during the monitoring period - some diversions and dry dams remained which were removed after the monitoring period. Average sediment concentrations during the active periods were on the order of 10,000 mg/l and the maximum concentrations were on the order of 100,000 mg/l. The hydrology of the watersheds was still changing at the end of the monitoring period.

For additional information contact James V. Bonta, Research Hydraulic Engineer, USDA-ARS, North Appalachian Experimental Watershed, P. O. Box 478, Coshocton, Ohio 43812.

OREGON

Research activities at the Columbia Plateau Conservation Research Center in Pendleton, Oregon include the following:

1. Runoff and soil erosion data has been collected from plots located in farmer-operated fields throughout five northeastern Oregon counties in dryland wheat production, for the past 5 years. The data are now being summarized and continue to show that frozen soils and snowmelt are key factors in runoff and soil erosion events. Although the 1983 winter was unusually mild, 38 percent of the observed runoff events involved frozen soils. Data from 4 complete erosion seasons were used as input to a physically-based snowmelt model. Model results, verified by the field data show that condensation melt, associated with the intrusion of warm, moist Pacific air masses, is one of the major mechanisms responsible for accelerated snowmelt. If frozen soils are present, infiltration rates are generally very low resulting in large soil losses. Since bordered erosion plots seldom reflect the severity and distribution of erosion on field sized areas, we are planning to use land based and aerial photography combined with computer image analysis techniques to measure and characterize rill erosion, macro and microtopographic features, random roughness, surface residue and green cover. This approach could result in a rapid and accurate procedure for estimating rill erosion on field sized areas.

2. Runoff and erosion data from 6 years of operation of the Kirk permanent erosion site has been summarized. Although precipitation has been above normal for 5 of the 6 years of site operation, both runoff and erosion have been much less than expected or predicted with the USLE. Frequency analyses of the fallow plot erosion data show that the erosion regime is dominated by numerous small events with large soil loss events a rarity. The largest yearly soil loss from the wheat-pea plots averaged 4.25 tons per acre and essentially no erosion occurred in two of the six years. Forty-four percent of the total six year erosion was the result of a single two day event occurring in December 1977. Large runoff and soil loss events at this site are probably associated with relatively rare combinations of meteorologic and hydrologic conditions. Observed C factors for the wheat-pea rotation have been extremely low; about 5 times smaller than the value recommended by SCS for MLRA B-9. These observations are in agreement with older data from the Pullman plots and more recent evidence. Since most of our wheat and pea residue is incorporated by plowing and October seeded winter wheat provides insufficient cover over winter, the data suggest that incorporated residue is much more important in a runoff dominated erosion regime than was previously suspected. All versions of the USLE were used to calculate predicted erosion both on the Kirk plots and using 10 years of Horner's (1943 Pullman) fallow plot data. All versions seriously overpredict erosion both for the Kirk fallow and wheat-pea rotation plots

and for the old Pullman fallow plot. Even though close agreement is obtained by using the observed C factor for the rotation plots, the overestimation of the fallow plot erosion and the interaction of all terms in the USLE points out the serious inadequacy of using this method in this climatic regime. Our limited experience with the results of tillage compaction suggests that this factor may be one of the primary reasons for observed interfield erosion variability. This area of investigation certainly requires much more research effort in the Pacific Northwest. The evidence strongly suggests that continued operation of the Kirk plots with the present rotation should be terminated. However, the continuous fallow plots which have been in operation for 7 years, would offer the opportunity to determine the effects of surface residue and crop cover on runoff and erosion. Also, the wheat-pea rotation plots could be used to study the effects of various degrees of compaction on runoff and erosion.

3. Monitoring of weather variables, solar radiation and soil temperatures in conjunction with erosion plots has been continued. Available data covers the winters of 1980 through 1984 in 5 counties of northeastern Oregon. Testing of a soil frost simulation model (Cary, 1982) has continued using portions of this data base. The model simulates the presence or absence of soil frost correctly about 80 percent of the time. National Weather Service data tapes containing the necessary input variables are also being used as model input variables for key stations in northeastern Oregon. From model results we expect to be able to develop probability distributions of soil frost for various aspects, slopes and weather conditions.

4. Soil temperatures and soil frost were monitored in 6 treatments of tillage and residue management at the Pendleton station. Results from the fall plowed and the no-till treatments show that frost penetration was three times greater in depth and frozen layers were present twice as long in the fall plowed system. In order to further quantify the influence of tillage and residue management on the development of soil frost, a field experiment involving five tillage and residue management treatments was initiated in the fall of 1983. Frost depth and duration will be determined from soil temperature sensors and frost tubes. We expect this 2 year experiment to reveal differences in frost depth and duration associated with different tillage and residue managements if differences do exist. A similar experiment involving 3 treatments of overwinter wheat stubble is being conducted on a 27 percent slope in Wascoe County, Oregon.

For additional information, contact John F. Zuzel or R. R. Allmaras, USDA-ARS, P.O. Box 370, Pendleton, Oregon, 97801.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
Southern Plains Area

Research activities at the Grassland, Soil and Water Research Laboratory in Temple, Texas include:

The EPIC model was refined and tested with more than 200 data sets. Adequate validation was accomplished and the model is now considered ready for use in the 1984 RCA analysis. An equation was developed for computing the soil erodibility factor based on soil texture and organic carbon content. Previously the soil erodibility factor was input to EPIC for the top soil only. The new equation provides better estimates of the soil erodibility factor as the top soil is eroded and the subsoil is exposed.

For more information contact Jimmy R. Williams, Hydraulic Engineer, USDA-ARS, P. O. Box 748, Temple, TX 76503.

