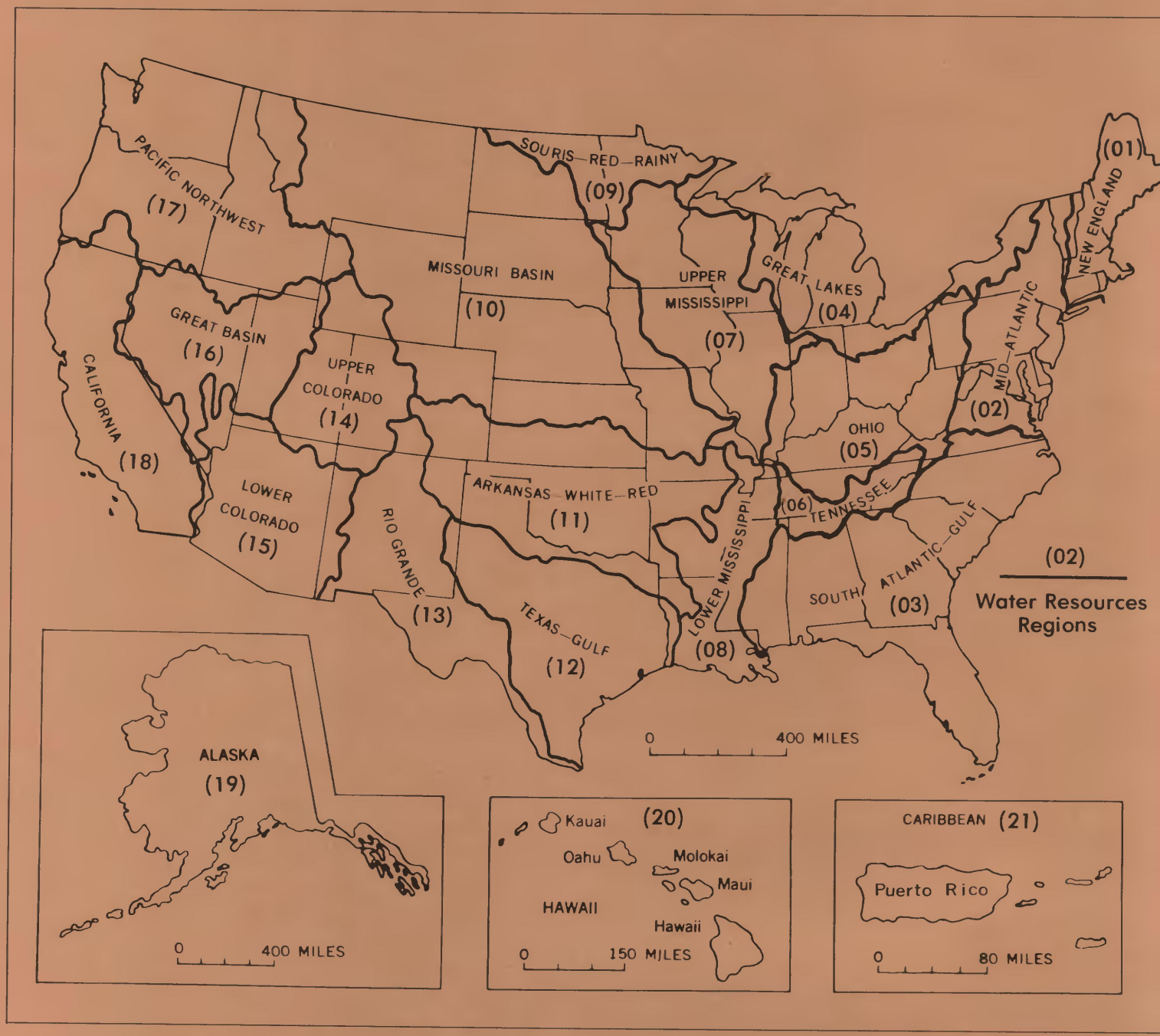
INTERAGENCY ADVISORY COMMITTEE ON WATER DATA

NOTES ON SEDIMENTATION ACTIVITIES CALENDAR YEAR 1982

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 1982

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

July 1983

NOTES ON SEDIMENTATION ACTIVITIES CALENDAR YEAR 1982

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 1982 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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SERVICE CHARGES

Charges for NAWDEX services are assessed at the option of the organization providing the requested data or data service. Search assistance services are provided free by NAWDEX to the greatest extent possible. Charges are assessed, however, for those requests requiring computer services, extensive personnel time, duplicating services, or service costs accrued by NAWDEX from other sources in the course of providing services. In all cases, charges assessed by NAWDEX Assistance Centers will not exceed the direct costs incurred in responding to the data request. Estimates of cost are provided by NAWDEX upon request and in all cases where costs are anticipated to be substantial.

ADDITIONAL INFORMATION

For additional information concerning the NAWDEX program or its services, contact:

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NEW ENGLAND REGION

Forest Service

Twenty-three acres of erosion control measures were applied on twenty-three acres on the White Mountain and Green Mountain National Forests.

The Northeastern Forest and Range Experiment Station is recording changes in stream chemistry at Durham, NH, that can be expected from contemporary clearcutting and strip cutting. Researchers have New England measured, gaged, and treated watersheds on the Hubbard Brook Experimental Forest (a Biosphere Reserve) on a yearly basis as well as on a storm basis. This work has led to a study of soil disturbance on the forest floor following clearcutting and whole tree harvesting.

Aroostook County Main has been targeted as an erosion and sedimentation control county by SCS. Erosion yields on some lands, identified by the North Main Regional Planning Commission, indicate losses in excess of 25 ton per acre per year. Although the Parkhurst Siding PL-566 Project Forestry Plan was not approved, the Forest Service in cooperation with the Maine Department of Forestry, has funded an initial effort at planning critical areas.

To date, 50 acres of farm land in the high yield category (25+ t/a/yr) and 50 acres in the medium category (5-12 t/a/yr) have been signed up for planting. On the average, erosion will be reduced by 1,600 tons per year.

Harvesting operations throughout New Hampshire were sampled to survey the current adoption rate of BMP's and to quantify the effects of the harvesting operations on erosion and sedimentation.

Publication: Effects of Timber Harvesting on Erosion and Sedimentation New Hampshire.

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. Sediment data are being collected on a daily basis at Muddy Brook at Childs Hill Road near Woodstock, Conn., to determine daily sediment loads, as part of a study to determine the effects of agricultural management practices being implemented in the Little River watershed. The study is being done in cooperation with the Northeastern Connecticut Regional Planning Agency.

2. 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.

3. 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

SOIL CONSERVATION SERVICE

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

a. River Basin Investigations

Major Basin	Basin Reported	State
Narragansett Bay	Meshanticut Brook	Rhode Island
Narragansett Bay	Lincoln Downs Brook	Rhode Island

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoirs:

Reservoirs	County	State
Blackberry #15	Fairfield	Connecticut
Trafton Lake	Aroostook	Maine
Dunham-Davee #1	Piscataquis	Maine
Oliverian 1	Grafton	New Hampshire
Jewel Brook Site 1	Windsor	Vermont

3. Special Studies

SCS - Maine continued to assist the St. John-Aroostook RC&D Steering Committee and the St. John Valley, Central Aroostook and Southern Aroostook Soil and Water Conservation Districts in the Field Appraisal of Resource Management Systems (FARMS) study. FARMS is a three-year program with the objective of showing how conservation practices, management practices, and crop quality and quantity relate to soil erosion rates and other variables.

The gathering of field data was completed in the 1982 field season. Computer analysis of data is in progress and a preliminary report is expected in May 1983.

CORPS OF ENGINEERS

North Atlantic Division

Baltimore District

Sedimentation Surveys

1. Initial Surveys -- No initial sedimentation surveys were performed within the District in 1982.

2. Annual Reconnaissance Surveys -- No serious sediment problems were reported in the District reservoirs in 1982. Some sediment is reported to be accumulating at the inflow point of Raystown Lake but it is not deemed to be a serious problem. The following quantities of sediment were removed from flood control projects in the District in 1982:

Project	Stream	Removal Location	Amount Removed (cu yd)
Arkport Dam, NY	Canisteo River	Intake Channel	7,784
Avoca, NY	Cohocton River	Channel	4,120
Binghamton, NY	Pierce Creek	Channel above Paved Channel	2,609
		Confluence with Susquehanna River	2,451
		Belden St. Drop Structure	220
Canisteo, NY	Purdy Creek	Check Dam	8,122
		Confluence of Purdy & Bennett Creeks	890
Corning, NY	Cutler Creek	Upper Channel	440
Hornell, NY	Canisteo River	Channel Between Main Street Bridge and Canacadea Creek	6,461
	Chauncey Run	Check Dam	826
	Crosby Creek	Check Dam	3,033
Lisle, NY	Dudley Creek & Tioughnioga River Confluence		950
Whitney Point Village, NY	Tioughnioga River Channel		1,077
		Total Removed	41,621

New York District

The District conducted sediment tests at the following locations:

Location (State) a Waterway	Sampling Equipment a Sample Types	Dates Sampled
New York State		
Milton Harbor	Smith-MacIntyre Surface grab	8/80
Wards Pt. Channel	" "	9/80
Buttermilk Channel	" "	10/80
Gowanus Bay	" "	7/81
Red Hook Flats	" "	10/82
New Jersey State		
Sandy Hook Junction	" "	8/80
Keyport Harbor-Matawan Cr.	" "	10/80
Port Newark Beach Channel	" "	2/82
New York/New Jersey State		
Arthur Kill North & South	" "	7/81
North Shooters Island Channel	" "	2/82

Note: Types of records maintained are Grain Size, Bioassay and Bioaccumulation.