AGRICULTURAL RESEARCH SERVICE

WASHINGTON

The following research is being conducted by the Land Management and Water Conservation Research Unit at Pullman, Washington:

1. A portable, photographically recording rill meter has been used to measure soil loss from rills from selected field sites in eastern Washington and northern Idaho at the end of the erosion season. The purposes of the study are to determine (1) the effect of slope length and steepness on soil loss, and (2) the variation of soil loss across the climatic belts of eastern Washington and northern Idaho. The results from this study, initiated in 1973 and concluded in 1983, have been used in developing a second generation adaptation to the Pacific Northwest of the Universal Soil Loss Equation.

2. Runoff plots have been installed on fields in eastern Washington on various crop treatments including conventionally tilled, conservation tilled, and direct stubble seeded winter wheat, and various primary tillages of wheat stubble. The purposes are (1) to determine the effect of crop treatments on (a) runoff, (b) soil loss, and (c) nitrogen and phosphorous in runoff water; (2) determine the effect of slope length on relative magnitudes of sheet and rill erosion; (3) determine the effect of certain conservation practices on runoff and erosion; and (4) determine potential for residue harvesting for biomass conversion processes. Instrumentation includes frost depth gages to determine the effect of crop treatment on frost depth and subsequent runoff and erosion following periods of frozen soil.

3. A crop management factor evaluation model has been developed for use in the adaptation of the Universal Soil Loss Equation to the Pacific Northwest. The model considers such factors as surface residue, tillage operations, vegetative cover, and soil moisture content prior to and during the winter erosion season.

4. A sediment transport and delivery rate study was conducted on a 27.1 square mile watershed. A PS-69 automatic pump sampler, located near a USGS gaging station, was used to collect suspended sediment samples. Several channel cross sections were measured before and after the erosion season to estimate the amount of channel aggradation or degradation and are used with upland erosion and valley deposition measurements and estimates to calculate delivery ratio. Data from the study are also being used to determine sampling frequency requirements for streams in agricultural watersheds of the Palouse. The field study was concluded at the end of water year 1980. Data analysis is underway.

For additional information, contact Donald K. McCool, USDA-ARS, Agricultural Engineering Department, 219 Smith Engineering Building, Washington State University, Pullman, WA 99164-6120.

LABORATORY AND OTHER RESEARCH

Bureau of Reclamation

A field test was made in the Fort Morgan Canal system of the prototype automatic pumping sediment sampler (PS-82). Comments were provided on the design and operation of the sampler to the project laboratory for modification of the sampler.

A technical guideline on procedures for Computing Degradation and Local Scour was issued for use by Reclamation in the planning and design river control structures.

Testing and revisions of the water-sediment routing model, developed under contract with Colorado State University, were continued. Verification of the sediment transport portions of the model were begun.

Computer programs were developed for Reclamation use which combine non-linear regression analysis and graphical representation to develop sediment rating curves.

A computer program was developed which models a settling basin with varying inflow conditions and, if desired, solves for an unknown basin dimension (either length, width, or depth).

A 1:18 scale model of Yellowtail Afterbay Dam was used to determine the source and how sediment migrates into the stilling basin. The results are being analyzed to determine the best method of preventing abrasion of the concrete basin surfaces.

Scour down tests at different discharges were made with sediment placed at crest elevation of a ramp flume water measuring device. The results are to be used with previous tests of individual particle escape elevation on the ramp and with physical and computer simulation of level deposits ahead of the crest. The results will be used to determine when sediment deposits cause significant error of water measurement and when cleaning is required.

Pilot model studies of the nature and modes of erosion on small earth-fill dams during overtopping flow were performed. Analysis of these studies will be used to help determine whether further detailed phyical model studies of crest, toe, and/or midbank protection schemes are feasible within constraints of model scaling capability.

Laboratory studies of pumping and transporting calcium carbonate slurry were completed.

CORPS OF ENGINEERS

The Hydrologic Engineering Center

The Hydrologic Engineering Center has been very actively providing technical assistance to Corps District offices who are dealing with sediment problems. The HEC participated in ten different sediment-related District studies. Several special projects reports, technical documents and other publications were published in 1983 documenting HEC's technical assistance activities. These studies included work for six District offices, four Divisions and OCE.

Several sediment investigations, initiated in 1983, are continuing into 1984. They include studies to evaluate possible project-related sediment problems on the Arkansas River in Colorado, the Santa Ana, Sacramento, and San Joaquin Rivers in California, and numerous creeks and smaller watercourses in California, Nevada, Utah, and Arizona.

Recently, HEC has begun an investigation for FEMA and the Omaha District to evaluate landslide, debris flows and mud flooding problems in the Wasatch Mountains in Utah. The purpose of this study is to develop methods for predicting occurrences of mud/debris flows and for estimating their impacts on local flooding for flood insurance purposes.

Work at HEC continues to focus on the maintenance and improvements of the mathematical model HEC-6, "Scour and Deposition in Rivers and Reservoirs." HEC is also developing task-specific utility routines designed to help Corps personnel to evalute sediment and hydraulic problems.

Conceptual design of a new one-dimensional fluvial hydraulics numerical model was begun and specific software engineering tasks identified.

CORPS OF ENGINEERS

Waterways Experiment Station

Title of Study:

Fine-Grained Shoaling in Navigation Channels

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

The Fine-Grained Shoaling in Navigation Channels study is a portion of the Improvements of Operations and Maintenance Techniques (IOMT) research program. This study was begun in FY 82. The objective of the study is to develop the capability to define the dynamic behavior of fine-grained sediments such that navigation channel shoaling can be predicted more accurately and more effective rememdies can be designed. Accomplishments during calender year 1983 include:

a. Flume tests to define the vertical structure of suspended sediments under various flow rates.

b. Flume tests to define rates of deposition or suspension for various flow rates.

c. Procurement of laboratory equipment for definition of fall velocity.

d. Procurement of laboratory equipment for determination of flow characteristics.

Future efforts will include additional work in defining settling velocity, deposition and erosion processes, bed consolidation, and field and laboratory methods to measure significant parameters. Rheology of suspensions, originally thought to be a significant task area, does not appear to warrant a very large effort under this work unit; however, the decision to exclude this task will be delayed for at least a year.

Title of Study:

Improved Dredging Methods

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

The Improved Dredging Methods project is a portion of the Improvement of Operations and Maintenance Techniques (IOMT) program, funded by the Office, Chief of Engineers. The objective of the project is to investigate potential improvements in existing maintenance dredging methods in support of COE Civil Works missions. The project was begun in October 1982. Accomplishments during calender year 1983 include:

a. Performance of a series of tests comparing wear and flow properties of high density polyethylene and steel pipe carrying sand slurries.

b. Publication of a report summarizing physical and operating characteristics of portable hydraulic dredges.

Future work will include laboratory investigations into energy requirements for high density slurry transpot, investigations of flexible dredge hose with integral flotation, and development of methods for measuring sediment volumes in dredge hoppers, and input to ER 1130-2-307, Dredging Policies and Practices.

Title of Study:

Sedimentation Engineering Manual

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

A draft of the EM was assembled.

Title of Study:

Advance Maintenance for Entrance Channels

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

The Advance Maintenance for Entrance Channels study is a unit of the Improvement of Operations and Maintenance Techniques (IOMT) program, funded by the Office, Chief of Engineers. The objective of the study is to develop rational criteria for the use of advance maintenance dredging, i.e., overwidth and/or over depth dredging, for entrance channels by evaluating the effect of depth and width on dredging frequency. A literature survey to determine the state of the art was conducted. Corps-dredged entrance channels have been identified, and those to which advance maintenance is applied have been so designated. Specific projects have been analyzed to determine the effect of

channel depth and width on dredging frequency and volume. The analysis was conducted using an empirical technique based on historical dredging records. The analysis of selected advance maintenance projects in the Portland District was completed. Accomplishments during 1983 include the following:

a. The analysis of selected advance maintenance projects in the Galveston and Savannah Districts were completed.

b. The analysis of selected projects in the Wilmington, Norfolk, and Mobile Districts were continued.

c. An ETL on present available analytic and empirical techniques for predicting the effect of advance maintenance and dredging requirements was completed.

d. An ETL draft describing a new empirical technique for predicting the effect of advance maintenance on dredging requirements developed from this study continued.

e. A TR describing the evaluation of advance maintenance effectiveness for specific entrance projects has been initiated.

Future work includes completion of the analysis of advance maintenance entrance project, particularly overwidth project, publication of the ETL describing an empirical approach to the prediction of advance maintenance effectiveness, and publication of the TR describing the results of the evaluation of specific advance maintenance projects.

Title of Study:

Principles of Channel Alignment on Navigable Alluvial Rivers, Phase I

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

This study is the first phase of a broad-based, long-range, state-of-the-art study to determine the principles of natural stream tendencies with regard to channel alignment. The study is divided into phases with the exact scope of each phase based on the results of preceding phases. Phase I includes (a) review of published literature, (b) analysis of prototype data, and (c) development and checking of hypotheses for natural channel alignment for varying conditions. Phase II will involve laboratory investigations to validate hypotheses developed in Phase I. This research is necessary to develop criteria to ensure the most economical and stable alignment for navigation channels.

An ASCE specialty conference entitled Rivers '83 was held in New Orleans on 24-26 Oct 83. Contributions by renowned researchers in the field of river meandering were invaluable, and selected papers are being integrated into

development of a hypothesis. This conference enabled WES to meet and discuss the theories of river meandering and to bring the subject up-to-date at virtually no cost to the government. Results of the first phase of this study are expected to be included in Chapter 9 of Navigation Channel Stabilization EM in FY 86.

Title of Study:

Stable Flood Control Channel Design (Improvements)

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

Guidance for the design of stable flood control channels to be used by design offices at the Corps of Engineers is being developed. Guidance on selective clearing and snagging for flood control was prepared for addition to Hydraulic Design Criteria (HDC). A contract draft report on guidelines for preliminary hydraulic design of stable channels was also prepared.

Title of Study:

Improved Numerical Procedures for Deep Draft Channels

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

Work to produce a 2-D/3-D system of computer programs for water and sediment movement was initiated. The finite element computer codes were developed and testing initiated. Other work on computer programs for such studies was monitored.

The TABS-2 numerical modeling system used extensively at WES, was enhanced substantially, and is being released in draft form to Corps of Engineers offices in February 1984.

Title of Study:

Mathematical Modeling of Three-Dimensional Coastal Currents and Sediment Dispersion: Model Development and Application

Conducted for:

Office, Chief of Engineers

Water Resources Region:

South Atlantic - Gulf

Location:

Mississippi Sound

Summary of Accomplishments:

A comprehensive model of coastal currents and sediment dispersion has been formulated and applied to the Mississippi Sound and adjacent continental shelf waters. The study combines mathematical modeling of various hydrodynamic and sedimentary processes with laboratory and field experiments. Of primary importance is the development of an efficient and comprehensive three-dimensional finite-difference model of Coastal, Estuarine, and Lake Currents (CELC3D). The model resolves currents driven by tide, wind, and density gradient. It has been applied to the Mississippi Sound, and results agree well with measured surface displacements and currents during two episodes.

Rates of entrainment and deposition of the Mississippi Sound sediments have been studied in a laboratory flume. Effects of (1) bottom shear stress, (2) bed properties, (3) salinity of water, and (4) sediment type on the erodability of sediments have been examined. Results of the laboratory study have been incorporated into the bottom boundary conditions for a three-dimensional sediment dispersion model. Gravitational settling and particle size distribution of the Mississippi Sound sediments were also studied in laboratories.