Philadelphia District

Sedimentation Survey - F. E. Walter Reservoir

Survey Purpose: Determine sedimentation rates for periods 1961 to 1971 and 1971 to 1981, within confines of the F. E. Walter Reservoir.

Type of Survey: Range

Elements Measured: Reservoir bottom elevations across 13 ranges.

Equipment Used: 1961, 1971: lead line
1981: recording fathometer

Survey Scope: Five range lines are within the bounds of normal pool elevation. The other eight are upstream of normal pool on three tributary streams.

Results: The sedimentation rate for the F. E. Walter Reservoir was determined to be 8.66 acre-feet/year between 1961 and 1971, 14.03 acre-feet/year between 1971 and 1981, and 11.35 acre-feet/year for the entire period 1961 to 1981.

Sediment Load Measurements

1. Delaware River at Trenton
   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

Forest Service

George Washington NF

Forest personnel monitored suspended sediment and/or turbidity at 16 sites. Twelve of these were for monitoring the impacts of timber harvest activities, three monitored the VEPCO pumped storage project and one monitored a stream draining a proposed wilderness area. All of the data were stored on STORET.

Twenty-three acres of eroding land were rehabilitated resulting in a reduction of approximately 500 tons of sediment annually. Eight acres were accomplished under PL-534 and 7 acres with KV funds.

Jefferson NF

The National Forest has a suspended sediment monitoring project on road reconstruction of low water bridge. Results indicate that increased sediment during bridge construction was not significant in relation to State standards and would have no impact on beneficial water uses. Monitoring is continuing through full period of road construction and stabilization.

Additional reforestation work was done to reduce off site movement of leachate and sediment from two county landfills. Monitoring of these areas will continue.

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 at Passaic River at Little Falls, N.J., and 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 Toms River near Toms River, N.J., Maurice River at Norma, N.J., West Branch Wading River at Maxwell, N.J., and Delaware River at Trenton, N.J., as a part of NASQAN.

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

3. Suspended-sediment data are being collected on a bimonthly 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 U.S. Corps of Engineers 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 North Branch Potomac River near Cumberland, MD. (discontinued September 30, 1982), and 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., and Shenandoah River at Millville, W.Va., as a part of NASQAN.

4. Suspended-sediment data are being collected on a bimonthly basis at Potomac River at Chain Bridge, Washington, D.C., as 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 are being collected from two streams, Conestoga River near Terre Hill, Little Conestoga Creek near Churchtown, and from a 25 acre site draining from fields that is selected for best management practices. Automatic samplers have been installed at each of the sites.

2. Sediment data were collected during the 1982 water years 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 were collected at 8 sites in the Raritan River basin in Hunterdon and Somerset Counties, N.J., and 2 sites in the Manasquan River basin in Monmouth County, N.J. Sampling was discontinued as of June 30, 1981. The study was in cooperation with the New Jersey Department of Environmental Protection to investigate sediment transport during storm events in two basins with highly erodible soils.

4. Suspended-sediment data were collected with automatic samplers at two sites in the Trotlers Run Basin in western Maryland during 1982. In addition, base-flow suspended-sediment samples were collected at three other sites in the basin. The data were collected as part of a study to evaluate the effects of mining on sedimentation.

5. 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.

6. Suspended-sediment data are being collected from the Swatara Creek at Pine Grove and from the Low 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.

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

District Chief, WRD
U.S. Geological Survey
208 Carroll Building
8600 LaSalle Road
Towson, MD 21204

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

District Chief, WRD
U.S. Geological Survey
Room 3416, Federal Building &
U.S. Courthouse
500 Quarrier Street, East
Charleston, WV 25301

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

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	Mill Creek	Mill Creek	Potomac	Virginia
Shenendoah	South River	South River	Augusta	Virginia

b. Public Law 566

Major Drainage	Watershed	Stream	County	State
Delaware River Basin	Upper Salem River	Salem River	Salem	New Jersey
Susquehana	Clover Creek	Clover Creek	Blair	Pennsylvania
Potomac River	Bull Run	Bull Run	Prince William, Fairfax & Loudoun	Virginia
James River Virginia	Upper Appomattox	Appomattox	Prince Edward & Appomattox	
Lake Champlain-Richelieu	Lower Otter-Dead Creek	Lower Otter-Dead Creek	Addison	Vermont

c. River Basin Investigations

Major Basin	Basin Reported	State
Chesapeake Bay Elk River)	Big & Little Elk Creeks	Maryland & Pennsylvania
Rappahanock, York, & Potomac	Mobjack Bay	Virginia
	Pamunkey River	Virginia
	Hawksbill Creek	Virginia
	Linville Creek	Virginia
	Dry River	Virginia
	Honey Run	Virginia
	Pleasant Run	Virginia
	Upper Rapidan	Virginia
Lake Champlain-Richelieu	Lake Memphremagog (St. Francis R)	Vermont
Lake Champlain Richelieu	Lake Champlain	Vermont

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoirs:

Reservoir	County	State
Lake Como	Kent	Delaware
Juniata Lake	Dubois	Pennsylvania
South River #3	Augusta	Virginia
North River #80	Rockingham	Virginia

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. Data analysis will be completed this year.

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. Maryland - A special reservoir sediment survey was performed on Lake Bonnie, Goldsboro Watershed (PL-566) Goldsboro, MD. utilizing Cesium 137 fallout as a datum marker plane. The study was made to determine the effects of channel modifications on sediment yield.

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

SOUTH ATLANTIC GULF REGION

BUREAU OF LAND MANAGEMENT

Alabama

Hydrologic Surveillance, Warrior Coal Field.

Suspended sediment data was collected as part of a project entitled, "Surveillance of Hydrologic Changes Resulting from Mining of Federal Coal in the Warrior Coal Field, Alabama." Streamflow and water quality data were collected at 20 sites. Sediment data were colleted at selected sites. Regression equations were developed and will be used to estimate the magnitude of sediment impacts resulting from mining. The results of this project have been used as the foundation for the preparation of the hydrologic portions of environmental impact statements and assessments required to support the Federal coal leasing effort in the Warrior Coal Field. All collected data will be placed in computer storage on an ongoing basis and will be published in the annual report, "Water Resources Data for Alabama." Sedimentation information is also included in the report by C. Puente, et al., "Assessment of Hydrologic Conditions in Potential Coal-Lease Tracts in the Warrior Coal Field, Alabama," Geological Survey (GS) Open File Report 81-540, 1982, 43 pp.

Surveillance of Hydrological Changes in Lake Tuscaloosa Resulting from Mining.

The purpose of this project (initiated in 1982) is to collect and interpret basic data on the water resources of Lake Tuscaloosa to aid the Bureau of Land Management (BLM) in its responsibilities for determining existing hydrological conditions and potential mining impacts on aquatic resources of the lake. The project involves the collection of streamflow and water quality data twice a year at 8-10 partial record sites near points of stream inflow to the lake. Sedimentation profiles were made using fathometer traverses near points of inflow to determine historical rates and patterns of sedimentation within the lake. All data collected will be placed in computer storage on an ongoing basis and will be published in the annual data reports, "Water Resources Data for Alabama." An interpretative report on the hydrology of the lake and covering the period of data collection will be written in Fiscal Year 1983.

Biological and Hydrological Impacts of Surface Mining for Federal Minerals on the Tyro Creek Watershed, Alabama.

In September 1981, the GS of Alabama and the BLM initiated a cooperative study, the purpose of which was to document the environmental changes to an aquatic ecosystem that may result from surface mining Federally-owned coal in the Warrior Coal Field of Alabama. This study, the first of its type to be conducted in Alabama, consists of three phases that will

document hydrologic conditions and associated fauna of the Tyro Creek watershed in Tuscaloosa and Fayette Counties, Alabama. Phase One, completed in October 1982, consisted of a premining biological, sedimentalogical, and hydrological data collection effort initiated in September 1981. Suspended and bottom sediments were collected and analyzed for a number of major and minor constituents, as well as trace metals. Samples were collected on a monthly basis. Phase One (premining) data collection efforts will continue until mid-1983 when mining is expected to commence. Two subsequent phases will follow which will characterize the hydrologic conditions during the mining process and after reclamation is completed. A Phase One report summarizing data collection efforts through September 1982 will be published by the BLM in 1983.

SOUTH ATLANTIC - GULF REGION

CORPS OF ENGINEERS

South Atlantic Division

Charleston District

Monitoring of coastal shoreline changes for the weir jetty system currently under construction at Little River Inlet, South Carolina was continued during 1982. The initial 5-year monitoring program for the newly constructed weir jetty system at Murrells Inlet, South Carolina was completed in October 1982. The anticipated report date is May 1984. A reduced monitoring effort for a second 5-year period is currently underway. 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 Fort Belvoir, Virginia for analysis.

Jacksonville District

Suspended sediment samples were taken daily on Rio Fajardo below Fajardo, Puerto Rico from October 1982 for the preparation of Rio Fajardo Dam General Design Memorandum. This station is operated by the U. S. Geological Survey.

Mobile District

Sedimentation Range Network Monitoring

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

2. Resurveys of the range networks in Claiborne, William "Bill" Dannelly, and R. E. "Bob" Woodruff Lakes on the Alabama River were also completed during the year.

Sedimentation Studies

1. The sedimentation studies of the Alabama, Apalachicola, Coosa, Pascagoula, and Tombigbee Rivers and Tibbee Creek will continue through 1983.

2. In addition, a sedimentation study was performed on the Coosa River by the A-E firm of Simons, Li and Associates, Inc. titled "Investigation of Sedimentation Impacts on the Alabama-Coosa River Systems from Montgomery to Gadsden, Alabama."

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
Choctawhatchee River at Caryville, FL
Escambia River near Century, 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 from locations on the Tombigbee River at Columbus, Aberdeen, Amory and Fulton, Mississippi. 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. Sediment samples were collected on Big Wills, Big Canoe, Choccolocco, Ohatchee, Kelly, Talledega, Weogufka and Hatchet Creeks in support of the A-E firms study.

3. There were no stations added or dropped from the sampling program during 1982.

Savannah District

District made no sedimentation measurements during the past year. Scheduled activities were eliminated by funding limitations on both navigation and reservoir projects.

Sedimentation ranges at the Clarks Hill project have been surveyed in 1954, 1959, and 1973. These surveys indicate no appreciable increase in sediment. At the Hartwell project, the sedimentation ranges were surveyed in 1961, 1971, and 1973. These surveys also show no significant sediment deposition in the lake. Funds for a resurvey of both projects have been requested in the FY 84

O&M Budget. At the Richard B. Russell project, currently under construction, the sediment ranges have been established and an initial survey is scheduled to be made prior to closure in September 1983. Resurveys will be made at intervals of 5 to 10 years. We have recently surveyed the area immediately upstream of the dam to locate debris which could interfere with sluice operations.

Wilmington District

A system of 52 sedimentation and two retrogression ranges were established at Falls Lake project (permanent impoundment began on 13 January 1983). A report describing the ranges, resurvey plans, and sedimentation characteristics of the project area will be prepared in calendar year 1983.

SOUTH ATLANTIC - GULF REGION

Forest Service

NFS in Alabama

The following activities were completed on the National Forests in Alabama within the South Atlantic-Gulf Region:

1. Twenty-five acres of severely eroding land were rehabilitated. This resulted in a sediment reduction of approximately 2200 tons/year.

2. Turbidity and suspended sediment was monitored on two projects.

Data acquired from the monitoring projects is stored in STORET.

NFS in Florida

The soil and water staff and district personnel cooperatively monitored turbidity and suspended sediment using ISCO automatic water samples on two projects in order to assess the impacts of constructing concrete low-water crossing structures. Preliminary results indicate that impacts occur during channel disturbance, but are very short lived, and can be mitigated by following simple precautionary measures.

Francis Marion and Sumter NF

National forest personnel rehabilitated 104 acres in the South Carolina Piedmont. This resulted in an estimated sediment reduction of over 5,000 tons annually.

Turbidity was monitored at 12 water quality stations. The data are on "Storet."

Chattahoochee-Oconee NF

In 1982, the National Forests were involved in measuring and/or reducing sediment levels by two means. The results are as follows:

Measurement

Measurements of turbidity and total suspended solids were taken at one station, Jigger Creek, on two occasions. Results are reported in STORET, Station Code 031222.

Reduction

Watershed improvements were performed on two types of projects on the forests: (1) Watershed Restoration - 52 acres, and (2) Watershed Enhancement - 100 acres. Total estimated sediment reduction for these projects is 2200 tons in 1982.

NFS in North Carolina

Water quality stations listed below monitored suspended sediment and/or turbidity.

Storet Code	Station Name
11 05 01	Upper Armstrong Creek Intake
11 05 02	Bee Rock Branch Intake
11 05 03	Upper Raceway Outfall
11 05 04	Cow Creek
11 05 05	Pups Branch Intake
11 05 06	Bad Fork Intake
11 05 07	Lower Raceway Outfall

NFS in Mississippi

Restoration measures by the National Forests in Mississippi resulted in a sediment reduction of approximately 600 tons on 12 acres.

SOUTH ATLANTIC-GULF REGION

GEOLOGICAL SURVEY

Chowan-Roanoke Subregion

1. Suspended-sediment data are collected bimonthly at Nottoway River near Sebrell, Va., Dan River at Paces, 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.

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 13,900 acre Jordan Lake, in cooperation with the U.S. Army Corps of Engineers.

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 at the Yadkin River at Yadkin College, N.C., as a Federal Sediment Index Station.

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 U.S. Corps of Engineers.

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 Wagesboro, 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 U.S. Corps of Engineers, Mobile District.

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 at Alabama River near Montgomery, Ala., incooperation with the Corps of Engineers and quarterly 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 Corps of Engineers, bimonthly at Tombigbee River at Gainsville 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 U.S. Corps of Engineers, to estimate the impact of sediment loads on the Tennessee-Tombigbee Waterway.

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 U.S. Corps of Engineers.

Pascagoula Subregion

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

2. Suspended-sediment data are being collected on a bimonthly 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 on Blue Creek near Oakman, Ala., at Turkey Creek below State Hwy. 69 near Tuscaloosa, 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.

2. Once daily and storm event suspended-sediment samples are 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 3 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 U.S. Army Corps of Engineers.

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
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
1835 Assembly Street, Suite 658
Columbia, SC 29201

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

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

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

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

SOIL CONSERVATION SERVICE

1. Studies of sediment damages and determinations of sediment yields were made for watershed plans in the following watersheds during 1982:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Lynches River	Back Swamp	Back Swamp	Lee	S. Carolina
Santee-Cooper	Buffalo-Muddy	Buffalo-Muddy Fork	Cleveland, Gaston, & Lincoln	N. Carolina
Chocatwhatchee-Escambia	Upper Choctawhatchee 03140201	Bear Creek, a portion of watershed No. 130	Geneva & Houston	Alabama

b. River Basin Investigations

Major Basin	Basin Reported	State
Tar-Neuse	Tar	N. Carolina
Savannah Ogeechee Altamaha Swannee	Southeast Georgia Land and Water Cooperative Study-28 counties	Georgia

c. Resource Conservation and Development

Project Name	County	State
Berry-Smith Irrigation Group	Edgefield	S. Carolina
Spelltown	Colleton	S. Carolina
Chestatee-Chattahoochee	Hart	Georgia

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoir:

Reservoir	Date of Survey	Location (County)	Drainage Area (Sq.Mi.)
Mill Creek, Site No. 7	9-7-82	Whitfield	9.63

3. Special Studies:

Sediment yield studies on several selected existing reservoirs were begun during 1981 and continued through 1982 in conjunction with a Statewide Cooperative River Basin Study of South Carolina.

GREAT LAKES REGION

CORPS OF ENGINEERS

North Central Division

Buffalo District

Lorain Harbor, OH, Erosion and Sedimentation Study. In conjunction with the above study, a support agreement was entered into with the U. S. Geological Survey to conduct a 1-year sediment sampling program in the Black River, OH, Watershed. Sediment sampling was performed at various locations in the Black River basin from 14 June 1980 through 30 June 1981. The purpose of the program was to provide sediment yield data at various locations on the river in order to identify the prolific source areas of sediment within the basin.

The sampling network consisted of water discharge and daily sediment load measurements at the permanent gage on the main stem, Black River at Elyria, OH as well as one additional continuous record gage and two partial record gages established upstream on the east and west branches. Suspended sediment loads were measured at the two continuous record stations by both automatic and manual methods. Suspended sediment and discharge data were collected periodically at the two partial record stations. In addition, between 13-16 April 1981, a series of discharge measurements and sediment cross-sections were made on the Black River about 1/2 mile upstream of Lake Erie (at Lorain Harbor) following a single run-off event. Bed material samples were collected at all the stations.

Results of this 1-year sediment sampling program were incorporated into a Preliminary Feasibility Report on Lorain Harbor, OH. This report addressed sedimentation and erosion from both streambank and upland erosion. Results of the study concluded that of the 241 bank miles of streambank only 11 percent were actively eroding. This study concluded that annual streambank erosion produced 10,700 cubic yards of sediment. Results from the upland erosion portion of this study indicated that there is considerable erosion from this source. Estimates of loss from this source amount to about 835,000 tons annually.

This report concluded that streambank erosion control improvements cannot be economically justified and therefore this study was terminated.

Sedimentation Report on 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 District, in cooperation with the Commonwealth, conducts an annual replenishment program. In 1982, 283,720 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 bathymetrically and topographically surveyed in April 1982 and September 1982. 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.

A hydraulic physical model test was conducted at Waterways Experiment Station during 1980 and 1981 and completed in 1982 on the design of protection for the prevention of beach erosion at Presque Isle. In addition, field data was collected as part of a tracer study of the littoral sediment movement along the offshore bar system. Reports on both of these studies are being prepared.

Sedimentation Report on Maumee Bay State Park. Maumee Bay State Park, located on the south shore of Lake Erie approximately five miles east of Toledo, Ohio, is a 1,855 acre Ohio Department of Natural Resources facility with a 11,000 foot long shoreline. Severe shore erosion is a major threat to this development and possible solutions are being addressed through a joint ODNR and Corps of Engineers Beach Restoration Study. Paradoxically, although the Maumee Bay State Park shore exhibits one of the highest erosion rates on Lake Erie, it also experiences one of the gentlest wave climates. Local wave data and sediment transport information is absent and the lack of native sand deposits in the nearshore prohibits a reasonable qualitative evaluation. In order to identify the potential stability of an unprotected medium sand beach and predict nourishment and back passing quantities for a breakwater alternative, a sand transport test was initiated in October 1981 and continued through the spring of 1982. This test consisted of the placement of 50 cubic yards of a natural tracer sand as an elongated sand "groin" which was then periodically surveyed and sampled along with the surrounding shore to determine direction, quantity and rate of transport. Open file report 82-1 of the Ohio Department of Natural Resources, Division of Geological Survey, entitled "A tracer-sand Study of Littoral Transport, Maumee Bay State Park, Lucas County, Ohio." by Jonathan A. Fuller, describes the results of this test.