Bottom boundary layer dynamics and wave effect on sediment dispersion have been studied by means of a turbulent transport model and a wave model. Model simulations of sediment dispersion in the Mississippi Sound agree well with available data from ship surveys.

A final report (TR CERC-83-2) on the model development and application to Mississippi Sound was published in September 1983.

Title of Study:

Oregon Inlet Shore Processes Numerical Model

Conducted for:

U. S. Army Engineer District, Wilmington, N. C.

Water Resources Region:

South Atlantic - Gulf

Location:

Oregon Inlet, North Carolina

Summary of Accomplishments:

The purpose of this study is to develop state-of-the-art numerical models to simulate the shore processes in the vicinity of Oregon Inlet, North Carolina. The models will be used to evaluate the effects of proposed jetties for Oregon Inlet on the movement of littoral materials in the vicinity of the inlet. In addition, they will be used to evaluate the impact of various sand bypassing schedules on shore processes. The models will determine complete wave fields, water elevations and currents due to tides and storm surges, wave-induced currents (including littoral and rip currents), wave set-up, and littorial and onshore-offshore movement of sediment.

During CY 83, a wave propagation numerical model, a wave-induced current numerical model, and littoral and onshore-offshore sediment movement models were tested and applications made.

FEDERAL HIGHWAY ADMINISTRATION

The Federal Highway Administration (FHWA) concentrated its activities on four major areas: control of culvert outlet erosion, control of stream instability at highway crossings, control of sediment produced by highway construction, and control of highway water quality. Major efforts were carried out by staff and contract research, and by the various studies in the Highway Planning and Research Program (HP&R) and in the National Cooperative Highway Research Program (NCHRP).

Control of Culvert Outlet Erosion - The objectives of these studies are to investigate the various flow conditions and the forces involved at the outlet area, the material necessary to resist the erosion, and the special design of energy dissipators and stilling basins to control the erosion.

A. The University of Akron continued the study, sponsored under the HP&R program by the Ohio Department of Transportation, on "Internal Energy Dissipators for Culverts" which is a continuation of earlier work on this topic. The work includes a laboratory investigation of staggered halves of roughness ring energy dissipators and will result in a table of design coefficients for "standard" internal energy dissipator chambers.

Control of Stream Instability at Highway Crossings - The objectives of these studies are to evaluate the significance of natural stream adjustments on the structural integrity of highway crossings, to provide techniques for resolving the impact of these changes, then to provide guidelines for measures to mitigate stream instability at highway stream crossings.

A. The U.S. Geological Survey completed a research study for FHWA entitled "Stability of Relocated Stream Channels." This study evaluates the channel stability or erosion associated with stream relocations done for the purpose of highway construction. The results indicated: where the stream channel is generally stable before highway construction, relocation does not significantly change stream length or channel slope, and sufficient time allows vegetation to reestablish along the constructed bankline or countermeasures are incorporated, channel relocation is a viable alternative which will not result in stream damage. The final report entitled "Stability of Relocated Stream Channels," FHWA report number FHWA/RD-80/158, was published in 1981. In addition to the final report, a slide tape presentation depicting the major aspects of the research was developed and available for loan.

B. As a result of the "Countermeasures" study completed in 1978, protective measures were identified that could benefit from additional evaluation and laboratory testing. One of these protective measures was spur or dike constructed along stream banklines. Although spurs and dikes have been applied nationwide there was no general guideline for their construction in application to protection of highway right-of-way. The Sutron Corporation in cooperation with the Pennsylvania State University completed the FHWA study entitled "Flow Control Structures for Highway Stream Crossings." The research evaluated present application of spur and conducted laboratory flume studies to refine design guidelines for use by highway engineers. The draft final report was

prepared and reviewed; it will be published soon.

C. The USGS completed the FHWA sponsored study on "Roughness Coefficients in Vegetated Flood Plains." The study took advantage of data collected by completed HP&R studies in the Gulf Coast States of Louisiana, Mississippi, and Alabama. Detailed data were used to field validate methods of roughness coefficient estimation which had been developed theoretically and only laboratory tested. The final report, which is currently being published, will describe methods that are relatively simple to apply and result in accurate estimates.

D. Sponsored by FHWA, the USGS continued a study on "Evaluation of Design Practices for Riprap Used in Protection of Highway Crossings." The study will determine, using field evaluation and collection of hydraulic data, the applicability of available riprap design procedures and provide guidelines for comprehensive design methods. Of special interest is the function of riprap in bends or when tested against impinging flow.

E. The FHWA continued the study of Flexible Linings in Drainage Ditches with the U.S. Geological Survey for a series of tests at their Gulf Coast Hydroscience Center in Bay St. Louis, Mississippi to evaluate the failure criteria and hydraulic resistance characteristics of some of the newer flexible lining materials as well as some traditional linings that have incomplete data. Materials being tested include: excelsior mat, fiberglass roving, jute netting with straw and asphalt spray, jute netting with and without straw, Holdgro, Enka mat (lightweight), Erosionet with straw and asphalt spray, D_{50} 1-inch gravel (dumped and spread), and D_{50} 1-inch gravel rolled into soil.

Control of Sediment Produced by Highway Construction - This problem consists of two stages: during construction and just after construction.

A. The USGS Hawaii District, through the sponsorship of Hawaii Department of Transportation, continued the study on Rainfall-Runoff and Rainfall-Sedimentation Discharge Relations in Hawaii-tyep Watersheds. The objective of this study is to determine the effects of highway construction on the rainfall-runoff and rainfall-sedimentation discharge relations of a watershed on Moanalua Valley, Oahu, considering all significant basin characteristics. The results obtained will be used as a basis for deriving similar relations for other basins in Hawaii. Data collection and analysis were completed in 1980. The draft final report was prepared and reviewed; it will be published soon.

B. It is equally important that upon completion of highway construction, immediate and adequate protection against erosion be provided for slopes and other roadside areas affected by grading. In most regions of the country this has been accomplished with the establishment of proper management of vegetative cover. In 1983, ten States were conducting studies designed to improve vegetation establishment techniques and subsequent management practices. The participating States were Alabama, California, Georgia, Indiana, Maryland, Michigan, New Jersey, North Carolina, Oklahoma and Rhode Island. Below are reports published in 1983.

Baker, R. F., "Roadside Vegetation Implementation of Fine Fescue Grasses," Report No. FHWA/NJ-83/003, New Jersey Department of Transportation, Trenton, New Jersey, July 1982.

Henslin, J. W., "Evaluation of New Turf Grass Selection," Report No. FHWA/MN/ME-82/02, Minnesota Department of Transportation, St. Paul, Minnesota, 1982.

Carpenter, P. L., and Masiunas, J. B., "Techniques to Increase Survival of New Highway Plantings (Seeding Portion)," Report No. FHWA/IN/JHRP-82/18, Indiana Department of Highways, Indianapolis, Indiana, May 1983.

Clary, R. F., "Planting Techniques and Materials for Revegetation of California Roadsides," Report No. USDA LPMC-2, E79LA02, California Department of Transportation, Sacramento, California, June 1983.

Wyant, D. C., "Efficiency of Erosion Control Practices of the Virginia Department of Highways and Transportation," FHWA/VA-83/3, Virginia Department of Highways and Transportation, Richmond, Virginia, July 1982. (NTIS No. PB 83196410)

Control of Highway Water Quality - The objectives of these studies are to monitor the highway water pollution parameters and to devise cost effective means to control them.

A. The FHWA research study on "Sources and Migration of Highway Runoff Pollutants," was completed by the Environmental Research Center of Rexnord, Milwaukee, Wisconsin 53214. Monitoring was completed in Milwaukee, Wisconsin; Sacramento, California; Harrisburg, Pennsylvania; and Effland, North Carolina. The final report will be published in 1984.

B. The third phase of FHWA's research runoff quality to determine the impact of highway runoff on receiving waters was started in 1980 with the Engineering Research Center of Rexnord, Milwaukee, Wisconsin 53214. Monitoring was completed and the final report is being completed.

C. FHWA initiated an interagency agreement with the U.S. Geological Survey to do a study on "Procedure to Predict the Impact of Hydrologic Modifications by Highways on Wetlands." Its objective is to develop guidelines and procedures to utilize wetland hydrodynamics in the evaluation, analysis, and design of highway crossings in flood plains and wetlands. This work shall utilize the U.S. Geological Survey SIMSYS2D modeling system as the basic tool in accomplishing the above objectives. An access system shall be made available to State highway agencies which will permit highway agencies or their consultants to access SIMSYS2D through the U.S. Geological Survey's National Water Data Exchange (NAWDEX) on an AMDAHL 470 Computer or load modules, as appropriate. The tool developed shall have the capability for dealing with estuarine and non-estuarine wetland systems. The study will also develop a training program and supporting materials to allow State highway agencies to develop capability and proficiency for use of hydrodynamics in the location, assessment and systems and in operation and utilization of SIMSYS2D.

D. The California Department of Transportation completed the HP&R study on "Modeling of Transportation Pavement Runoff." This study used data developed on the completed California study "Water Pollution Aspect of Particles Which Collect on Highway Surface."

Racin, J. A., Howell, R. B., Winters, G. R., and Shirley, E. C., "Estimating Highway Runoff Quality," FHWA/CA/TL-82/11, California Department of Transportation, Sacramento, California, September 1982.

E. The California Department of Transportation continued another HP&R study on "Mitigation of Highway Related Chemical Water Quality Pollutants."

F. The University of Washington in Seattle completed the HP&R study on "Highway Stormwater Runoff Quality" sponsored by the Washington Department of Transportation. The final report was published in 1983.

Mar, B., et al, "Highway Runoff Water Quality," Summary 1977-1982, WA-RD-39.16, Washington State Department of Transportation, Olympia, Washington, September 1982.

G. The Alaska Department of Transportation and Public Facilities continued the HP&R study to evaluate the effectiveness of roadway drainage structures for fish passage.

H. The Center for Natural Areas of Maine completed the FHWA study on Valuation of Wetlands. A method of assessing the functional values of wetlands was presented. The method will assist highway agencies in determining the relative functional value of wetlands and the significance of impacts due to highway construction. The report will be available in early 1983. The method is being considered for use by several agencies outside the highway community.

Adamus, P. R. and Stockwell, L. T., "A Method for Wetland Functional Assessment: Volume I. Critical Review and Evaluation Concepts," FHWA-IP-82-23, Federal Highway Administration, Washington, D.C., March 1983.

Adamus, P. R., "A Method for Wetland Functional Assessment: Volume II, FHWA Assessment Method," FHWA-IP-82-24, Federal Highway Administration, Washington, D.C., March 1983.

I. The administrative contract was continued by FHWA to identify effective alternatives for mitigating highway stormwater runoff pollution. The research will also identify ineffective practices.

J. The Florida Department of Transportation continued an HP&R study to analyze the heavy metal input to receiving waters from highway stormwater runoff and determining any metal species change which occurs in the receiving water. The research will also evaluate the environmental consequences.

K. An FHWA Region 15 Demonstration Project to illustrate techniques and equipment for sampling and analysis of highway stormwater runoff is now available. Several demonstrations were made this year.

L. In response to the serious problems encountered with conventional deicing chemicals, sodium and calcium chloride, FHWA continued the development of an effective alternative material. Research identified Calcium Magnesium Acetate (CMA) as a promising alternative. Studies are now underway to develop a commercial source for CMA. Before extensive commitments for CMA are made, it is important to insure the environmental suitability of CMA. Research was initiated with the Transportation Laboratory of CALTRANS to investigate CMA's compatibility with the environment and identify any potential problems.