Sedimentation Report on 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 District in cooperation with CERC is 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.

Hydographic and topographic surveys were made in April 1982 and September 1982. The April '82 surveys extended 2,000 feet west and 4,500 feet east of the project. Quantities of sediment transport in the project area were computed from the survey data.

A moveable-bed hydraulic physical model test was conducted at the Waterways Experiment Station during 1982 reproducing the sediment transport conditions observed in the prototype.

Sedimentation Report on Cleveland Harbor Section 111 Study. Under Section 111 of the River and Harbor Act of 1960 (P.L. 90-483; approved 13 August 1968) the District conducted a study of shore erosion damages in Cleveland Harbor and adjacent shorelines with the intent of determining if and to what degree the Federal Navigation works may have contributed to shore damage.

Recession rates were developed for 21 miles of shore for the periods 1876-1937,1937-1973, and 1876-1973 based on historical maps and aerial photographs. Based on theoretical calculations, bed material sampling and bathymetric surveys it was determined that the upstream portion of the Federal navigation annually traps approximately 45,000 cubic yards of sand-sized material. This represents a quantity of potential littoral material which is annually denied to the system by maintenance dredging.

As a result of this study described in a Stage 2 Checkpoint Conference Document, dated October 1982, the maintenance dredging program will be modified to, where practical, dispose of the sand-sized material offshore of the impacted areas of shoreline.

Reservoir Sedimentation Survey on Mt. Morris Dam. Mt. Morris Dam is located on the Genesee River in Livingston County, NY about 67 miles upstream from the mouth. The reservoir is entirely contained in the deep valley gorge of the river between Mt. Morris and the lower Portage Falls. In accordance with EM-1100-2-4000, Reservoir Sedimentation Investigation Program, dated 15 November 1961, a resurvey was conducted in 1980 for this reservoir. The purpose of the investigation was to determine whether sediment was accumulating behind the dam and thus reducing the capacity of storage.

In January 1980, the first photogrammetric survey was conducted. The area capacity curve developed from this survey was used for the 1982 sedimentation report. It was compared to the area capacity curve developed from the range profile survey in 1963 to determine the net change. Results show that total sediment accumulation occupied 11 percent of the total reservoir storage at the spillway level. This value may not be representative of actual reservoir sedimentation, however, because the method of analysis changed between 1963 and 1980 due to problems with the earlier survey methods. The surveys that were conducted in 1963 and 1957 used the range profile method and the survey of 1980 used the photogrammetric method. To ensure a more accurate long term rate of sediment accumulation, another photogrammetric survey is planned for 1985 to compare to the original photogrammetric survey of 1980. At that time the schedule for future photogrammetric surveys will be determined.

Sediment Activities at Genesee River, Genesee, NY. Streambank erosion and meandering of the Genesee River has been observed in a 20-mile reach downstream of the Mt. Morris Dam. A study has been initiated to determine the causes for this erosion and also to investigate the effect, if any, of the construction and operation of the dam on the erosion and meandering of the river. The study involves the analysis of the past aerial photographs, available historic physical data, and the use of computer models.

Sediment Activities at Keshequa Creek, Nunda, NY. Local stream bed scour in Keshequa Creek near the Church Street bridge in Nunda, NY resulted in exposing the village water main and sewer pipes. In order to arrest the erosion, the village constructed a sheet pile weir approximately three feet high downstream of the exposed pipes and backfilled to cover the pipes. Since Keshequa Creek is a very steep-sloped stream and carries a considerable gravel bed load, additional aggradation has occurred upstream of the weir. In order

to determine the reduction in channel capacity and to estimate the effect of additional shoaling, water surface profiles were calculated for assumed aggradation scenarios. These resulted in recommendations on the amount of allowable shoaling in the creek on the criteria established for its removal.

Environmental Analyses of Harbor Sediments for O&M Program. In 1982, sediment samples were obtained from the following list of project locations within the District. The sediment samples were subjected to bulk chemical analysis, elutriate chemical analysis, mechanical analysis and bioassay testing.

At the Times Beach disposal area, Buffalo, NY, special bioassay studies were performed to determine if there is a bioaccumulation of heavy metals and organics in earthworms. Also, water chemistry analysis was performed.

In addition, special testing of Ashtabula River sediments (EP toxicity, column leach and settling tests) is presently being carried out to supply data for evaluation and design of an upland disposal facility.

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	Type	Type of Tests	Date of Award	Date of Completion
Cleveland Harbor	O&M	Bulk Elutriate Bioassay	May 82	Nov 82
Erie Harbor	O&M	Bulk Elutriate Bioassay Mechanical	Jul 82	Dec 82
Buffalo Times Beach	O&M	Water	Jul 82	Dec 82
Buffalo Times Beach	O&M	Worm Bioassay	Apr 82	Dec 82
Ashtabula River	O&M	Bulk EP Toxicity Column Leach Settling	Aug 82	Dec 83

Sedimentation Activities for Division M&O Branch

In 1982, sediment densities were determined in the federal navigation channels of the harbors listed below. This was done using the nuclear density probe. Also listed are tests performed on sediment samples obtained from Buffalo, Fairport and Huron harbors.

Harbor	Project Type	Test Type
Ashtabula, OH	M&O	Density
Buffalo, NY	M&O	Specific Gravity Particle Size Density
Conneaut, OH	M&O	Density
Erie, PA	M&O	Density
Fairport, OH	M&O	Specific Gravity Particle Size Density
Huron, OH	M&O	Specific Gravity Particle Size Density
Lorain, OH	M&O	Density
Sandusky, OH	M&O	Density
Toledo, OH	M&O	Density

Suspended Sediment Sampling. Daily samplings were conducted with Depth-integrating sampler D-49 on Cuyahoga River at Independance, OH and on Maumee River at Waterville, OH for Cleveland Harbor and Toledo Harbor O&M purposes. Types of records maintained are mean daily discharge and suspended sediment discharge.

Detroit District

Sedimentation activities at the two harbors are listed below:

Harbor	Sampling Equip. & Type	Sampling Frequency	Station Purpose
Harrisville, MI	Piston	Before Nourishment	To determine suitability of material for Beach Nourishment
Lexington, MI	In Borrow Pit	Before Nourishment	To check nourishment against required gradation

GREAT LAKES REGION

Forest Service

Erosion control measures were applied on thirty acres on the Huron, Manistee, Hiawatha, and Ottawa National Forests.

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 sites 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:

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

SOIL CONSERVATION SERVICE

Special Study

New York - A complete gross erosion (sheet & streambank) study, along with delivery estimates, was made on the 61 square mile Otisco Lake Watershed. The USGS, in cooperation with Onondaga county, has installed 6 water quality stations on 5 tributaries to the lakes. These stations periodically monitor suspended sediment in addition to chemical parameters. Otisco Lake is one of the surface water supplies for the city of Syracuse.

OHIO REGION

CORPS OF ENGINEERS

Ohio River Division

Report on sedimentation activities in the Ohio River Division for calendar year 1982 is as follows:

Sedimentation Resurveys

1. Grayson Lake. A detailed resurvey of the 26 existing sediment ranges at Grayson Lake, Little Sandy River, Kentucky, was conducted in 1982. A report on the resurvey is scheduled for completion in 1983.

2. Sedimentation reconnaissance surveys were conducted in 1982 at Beech Fork Lake, Beech Fork, WV, Burnsville Lake, Little Kanawha River, WV, and North Fork of Pound Lake, North Fork of Pound River, VA. A letter report on the reconnaissance investigation at North Fork of Pound Lake was submitted in 1982. Reports on the Beech Fork Lake and Burnsville Lake reconnaissance investigations are scheduled for completion in 1983.

3. Reports on the 1980 resurveys at East Lynn Lake, Twelvepole Creek, WV, and at R. D. Bailey Lake, Guyandotte River, WV, and the 1981 resurvey at Summersville Lake, Gauley River, WV were submitted in 1982.

4. Reports on the Sedimentation Reconnaissance resurveys conducted in 1981 at Beach City Lake, Sugar Creek, OH, Leesville Lake, McGuire Creek, OH, Wills Creek Lake, Wills Creek, OH, and Deer Creek Lake, Deer Creek, OH, were submitted in 1982.

5. Tygart Lake. A detailed sedimentation report for the 1973 Tygart Lake Project Survey was completed and submitted during calendar year 1982. This project is scheduled for a reconnaissance survey in 1983.

6. Conemaugh River Lake. A reconnaissance sedimentation survey was completed at Conemaugh River Lake during 1982. The survey covered the entire reach of the total storage pool (elevation 975 feet NGVD) using the same range monuments established in the 1966 survey. In addition, three Category C ranges were established downstream of the reservoir. The detailed sedimentation report will be submitted during the third quarter of fiscal year 1983.

7. Old Hickory Reservoir. The Old Hickory Reservoir resurvey of September 1980 was approved by the Division in January 1983. A report showed a low deposition rate with the largest accumulation occurring in the portion of the reservoir where several major tributaries enter.

8. Martins Fork Reservoir. The 1981 and 1982 resurveys show that another survey is needed in 1983. A report will be prepared after the 1983 survey which possibly could recommend future sediment study activities for Martins Fork Reservoir.

9. Dale Hollow Lake. The report of the August 1980 range resurvey is complete and will be submitted for review soon. Only a minor amount of deposition has occurred since 1960, showing that the reservoir volume is remaining stable.