M. The administrative contract was continued by FHWA to investigate highway maintenance activities, identify potential hazards to water quality, and develop guidelines for effective mitigation alternatives.

If more information is desired about these research studies, inquiries should be addressed to the sponsoring agnecies.

GEOLOGICAL SURVEY, CORPS OF ENGINEERS, FOREST SERVICE, BUREAU OF RECLAMATION, AGRICULTURAL RESEARCH SERVICE, FEDERAL HIGHWAY ADMINISTRATION, AND BUREAU OF LAND MANAGEMENT

Federal Inter-Agency Sedimentation Project
Minneapolis, Minnesota

During 1983, the project built an experimental sediment-concentration meter and then, with cooperation from Geological Survey personnel in Wisconsin, installed the meter on Willow Creek in Madison. The sensing portion of the meter, which is explained in Report X, consists of a vibrating tube connected to a sampling pump. The vibrational frequency of the tube is related to the sediment concentration of the river water flowing through the tube; consequently, a frequency record can be converted to a concentration record. The field tests, which will continue into 1984, are designed to provide data on the accuracy of the meter.

Two field tests of the PS-82, an experimental pumping sampler, were completed during 1982. Because the results were favorable, equipment for mass-producing the machines and sample containers is being built by contractors. A few of the samplers, which are small and lightweight, will be available in 1984 for $1200. Interested parties are invited to contact the project for copies of the instruction manual which describes the machine's characteristics.

An optical device that responds to infrared light was tested for use as a sediment-concentration meter. Unfortunately, the instrument proved to be highly sensitive to the size of the sediment particles; consequently, concentration could be measured but only after the sample's particle-size distribution had been carefully determined. A report on the tests will be available from the project in 1984.

Personnel who have difficult application involving bed-material sampling may be interested in a new, modified version of the BM-54 sampler. With the modifications, the sampler is activated when the line tension is released, or when a special pressure-plate strikes the streambed or when the operator actuates a special solenoid.

The brass valves in a point-integrating suspended-sediment sampler, were replaced with plastic valves in an effort to reduce the possibility of contaminating samples with metallic compounds and to alleviate binding and sticking of the metal parts. Test results indicate that, in terms of mechanical performance, plastic valves are better than metal valves.

The project is studying the feasibility of measuring the particle-size distribution of a sediment sample by monitoring the component of hydrostatic pressure produced by sediment particles as they settle in quiescent water. To date, the study has been limited to developing equations for converting a pressure record to a size-distribution curve and testing a few types of sensitive pressure transducers. Work on this study will be continued.

During the past several years, the project has developed sampling procedures and sampling equipment that have been adopted as standards by most federal agencies. To help disseminate information, the American Society for Testing

and Materials requested a document outlining the best available technology in the field of sampling sediment in motion. John Skinner invited representatives from industry and government to join the effort by participating in a task group. The group has completed its work and the final document was first published as a "proposed practice" in the 1982 edition of the ASTM standards. The project will continue to support standardization programs. Currently, a task group is being organized to address problems related to sampling deposited sediment.

Equipment that has been developed by the project is first reviewed by the technical committee and then submitted to the Corps of Engineers contract and purchasing division. Manufacturing contracts are awarded through a competitive bid process. Manufactured items are delivered to the project for inspection and calibration. Each year the project supplies sediment samplers and analyzers to about 300 field offices. All equipment items are pictured and described in a catalog that, upon request, will be supplied free of charge. To augment its supply activities, the project also maintains a stock of replacement parts and repairs damaged sampling equipment.

The following table lists major pieces of equipment that the project supplied to governmental and educational institutions:

	Instrument	Sold 1982	Sold 1983	Inventory, Dec. 1983
DH-48	Hand sampler	33	36	230
DH-75Q	Hand sampler	6	6	13
DH-59	Hand-line sediment sampler	9	24	11
DH-76	Hand-line sediment sampler	6	2	5
D-74	Depth-integrating sampler	3	15	27
D-74AL	Depth-integrating sampler	1	6	1
P-61	Point-integrating sampler	6	3	14
P-63	Point-integrating sampler	2	1	4
P-72	Point-integrating sampler	0	5	17
BMH-53	Bed-material hand sampler	3	6	63
BMH-60	Bed-material hand sampler	2	18	18
BM-54	Bed-material sampler	4	18	13
SA	Particle-size analyzer	0	3	2
PS-69	Pumping sampler	2	4	3
	Total	77	147	

For additional information and copies of published reports readers may call FTS 725-2218 or write to:

Project Leader
Federal Inter-Agency Sedimentation Project
St. Anthony Falls Hydraulic Laboratory
Hennepin Island & Third Avenue S.E.
Minneapolis, Minnesota 55414

GEOLOGICAL SURVEY

CO 84-179 Analysis of the sediment data network in Colorado

WRD Project No.: CO 84-179
Project Title : Analysis of the sediment data network in Colorado
Project Chief : Elliott, John G.
Headquarters Office : Lakewood, Colorado

Problem: Sediment data have been collected at surface-water sites for many years throughout Colorado by many different agencies. Most of these data have been published either in interpretative or in hydrologic-data reports. To date, however, there has been no coordinated effort to compile and analyze all sediment data available for Colorado streams. With the increased potential for coal and oil-shale mining and associated development as well as the future need for reservoirs and diversion structures, there is need to compile and interpret available sediment data so that it will be more usable to State and Federal water planning and management agencies. This need can be met by compiling data into a single data base and by preparing a statewide sediment yield map.

Objectives:

1. Collate available sediment data and document location, source of data, and other pertinent technical information regarding the accuracy and useability of the data.