10. Lake City, Tennessee, Local Protection Project. In May 1982, seven sediment ranges were established and 13 ranges were resurveyed to better define the amount and location of sediment deposition. A backwater model was developed to determine the deposition effect on the channel design flood. The model showed the design flood profile would be increased approximately two feet in elevation and cause significant increase in flood damage. Recommendations have been made to remove the accumulation of sediment and return the channel to its designed capacity.

11. Corbin, Kentucky, Local Protection Project. Seventeen sediment ranges were resurveyed on Lynn Camp Creek in June 1982. Comparison of the 1973 (original survey), 1979 and 1982 range surveys show minor deviations in cross section elevations.

12. Middlesboro, Kentucky, Local Protection Project. A resurvey of ranges on the Middlesboro canal was made in July of 1981. Volume computations made during the summer of 1982 showed that deposition at that time had a minor effect on increasing the heights of the design flood. However, a resurvey and establishment of additional ranges is planned for the summer of 1983 since significant deposition now appears to be present.

Sediment Load Measurements.

1. Fishtrap Lake, Levisa Fork, Kentucky, and Dewey Lake, Johns Creek, Kentucky. The U. S. Geological Survey collected suspended sediment data at the Johns Creek at Meta, Kentucky, monitoring station as a part of a cooperative agreement with the Huntington District through 30 September 1982. After that date, the Huntington District collected the suspended sediment data at this station. Suspended sediment data were collected by the U. S. Geological Survey with participation by the Huntington District at the Levisa Fork, at Big Rock, VA, gaging station through 30 September 1982. After that date, the Huntington District collected suspended sediment data at this station. The Huntington District collected suspended sediment data on four tributary streams in the Fishtrap Lake Drainage Basin throughout 1982. Also in the Fishtrap Lake Drainage Basin, the Huntington District collected suspended sediment data on Grapevine Creek beginning 1 October 1982. Suspended sediment data were collected by the Huntington District on three tributary streams in the Dewey Lake Drainage Basin through 1982.

2. R. D. Bailey Lake, Guyandotte River, WV. Suspended sediment data were collected by the Huntington District at the Clear Fork and the Baileysville monitoring stations during 1982.

3. Data collection and a pilot study of the sediment control dam on Defeated Creek, a tributary of Carr Fork Lake, was completed and the final report was submitted.

4. Four monitoring stations were established at the LittCarr Sediment Dam, Carr Fork Lake. Equipment at each site consists of an automatic sampler and strip chart reporter; records to be developed for each station include suspended sediment load and discharge.

5. Barbourville, Kentucky, Local Protection Project. A sediment transport model was developed for the Cumberland River and a high flow diversion channel as part of the Barbourville Local Protection Project under Section 202 (Public Law 96-367). The system was modeled to be used in a diversion channel design and to determine if excessive maintenance problems would exist in the main and diversion channels.

6. Upper Cumberland River Basin. Sediment sampling (grab samples) by the U. S. Geological Survey at Harlan, Pineville, Middlesboro and Barbourville, Kentucky, is continuing in anticipation of sedimentation studies, necessary for implementation of Section 202 (Public Law 96-367) work.

OHIO REGION

Forest Service

Daniel Boone NF

Kentucky - Licking Sub-region

Forest personnel monitored one project (timber sale) for turbidity. Information on four stations will be stored in "Storet."

Cumberland Sub-region

Forest personnel monitored four projects for turbidity (1 base line for timber activities, 3 for coal extraction). Information on twenty-two stations will be stored in "Storet." Additional protective maintenance of drainage systems and vegetative cover on 232 acres of previously reclaimed abandoned coal mines was continued.

Watershed restoration was accomplished on 10 acres in FY 1982 and maintenance was done on 92 acres resulting in a net reduction in sediment loss of approximately 400 tones.

Jefferson NF

Baseline monitoring station established on Bournes Brance near Grayson County, Campbell County, Virginia Line, includes automatic suspended sampling.

Other National Forests

Thirty-six acres of erosion control measures were applied on thirty-six acres on the Allegheny, Wayne, Hoosier and Shawnee National Forests.

Northeastern Forest and Range Experiment Station

The Northeastern Station has long-term studies underway to determine sediment yield from watersheds which have been treated in one of several ways: (1) Forest land undisturbed since 1908, (2) Farm land abandoned in the 1930's, (3) Forest land partially harvested using wheeled skidders and carefully constructed logging roads. In addition, unit scientists have been studying the effects of logging road construction on sediment production on the Fernow Experimental Forest. Road disturbance data are being collected on rates of growth, soil moisture regimes, surface runoff patterns, and any change in acidity or alkalinity of runoff water from the road area.

In addition, the Northeastern Station maintains approximately 80 stream gaging stations on mined and unmined watersheds in Appalachian coalfields of Alabama, Tennessee, Kentucky, Virginia, West Virginia, Ohio, Pennsylvania, and Maryland. Monthly grab samples are analysed for suspended solids in addition to various chemical parameters.

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.

Upper Ohio Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Ohio 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 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, 1982).

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., Big Coal River near Alum Creek, W. Va. (discontinued September 30, 1982), Coal River at Alum Creek, W. Va. (discontinued September 30, 1982), Coal River at Tornado, W. Va., Rock Creek at Danville, W. Va., Rock Creek at Rock Creek, W. Va. (discontinued September 30, 1982), 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 about monthly at Cranbery Creek at

Beckley, W. Va., Little Whitestick Creek at Beckley, W. Va., and Soak Creek at Sophia, W. Va.

4. Suspended-sediment data are being collected on a 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:

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. In cooperation with the U.S. Bureau of Mines and the Office of Surface Mining, Reclamation and Enforcement, suspended-sediment data were collected on a event basis and with automatic samplers at the following sites as part of a study of the effects of land-use changes on the magnitude and frequency of flood-peak flows and on sediment characteristics of the Tug Fork in Kentucky, Virgina, and West Virginia (discontinued September 30, 1982):

Right Fork Hurricane Creek near Stopover, Ky.
Puncheoncamp Branch at Leckie, W. Va.
Left Fork Sandlick Creek at Elbert, W. Va.
Pumpkin Branch near Hurley, Va.
Camp Creek near Argo, Ky.
Elkfoot Branch near Nigh, Ky.
Elkhorn Creek Tributary at Welch, W. Va.
Freemans Branch near Skygusty, W. Va.
Right Fork Sandlick Creek near Gary, W. Va.
Crane Creek near Panther, W. Va.

4. Suspended-sediment data collection was begun on a twice-weekly plus storm-event basis in October 1980 at the following sites in the Tug River basin (discontinued September 30, 1982):

Pumpking Branch near Hurley, Va.
Camp Creek near Argo, Ky.

Rt. Fork Hurricane Creek near Stopover, Ky.

and at Elkfoot Branch near Nigh, Ky., in the Levisa Fork basin. All four of these stations were established to provide information to assist in investigation of flooding in the Tug Fork basin of Virgina, Kentucky, and West Virginia.

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

6. Suspended-sediment data are being collected on a daily basis at Johns Creek near Meta, Ky., to monitor sediment discharge into Dewey Lake. The work is being done in cooperation with the U.S. Corps of Engineers, (COE), Huntington District (discontinued September 30, 1982).

7. 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.

Great Miami Subregion

1. Suspended-sediment data are being collected on an intermittent basis at Whitewater River at Brookville, Ind., 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.

2. Suspended-sediment data are being collected on a monthly basis at the following stations, in cooperation with the Kentucky Natural Resources and Environmental Protection Cabinet:

Licking River near Sherburne, Ky.
South Fork Licking River at Cynthiana, Ky.
North Fork Kentucky River near Jackson, Ky.
Middle Fork Kentucky River at Tallega, Ky.
South Fork Kentucky river at Booneville, Ky.
South Fork Elkhorn Creek at Midway, Ky.

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 two sites in Indiana using automatic sediment samplers as part of the Federal Coal Hydrology program.

2. Suspended-sediment data were collected monthly at White River at Hazelton, Ind., as part of NASQAN (quarterly frequency beginning October 1982).

3. Suspended-sediment data are being collected on a monthly basis at Wabash River at New Harmony, Ind., and at Little Wabash River at Main Street at Carmi, Ill., as a part of NASQAN (quarterly frequency beginning October 1982).

4. Suspended-sediment data were being collected every other day at Embarras River near Oakland, Ill., in cooperation with the U.S. Army Corps of Engineers, Louisville District (discontinued September 30, 1982).

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, 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. (started April 1, 1981)

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.

2. Suspended-sediment data are being collected on a once-weekly and storm-event basis at Ohio River at Louisville, Ky., in cooperation with the C.O.E., Louisville District.

3. Suspended-sediment data are being collected on a monthly basis at the following stations, in cooperation with the Kentucky Natural Resources and Environmental Protection Cabinet:

Floyds Fork near Crestwood, Ky.
Floyds Fork at Fisherville, Ky.
Beech Fork at Maud, Ky.
Tradewater River at Olney, Ky.

Special Studies

1. Suspended-sediment data were collected with automatic samplers 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 Greene County.

2. A rainfall-runoff modeling station was installed on 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 and daily basis at Convers Run near Valley Point, W. Va., and 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 1982. 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. In cooperation with the Tennessee Department of Transportation, the problem of scour at highway bridges has been investigated at known and potential problem sites across Tennessee. The project report "Man-induced channel adjustment in Tennessee streams" by Clarence H. Robbins and Andrew Simon has been released as U.S. Geological Survey Open-File Report 83-43.

11. A 5-year study was initiated in 1980 to model the cumulative downstream effects of coal mining in the Smoky Creek basin, Tennessee. In conjunction with this study automatic suspended-sediment samplers are operating at 5 sites.

12. In cooperation with the U.S. Army Corps of Engineers, 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.

13. 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.

14. 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).

15. A three-year study to test the predictive capability of several digital models to simulate streamflow and the transport of sediment and other water-quality constituents in an agricultural watershed in the coal-mining region of Indiana began in October 1981. Three watershed models will be calibrated and verified using data from one watershed. The study is part of the coal hydrology program.

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
Federal Building and U.S. Courthouse
Room 3416
500 Quarrier Street, East
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

SOIL CONSERVATION SERVICE

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

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Wabash River	Lake Sara	Blue Point Creek	Effingham	Illinois
Muskingum River	East Branch Sugar Creek	East Branch Sugar Creek	Tuscara-was	Ohio
Muskingum River	Killbuck Creek	Killbuck Creek	Wayne	Ohio
Cumberland	Little River	South Fork	Christian	Kentucky
Tippecanoe River	Bruce Lake	Overmeier Ditch	Fulton	Indiana
Ohio	Red River	Summers Branch	Summer	Tennessee
Ohio	Grave Creek	Middle & Little Grave Creeks	Marshall	W. Virginia

b. River Basin Investigations

Major Basin	Basin Reported	County	State
Ohio River	East Fork Massac Creek	McCracken	Kentucky
Ohio River	Kanawha		W. Virginia

2. Reservoir Sedimentation Surveys

a. Reservoir sedimentation surveys are completed on the following:

Reservoir	County	State
Upper Wabosh #2	Mercer, Drake	Ohio
Caney Creek MPS #2	Grayson	Kentucky
Mud River MPS #33	Logan	Kentucky
Mill Creek #4	Jackson	W. Virginia
Salem Fork #11A	Doddridge	W. Virginia

TENNESSEE REGION

Forest Service

NFS in North Carolina

Suspended sediment was monitored on the water quality stations listed below.

Storet Code	Station Name
11 07 36	Fletcher Creek
11 07 35	Middle Fork
11 07 37	Spencer Branch

Watershed restoration was accomplished on 10 acres in FY 1982 and maintenance was done on 92 acres resulting in a net reduction in sediment loss of approximately 400 tons.

Cherokee NF

Forty-nine acres of severely eroding lands were rehabilitated. This resulted in an annual sediment reduction of approximately 2,450 tons. Stream turbidity was monitored at twenty stations. The data are stored in Storet.

Chattahoochee-Oconee NF

Watershed restoration was completed on 5 acres resulting in a reduction of about 250 tons of sediment.

Jefferson NF

Baseline monitoring stations were established on High Knob in Scott and Wise Counties, Virginia to include automatic sampling of suspended sediment.

Restored 10 acres of abandoned roads in Scott County, Virginia. This resulted in an estimated 500 tons per year reduction in sediment.

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.

3. In cooperation with the North Carolina Department of Natural Resources and Community Development, suspended-sediment samples are collected about monthly at Pigeon River near Hepco, N.C.

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 sampler at Tennessee-Tombigbee Waterway at Cross Roads, Miss., in cooperation with the U.S. Corps of Engineers.

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.

Special Studies

In cooperation with the Tennessee Department of Transportation, the problem of scour at highway bridges has been investigated at known and potential problem sites across Tennessee. The project report "Man-induced channel adjustments in Tennessee Streams" by Clarence H. Robbins and Andrew Simon has been released as a U.S. Geological Survey Open-File Report 73-43.

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
Room 436, Century Postal Station
300 Fayetteville Street Mall
Raleigh, NC 27602

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

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
A-413 Federal Building
U.S. Courthouse
Nashville, TN 37203

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

SOIL CONSERVATION SERVICE

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

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Clinch River	Copper Ck	Copper Ck & Tribs	Scott & Russell	Virginia
Tennessee	Hiwassee	Conasauga Ck	McMinn	Tennessee

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoir:

Reservoir	County	State
Reelfoot-Indiana No. 7	Obion	Tennessee

TENNESSEE VALLEY AUTHORITY

Notes on Sedimentation Activities for Calendar Year 1982

Tennessee River Basin

Ocoee No. 1 Reservoir

The reservoir was filled in 1911 and TVA made a survey in 1940, but ranges were not established until 1949 at which time monuments were emplaced for 38 ranges. Six sediment surveys were made from 1954 to 1979. A survey made in 1982 indicates a total deposit of 25,900 acre-feet of sediment and a storage loss of 23.7 percent since dam closure in 1911.

Ocoee No. 3 Reservoir

Twenty-eight of the 31 established ranges were surveyed in 1982. This reservoir was filled and ranges established in 1942. Fourteen sediment surveys were made from 1945 to 1979. The 1982 survey indicated a total deposit of 10,000 acre-feet of sediment and a storage loss of 73 percent, a net reduction of 900 acre-feet of deposits since the previous survey in 1979. The reservoir was drawn to minimum levels in order to flush sediment from the reservoir.

Normandy Reservoir

This reservoir was filled and 31 ranges surveyed and monumented in 1976. All ranges were surveyed in 1982. Calculations indicate a total deposit of 970 acre-feet of sediment for a storage loss of 0.76 percent.

Sediment Oxygen Demand

In situ measurements of sediment oxygen demand were made at two locations in Fort Loudoun Reservoir and one location in Tellico Reservoir.

Sediment Sampling

Sediment samples were collected for PCB analysis from 25 locations in Fort Loudoun Reservoir, the Little River embayment and tributaries to the Little River, and six locations in the Beech Creek embayment of Kentucky Reservoir. One areal composite sample was collected from the forebay area of each main stem Tennessee River reservoir and Melton Hill and Douglas Reservoirs, and at the mouth of the Fleet Hollow embayment of Wilson Reservoir. These 12 composite samples were analyzed for moisture content, loss on ignition, particle size distribution, PCBs, and the metals on the NRDC consent decree list (Cu, Zn, Ag, Be, Cd, Pb, Cr, As, Se, and Hg) plus iron and manganese.

UPPER MISSISSIPPI REGION

CORPS OF ENGINEERS

North Central Division

Chicago District

The District conducted a feasibility study of the Fox River and its tributaries in Illinois and Wisconsin to investigate the water and related land resource problems and needs in the Fox River Basin. For this study an investigation was made of the various literature sources relating to sedimentation in the Chain-of-Lakes. The existing data was organized and evaluated with regard to the sources of sediment accumulating in the lakes, trap efficiencies and the rate of sediment deposition in the Chain. The results of this investigation were presented in a report for the District by CH2M Hill. "Investigating Sedimentation in the Fox River Chain-of-Lakes and Associated Channels", February 1982.

A sediment sampling program was conducted at Waukegan Harbor, Illinois during November 1982 in relation to proposed maintenance dredging. Grab samples of sediment were collected from four locations and used for analysis of their pollutional nature. Elutriate tests were performed on sediment samples in order to evaluate the leaching of contaminants under controlled conditions. The results of these analysis will be presented in a report in February 1983.

The Chicago District funded two USGS suspended sediment discharge stations during water year 1982. These stations are located on the Kankakee River near Wilmington, Illinois and on the Des Plaines River at Riverside, Illinois. Suspended sediment load is recorded daily at these stations. Data is available through WATSTORE data storage and retrieval system.

Rock Island District

Suspended Sediment Sampling. Suspended load sampling is being conducted at 32 stations; 3 located on the Mississippi River and 29 on its tributaries. Fourteen long-term stations are operated and maintained directly by the District. Eighteen 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 19 stations located on tributaries of the Mississippi River. At 15 of these stations suspended sediment samples are also collected. At the remaining four stations, the Turkey River at Garber, Iowa; Skunk River at Augusta, Iowa; Rock River at Jefferson, Wisconsin; and the Rock River at Afton, Wisconsin, only bedload samples are collected. Bedload samples are collected during the 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.

St. Paul District

Sediment load measurements (suspended sediment, bed material samples) were made at 14 stations, and all measurements are being conducted by the U. S. Geological Survey under St. Paul District sponsorship. Five stations in Rochester, Minnesota are operated under the Rochester Flood Control Project. Samplings were conducted monthly and the total load determined by Modified Einstein Method. At the rest of nine stations, samplings were conducted daily.

UPPER MISSISSIPPI REGION

Forest Service

Erosion control measures were applied on twelve acres on the Chippewa National Forest.

University of Wisconsin

The University of Wisconsin is conducting an "Evaluation of Streambank Management on Trout Habitats in the Upper Sugar Creek Watershed Wisconsin." Results of this investigation should yield information supporting the establishment and management of streamside vegetation to reduce streambank erosion and resulting sedimentation and maintain fish habitat.

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.

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 U.S. Corps of Engineers.

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.
Flordin Cr. near Burr, Minn.
Lac Qui Parle River near Conby, 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 U.S. Corps of Engineers.

3. Suspended-sediment data are being collected on a periodic and storm-event basis during October and mid-March to September 30 at Stockton Valley Creek at Stockton, Minn. and at Garvin Brook near Minnesota City, Minn., in cooperation with Minnesota Pollution Control Agency.

4. Suspended- and bed-material data are being collected on a periodic and storm-event basis for the U.S. Corps of Engineers, at Chippewa River at Durand, Wis., and at Black River at Galesville, Wis.

5. Suspended sediment and bed material data are being collected on an intermittent basis for the U.S. Corps of Engineers, at Chippewa River near Caryville, Wis., and at Chippewa River near Pepin, Wis.