2. Interpret available sediment data and prepare a statewide sediment yield map.

3. Evaluate areas impacted by land-use changes such as mining or agricultural development where sediment data are available. Determine if sediment yield can be related to land use, basin and climatic characteristics.

Approach:

1. Available data from researchers as well as other agencies would be compiled and evaluated for adequacy before including in the data base. All data including USGS data will be tabulated and illustrated for presentation in a report.

2. Annual sediment loads will be computed from daily-sediment stations. Annual sediment loads will also be computed from miscellaneous sediment data utilizing transport curves and discharge records. Record extensions will be made where they can be proven to be statistically sound. Mean annual loads for a selected base period will be illustrated graphically on a state map to define spatial variations in annual sediment loads.

3. Mean annual sediment loads will be regressed against land-use factors,

and basin and climatic characteristics to determine if variation in sediment loads can be explained by natural characteristics and man induced development. The extent of this analysis will depend upon the adequacy of the sediment data base. Recommendations will be made regarding the adequacy of the existing statewide sediment data base and data collection network.

GEOLOGICAL SURVEY

IL82-048 An Evaluation of Bedload Data in Illinois

WRD Project No.: IL82-048

Project Chief: Graf, Julia B.

Field Location: Illinois, Statewide

Problem: Erosion and sedimentation are major issues in Illinois, where loss of farmland through soil erosion is of great concern, and where sediment deposition adversely affects wildlife habitats and decreases useful life of reservoirs. Accurate measurement of sediment transported by streams is critical to the evaluation of these problems as well as of remedial measures. Although sediment data in Illinois is minimal, data collected since 1978 can provide a basis for development of bedload transport computed by indirect methods, and for evaluation of the suitability of bedload sampling sites.

Objectives: (1) To evaluate data collected at 9 guaging stations in Illinois with the Helley-Smith bedload sampler. (2) To examine the possibility of supplementing bedload records by indirect methods. (3) To evaluate the suitability of each bedload sampling station.

Approach: Bedload transport curves will be developed for stations for which sufficient samples have been collected. Indirect mehtods (Meyer-Peter Muller, Schoklitsch, and modified Einstein) will be used to develop transport curves for stations with few bedload samples. Bedload discharges computed by indirect methods will be compared to measured bedload discharges to evaluate the possibility of supplementing or extending curves developed from measured values. Data will be examined with respect to variables affecting transport, e.g., position with respect to the flood hydrograph, local slope. Examination of sediment data and station records will be made to evaluate the suitbility of bedload sites.

FY-1983 Progress: Report completed and published. Graf, Julia B., 1983, Measurement of bedload discharge in nine Illinois streams with the Helley-Smith sampler: U.S. Geol. Survey Water Resources Investigations Report 83-4136, 70p.

GEOLOGICAL SURVEY

IL82-055 Evaluation of Shift-Control Method of Estimating Sediment Discharge in Illinois Streams

WRD Project No.: IL82-055

Project Chief: Frost, Leonard R., Jr.

Headquarters Office: Urbana, Illinois

Field Location: Illinois, Statewide

Problem: Water-resource planning and water-quality assessment require a base level of information on sediment concentration and discharges in streams. Conventionally this information is obtained by collecting water-sediment samples, once daily and more often during storms, and computing the sediment discharge on daily basis. A shift-control method that requires that some daily records be available to define the sediment transport curve may prove feasible to compute sediment discharge from sediment-transport curves and infrequent periodic samples. Records for periods succeeding the available records would be estimated using water-discharge records and the sediment-transport curve to compute a sediment-discharge hydrograph which is then shifted based on the intermittent sample record. The shift-control method needs to be evaluated for its applicability of Illinois streams.

Objectives: To evaluate the shift-control method of estimating sediment discharge in Illinois streams using a minimum number of samples.

Approach: Records at 12 stations will be used to evaluate the shift-control method of estimating sediment discharge in Illinois streams. The selection will provide areal coverage of drainage basins statewide that range in drainage area from 2.44 to 5,150 square miles.

Sediment transport curves relating daily mean discharge to daily sediment discharge will be prepared from the most recent 2 years of daily records for each station.

Equations that define these curves, and daily water discharge, will be used to compute daily sediment discharge by the following procedures: (1) unadjusted values directly from the sediment transport curve, and (2) adjusted by the shift-control method by using samples at 4, 2, and 1 week intervals as control samples (simulates monthly, biweekly, and weekly sampling).

The values for monthly and annual sediment discharge obtained by each of the above procedures will be compared to the published values obtained by daily sampling to evaluate the feasibility of using periodic samples to estimate sediment discharge.

FY-1983 Progress: L. R. Frost, Jr. and L. J. Mansue developed transport equations for suspended sediment for 12 Illinois streams. These equations were used with streamflow data to develop estimated sediment-discharge

hydrographs. The hydrographs were then shifted to conventionally determined values (control points) selected to simualte weekly, biweekly, and monthly sampling. Estimates of monthly suspended-sediment loads ranged from 16 to 326 percent of measured values. Annual estimates ranged from 41 to 136 percent of measured. An evaluation of the length of record used to develop transport equations was inconclusive. An analysis of the subjectivity of the method showed estimates of sediment load were influenced more by the selection of days used for control points than by the person applying the method. A report has been prepared for release to the WRI series.

WA84-27250 Sedimentology of Lahars at Mount St. Helens

WRD Project No.: 4753-27250
Project Chief: Scott, Kevin M.
Headquarters Office: Vancouver, Washington
Field Location: Toutle and Cowlitz Rivers, southwestern Washington

PROBLEM: In the eruptive history of Mount St. Helens at least 30 lahars (volcanic debris flows and mudflows) have extended more than 40 km from the volcano in the Toutle River and at least several have reached the Columbia River, via the Toutle River, over 100 km downstream. The magnitude and frequency of those flows is relevant to long-term planning for lahar hazards in the watershed. Damage and remedial engineering work related to the 1980 lahars, mainly the large flow originating in the North Fork Toutle River, have exceeded several hundred million dollars to date.