Upper Mississippi-Maquoketa-Plum Subregion

1. Suspended-sediment data are being collected on a daily basis at Upper Iowa River near Dorchester, Iowa, (discontinued September 30, 1982) and at Mississippi River at McGregor, Iowa, as a part of the Great River Environmental study in cooperation with U.S. Corps of Engineers, St. Paul District.

2. Suspended-sediment data are being collected on a periodic and storm-event basis to determine daily suspended-sediment loads for the U.S. Corps of Engineers at the Grant River at Burton, Wis.

3. Suspended-sediment data are being collected on a periodic and storm-event basis to determine daily loads in cooperation with the Wisconsin Department of Natural Resources at the following sites (discontinued September 30, 1982):

Pats Creek near Belmont, Wis.
Madden Branch Tributary near Belmont, Wis.
Madden Branch near Meckers Grove, Wis.
Apple River near Shullsburg, Wis.

4. Suspended-sediment data are being collected at Maquoketa River near Maquoketa, Ia., as a part of the Great II River Environmental study in cooperation with the U.S. Corps of Engineers, Rock Island District (discontinued December 31, 1981).

5. Suspended-sediment data are being collected on a storm-event basis at Turkey River at Garber, Iowa, as part of Great II study in cooperation with

Turkey River at Garber, Iowa, as part of Great II study in cooperation with the U.S. Corps of Engineers, Rock Island District (discontinued September 30, 1981).

Wisconsin Subregion

1. Suspended-sediment and bed-material data are being collected on a periodic and storm-event basis for the U.S. Corps of Engineers 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 Crow Creek at Bettendorf, Iowa as part of the Great II River Environmental study in cooperation with U.S. Corps of Engineers, Rock Island District (discontinued December 31, 1981).

5. Suspended-sediment data are being collected on a storm-event basis at Wapsipinicon River at De Witt, Iowa, as part of Great II study in cooperation with the U.S. Crops of Engineers, Rock Island District (discontinued September 30, 1981).

6. Suspended-sediment data are being collected on a daily basis at Iowa River at Wapello, Iowa, in cooperation with U.S. Corps of Engineers, Rock Island District. Suspended-sediment data are also being collected on a bimonthly basis as a part of NASQAN.

7. Bed load-sediment data are being collected on a storm-event basis at Iowa River at Wapello, Iowa and Skunk River at Augusta, Iowa, in cooperation with U.S. Corps of Engineers, Rock Island District, Great II study (discontinued September 30, 1981).

Rock Subregion

1. Suspended-sediment data are being collected on a periodic and storm-event basis to determine daily suspended-sediment loads for the U.S. Corps of Engineers, Rock Island District at (discontinued September 30, 1982):

Crawfish River at Milford, Wis.
Turtle Creek near Clinton, Wis.
Sugar River near Brodhead, Wis.

Pecotonica River at Martintown, 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.
Willow Creek at Madison, Wis.

3. In cooperation with the Rock Island District, U.S. Army Corps of Enginners, suspended-sediment data was collected every other day at Rock River near Joslin, Ill, (discontinued September 30, 1982). However, suspended-sediment data are being collected on a bimonthly basis 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, U.S. Army Corps of Engineers.

2. Suspended-sediment data are being collected on a daily basis at Des Moines River at St. Francisville, Mo., in cooperation with the U.S. Corps of Engineers, 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. In conjunction with the operation of these stations, a sediment reservoir sedimentation study is being conducted at Lake Panorama at Panora, Iowa (completed April 1981). 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 U.S. Corps of Engineers, Rock Island District.

2. Suspended-sediment data are being collected on a daily basis and particle-size data collected on a intermittent basis in cooperation with the Missouri Division of Environmental Quality at the following sites:

North Fork Salt River near Hunnewell, Mo.
South Fork Salt River at Santa Fe, Mo. (discontinued June 30, 1982)
Youngs Creek near Mexico, Mo. (discontinued June 30, 1982)
Middle Fork Salt River at Duncans Bridge, Mo. (discontinued June 30, 1982)
Middle Fork Salt River at Paris, Mo.
Elk Fork Salt River near Paris, Mo. (discontinued June 30, 1982)

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 U.S. Army Corps of Engineers, 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.

2. In cooperation with the Chicago District, U.S. Army Corps of Enginners, and the Illinois Department of Transportation, Water Resources Division, suspended-sediment data were being collected every other day at:

Des Plaines River at Riverside, Ill. (discontinued September 30, 1981)
Kankakee River near Wilmington, Ill. (discontinued September 30, 1981)

Lower Illinois Subregion

1. Suspended-sediment data are being collected every other day, in cooperation with the St. Louis District, U.S. Army Corps of Engineers, at Illinois River at Valley City, Ill., additional samples are collected on a bimonthly basis as part of the NASQAN program.

Upper Mississippi-Kaskaskia-Meramec Subregion

Suspended-sediment data are being collected every other day, in cooperation with the Rock Island and St. Louis Districts of the U.S. Army Corps of Engineers, at the following sites:

Kaskaskia River at Cooks Mills, Ill.
Sangamon River near Oakford, Ill.
Illinois River at Valley City, Ill.
Kaskaskia River at Venedy Station, Ill.
Big Muddy River at Murphysboro, Ill.

Suspended-sediment samples are also collected on a bimonthly basis at all of 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 U.S. Army Corps of Engineers, 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 U.S Army Corps of Engineers, 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 U.S. Army Corps of Engineers, St. Louis District.

Special Studies

1. Five stations were established in the Rochester area in cooperation with the St. Paul District, U.S. Army Corps of Engineers, to determine changes in sediment yield from channelization. The periodic stations include Bear Creek on Belt Line, Minn., Cascade Creek at Rochester, Minn., Silver Creek at Rochester, Minn., and S.F.K. Zumbro River on Belt Line, Minn. S.F.K. Zumbro River near Rochester, Minn. is a daily station. In addition, all stations are sampled during three storm events per year.

2. Suspended-sediment data are being collected every other day 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 are 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 strip mining progresses and also to calibrate, test, and verify a predictive model on strip-mining impacts.

Laboratory Activities

The Geological Survey laboratory in Iowa City, Iowa, analyzed suspended-sediment samples collected by the Corps of Engineers 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

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
Mississippi River	Troublesome Creek	Troublesome Creek	Knox, Lewis, Marion	Missouri
Mississippi River	Grassy Creek	Grassy Creek	Lewis, Marion	Missouri

b. River Basin Investigations

Major Basin	Basin Reported	Watershed	State
Illinois River	Kankakee	Kankakee River	Illinois
Illinois River	Cooperative Study	Lake Decatur	Illinois
Kaskaskia	Cooperative Study	Racoon Lake	Illinois
Mississippi River	Cooperative Study	Fountain Creek	Illinois
Mississippi River	Cooperative Study	Kincaid Lake	Illinois
Rush-Vermillion	Northern Loess Hills	Isabelle Creek	Wisconsin
Grant-Little Maquoketa	Northern Loess Hills	Rattlesnake Creek	Wisconsin
Pecatonica	Northern Loess Hills	Richland Creek	Wisconsin, Illinois

c. Special Studies

Major Basin	Basin Reported	State
Mississippi River	Great III	Missouri, Illinois

d. Public Law 639

Major Basin	Basin Reported	State
Minnesota River	Yellow Bank Watershed	Minnesota, South Dakota

2. Reservoir Sedimentation Surveys

a. A reservoir sedimentation survey was completed in the following:

Reservoir	County	State
Diamond Lake C-14	Poweshiek	Iowa

b. A reservoir sedimentation survey was initiated in the following:

Reservoir	County	State
Plain Honey #4	Sauk	Wisconsin

LOWER MISSISSIPPI REGION

CORPS OF ENGINEERS

Lower Mississippi Valley Division

Memphis District

Sediment sampling continued at the 20 stations in the St. Francis River Basin and at the 3 stations on the L'Anguille River. Suspended sediment samplers DH76TM, DH78, D74ALTM and bed sampler BMH60 were used. Samples 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 14 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; Lower Atchafalaya River at Morgan City, LA, monthly; Red River at Fulton, AR, semimonthly; Red River at Shreveport, LA, semimonthly; Red River at Alexandria, LA, semimonthly; Red River above Old River Outflow Channel, semimonthly; Atchafalaya Basin, Bayou Chene below Bayou Crook Chene weekly; Atchafalaya Basin, Lake Long Below Bayou La Rompe, weekly; Atchafalaya Basin, Little Tensas below Blind Tensas Cut, weekly; Atchafalaya Basin, East Access Channel above Chicot Pass, weekly.

2. Daily suspended sediment samples were taken on the Red River at Colfax, LA.

3. A cooperative program with the U. S. Geological Survey for collection and analysis of suspended sediment samples was in effect for stations located on the Mississippi River at St. Francisville, Plaquemine, Union, Luling Ferry, Violet, and Venice, LA. Samples were taken on the Red River at Boyce and Moncla, LA. The sampling frequency was monthly and the data will be published by USGS in its annual publication.

4. Sediment data collection in the Red River Basin was transferred to the Vicksburg District, August, 1982.

5. 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 samples were taken with a trap type sampler.

Office Investigations

For the District, WES is undertaking a predictive 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 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

Sedimentation Surveys. A resurvey of upstream sediment and downstream retrogression range for Carlyle Lake was initiated during calendar year 1982. The resurvey is complete with the exception of sedimentation ranges 7A and 9A, which will be resurveyed in early 1983. The data analysis will be completed and submitted by late 1983, depending on work priorities.

The Report of Sedimentation, 1980 Resurvey for Rend Lake and the Report of Sedimentation, 1980 Resurvey for Lake Shelbyville were completed and approved. The reports analyzed both the 1974 and 1980 resurvey data for the respective lakes.