OBJECTIVES: 1) To analyze the flow types and depositional facies of the 1980 lahars in the watershed, focusing especially on logitudinal changes in the flows and their downstream runout equivalents. 2) To use that analysis to determine the magnitude, frequency, and behavior of the lahars and runout flows that occurred in previous eruptive periods. 3) To apply the analysis of the complete flow record to hazard planning.

APPROACH: The analysis of the 1980 lahars involves field and laboratory measurements of sediment size parameters, composition, roundness, orientation, depositional forms, and sedimentary structures and boundary features. The analysis of the older flows will involve the same measurements plus stratigraphic analysis to determine the age of the flows using radiocarbon dating and tephra identifications. Magnitude of the older flows will be based on thicknesses of their flood plain deposits compared to those of the 1980 lahars, and by measurements of flow cross sections where the peak stage can be identified by means of boundary features and correlated with the corresponding channel deposits. Textural differences may provide evidence of flow volumes.

FY-1984 PROGRESS AND RESULTS: The analysis of lahar magnitude and frequency showed that the engineering design event in the Toutle River system is a lahar or a hyperconcentrated flow transformed from an upstream lahar, rather than a flood flow. This result is valid considering the higher velocities of lahars and runout flows, and thus the correspondingly smaller cross-sectional areas, of a given discharge relative to that of a flood flow. The largest lahar in the history of the watershed formed from erosion of stream-channel sediment by a flood surge resulting from an avalanche blockage of an ancestral Spirit Lake between 2500 and 3000 years ago. Peak discharge of this flow was 200,000-300,000 m^3/s, and flood plains were inundated to depths exceeding 30 m.

FY-1985 PLANS: The major project report, a Professional Paper on lahars and lahar-runout flows in the Toutle-Cowlitz River system, has completed review and should be approved early in the fiscal year. The techniques and approaches used to study the pre-1980 flows at Mount St. Helens will be extended to at least one other Cascade Range volcano.

WRD Project No.: WA83-273
Project Title: Rheological properties and initiating mechanisms of mudflows and debris flows
Project Chief: Pierson, Thomas C.
Headquarters Office: Vancouver, Washington
Field Location: Mount St. Helens

Problem:

Hydraulics textbooks are filled with equations that can be used to accurately predict how water, a Newtonian fluid, will flow under specific sets of conditions, that is, equations that relate flow behavior to a set of internal and external independent variables. But there is very little quantitative information available for natural non-Newtonian slurry flows (mudflows and debris flows), that allows prediction of their flow behavior. It is also extremely difficult to predict the magnitude of such flows. Yet mudflows and debris flows are a much more frequent geologic process in steep terrain than has commonly been thought.

Objectives:

1) To develop empirical relationships between dependent variables (velocity, impact force, discharge) and independent variables (depth, channel gradient, channel sinuosity, particle-size distribution, water content, entrained-air content, temperature, and clay mineralogy) in natural slurry flow based on observed and measured flow behavior, so that the rheology of a wide range of mudflows and debris flows may be defined.
2) To identify the source of the liquid and solid components of a range of mudflows and debris flows, and to define the mechanisms by which the components are mixed and the flows mobilized under natural conditions.

Approaches

1) Direct observation and measurement of small channelized debris flows that occur periodically during the summer downstream from the Shoestring Glacier. Instrumentation will include vertical still photography (to obtain horizontal velocity distribution), 16 mm movie photography (to measure velocity of flow front over length of monitored reach), vertically mounted sonar rangefinders (to obtain debris flow hydrographs, average velocity of peaks, and peak attenuation), seismograph (to measure seismic energy generated), and a vertically erected 0.7 m high steel "post", anchored in bedrock in the center of the channel (to measure velocity head at three different depths with differential pressure transducers embedded in the leading edge and to collect samples, approximately one liter each, at the same three depths using collection chambers on the trailing edge that will be uncovered after the bouldery front passes). Observers will be on hand to collect surface samples, measure temperature, and measure entrained air.

2) Determination of flow behavior of large mudflows that moved down Pine Creek and Muddy River during the May 18, 1980 eruption. Velocities (minimum) will be computed at surveyed channel bends utilizing the principal of velocity controlled superelevation of fluid rotating in channel bends and from surveyed

run-up elevations by assuming complete conversion from potential to kinetic energy. Channel parameters will be determined from field surveys, maps, and air photos. Material properties of peak flow deposits at different points along the flow paths will be determined in the laboratory.

3) Experimental testing of reconstituted mudflow slurries in the laboratory will be carried out to determine the effect of changing water and air content on the yield strength of slurries using a sensitive shear vane, a specially designed shear box, and a coaxial viscometer. Pore-water pressure gradients and decay curves will also be determined.

FY 1983 Progress:

Monitoring of debris flows at the Shoestring site continued through the fall of 1983. Data on the dynamics of a relatively large flow was obtained on October 30. Of particular interest was the partially successful operation of the in-channel velocity-head meter, an assembly of pressure transducers designed to record the vertical velocity profile in debris flows.

Data on flow dynamics was also obtained from three debris flows resulting from extremely rapid snowmelt in Wrightwood, California and Farmington, Utah, using field-portable equipment. The clay-rich slurries of the Utah debris flows contrasted sharply with the fines-poor slurries from Mount St. Helens; comparison of the two types should lead to a better understanding of the role of slurry composition on flow dynamics.

FY 1984 Plans:

Monitoring of debris flows will continue at the Shoestring site and perhaps again along the Wasatch Front in Utah.