The initial survey of the upstream sediment and downstream retrogression range for Mark Twain Lake (Clarence Cannon Dam) were completed, except for sediment ranges 23B and 45B. These ranges will be surveyed as soon as the right of entry is obtained.

Sediment Load Measurements. Three sedimentation ranges on the Illinois River were resurveyed. They are located at Meredosia, Pearl and Hardin, Illinois. Data collected included suspended sediment, bed samples and current velocities. It is anticipated that these ranges will be resurveyed this year, with the results analyzed for the on-going navigation study.

A sediment range was established on the Mississippi River at Mile 204.7 to obtain data for the Lock and Dam No. 26(Replacement) hydropower study. Suspended sediment, bed samples and current velocities were obtained at two

different flow conditions, open river (March 1982) and pooled (August 1982). This range will be resurveyed periodically to obtain data for different flow conditions.

There are total of 31 sediment stations within the District. The numbers of stations added and dropped from the program during the calendar year were three and seven, respectively.

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.

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 on-going 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. Sedimentation data was collected at approximately 37 stations during 1982. Bed samples are collected using either BM-54, BMH-60, or drag bucket bed material samplers while suspended samples are collected using either D-57, D-48, D-74, or P-61 suspended material samplers.

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 continued on the Boeuf River project alternatives to determine project effects on sediment inflows and methods of minimizing sediment depositions. Sediment routing model HEC-6 is being used. This study should be completed in 1983.

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 initiated. This should be completed in the early part of 1983.

4. The Yazoo Basin Sedimentation Study, initiated in 1979 by the District and Colorado State University, was continued in 1982. The purpose of the study is to determine 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. The study will determine the engineering feasibility of modifications to lessen sedimentation problems and enhance flood control capability in the Basin. Work accomplished to date has provided estimates of anticipated sediment deposition rate, indicated major problem areas, and verified original projections of anticipated maintenance problems which were used in project formulation. Alternative designs of channels and effects of tributary sediment control have been analyzed. The study is scheduled for completion in 1983.

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 U. S. D-49 and the concentration in terms of the percent of weight were maintained.

LOWER MISSISSIPPI REGION

Forest Service

NFS in Mississippi

Forest restored 9 acres of eroding lands resulting in about 450 tons of sediment reduction.

Ouachita NF

National Forest personnel installed water control measures and revegetated 17.5 acres of old roads and gravel pits. This resulted in an annual sediment reduction of 875 tons.

Turbidity was monitored at six stations. The data are in "STORET."

Ozark-St. Francis NF

The Ozark-St. Francis National Forests accomplished 6 acres of watershed improvements, providing an estimated sediment reduction of 35 tons per year. One hundred (100) acres of previous improvements received maintenance.

LOWER MISSISSIPPI REGION

GEOLOGICAL SURVEY

Lower Mississippi - Hatchie Subregion

1. Suspended-sediment data are being collected on a bimonthly 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.

2. Suspended-sediment data are being collected on a monthly basis at Bayou de Chien near Clinton, Ky., in cooperation with the Kentucky Natural Resources and Environmental Protection Cabinet.

Lower Mississippi - St. Francis Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at St. Francis River at Parkin, Ark., St. Francis Bay at Riverfront, Ark., Arkansas River at Dam 2 near Gillette, Ark., and at White River at Clarendon, Ark., as a part of NASQAN (quarterly frequency began October 1982).

Lower Mississippi - Yazoo Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Mississippi River near Arkansas City, Ark., and at Yazoo River at Redwood, Miss., and on a monthly basis at Yazoo River near Shell Bluff, Miss., as a part of NASQAN (quarterly frequency began October 1982).

Lower Red - Ouachita Subregion

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

Lower Mississippi - Lake Maurepas Subregion

1. Suspended-sediment data are being collected on a bimonthly 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 Mississippi River near St.

Francisville, La., as a part of NASQAN.

Louisiana Coastal Subregion

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

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

Mississippi River at Belle Chasse, La.
Tchefuncte River near Covington, 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:

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

Special Studies

1. In cooperation with the Tennessee Department of Transportation, the problem of scour at highway bridges has been investigated at known and potential problem sites across Tennessee. The project report "Man-induced channel adjustments in Tennessee streams" by Clarence H. Robbins and Andrew Simon has been released as U.S. Geological Survey Open-File Report 83-43.

2. Monthly collection was begun at 23 stations on the St. Francis River and selected tributaries in October 1977 for the Corps of Engineers. Monitoring is expected to continue for five years. Following the 5-year period, the existing network may be reduced to a few stations that would be monitored more intensively.

3. Suspended-sediment data are collected on a weekly basis and for selected storm events on Tillatoba Creek below Oakland, Miss., and South Fork Tillatoba Creek near Charleston, Miss. This information is collected in cooperation with the U.S.Soil Conservation Service in order to estimate the sediment loads of Tillatoba Creek during periods of high discharge.

4. Suspended-sediment samples are collected on a monthly basis on Coldwater Creek and David Bayou near Sledge, Mississippi. The samples are collected as part of a lignite hydrology project.

5. 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.

6. 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 U.S. Corps of Engineers 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

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

SOIL CONSERVATION SERVICE

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

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Lower Mississippi (08)	Obion River	Wolf Creek	Gibson	Tennessee

b. River Basin Investigations (PL-639)

Major Basin	Basin Reported	State
Lower Mississippi (08)	Wolf River	Tennessee Mississippi
Lower Mississippi (08)	Loosahatchie River	Tennessee

SOURIS-RED-RAINY REGION

GEOLOGICAL SURVEY

Souris Subregion

1. Suspended-sediment data are being collected on a monthly basis at Souris River near Westhope, N. Dak., as part of the National Stream Quality Accounting Network (NASQAN) (quarterly frequency beginning in October 1982).

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 bi-monthly 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 monthly basis at Beaver Creek near Finley, N. Dak., as a part of the National Hydrologic Benchmark Network (quarterly frequency beginning in October 1982).

3. Suspended-sediment data are being collected on a bimonthly 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.

Special Studies

Suspended-sediment data are being collected during periods of high flow at two sites in the Turtle River basin, N. Dak., in cooperation with the U.S. Soil Conservation Service (discontinued September 30, 1982).

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

MISSOURI REGION

BUREAU OF LAND MANAGEMENT

Colorado

As part of the Technical Investigations program, two sediment sampling stations are located on the Canadian River. These stations are placed above and below potential coal lease tract areas for the purpose of determining impacts associated with coal mining. These two stations are:

1. Canadian River near Brownlee.
2. Canadian River near Lindland.

Montana

Sediment yield studies are being conducted on native rangeland in central and eastern Montana. Measurement of long-term deposition in small reservoirs is being used to characterize average annual yield by geologic/soil type and surface resource management.

Suspended sediment data is being acquired in connection with coal hydrology studies in eastern Montana and western North Dakota. These studies, being conducted cooperatively with the Geological Survey, are being used to define baseline hydrologic characteristics and forecast probable impacts of surface coal mining.

Data collection is underway in preparation for development of a watershed management plan for the Willow Creek Watershed. Sediment yield problems are chief among the concerns that will be addressed in the plan.

Wyoming

North Platte River.

Area encompasses approximately 600 square miles. Continuing (third year) data collection and monitoring in order to identify and quantify severe sediment source areas. Investigations will result in formulating watershed management plans.

Powder River Basin.

Basic data collection, including water quality, sediment, and discharge is being continued (second year) on selected ephemeral and perennial drainages.

South Bighorn Mountains.

Monitoring of changes in water quality, sediment, and discharge in response to timber management activities is continuing.

Fifteenmile Creek.

Cooperative study plan with the University of Wyoming and DEQ was continued in 1982. Progress include the site selection for a riparian exclosure, channel morphology, and animal behavior study site. All studies are directed toward the impact of riparian zone uses on sedimentation. Three ICSO automated samples were installed by the Bureau of Land Management to monitor suspended sediment concentration from upper drainages. Repair of existing watershed structures was continued.

North Platte River.

The Pacific Southwest Interagency Advisory Committee (PSIAC) ratings were determined on approximately 2.2 million acres in the Overland and Gas Hills environmental impact statement areas. Data were collected to identify sediment source areas and quantify sediment yields.

The continuation of these efforts are, of course, dependent on available funding.

MISSOURI REGION

Bureau of Reclamation

A degradation analysis for the terminal drop structure in the third sectior of the Mirdan Canal in Nebraska was completed. The channel streambed is expected to degrade to elevation 2035 at the terminal drop structure with releases from the Mirdan Canal. A local scour of 7 feet was estimated for a 100-year flood peak on the watershed above the terminal drop structure. Therefore, the combined effect of degradation and local scour is estimated to be a streambed lowering down to elevation 2028, a total depth of 17 feet.

A sediment sampling program was established in the South Platte River near Weldona, Colorado, and on four canals which divert from the river in the vicinity of Narrows damsite.

A hydrographic resurvey was completed for Bighorn Lake above Yellowtail Dar on the Bighorn River. Of the established 68 sediment ranges, 44 ranges were resurveyed by hydrographic means in the reservoir area extending from range 1 near the dam upstream to range 34, a distance of about 60 miles. Due to high reservoir level and dense vegetation in the delta several ranges above range 34 will have to be surveyed after the reservoir level is drawn down in the fall of 1982. In the narrow canyon area the resurvey was accomplished by use of a depth fathometer and tethered piano wire-distance measuring device mounted on a small boat. In the wide bay area in and above Horseshoe Bend the resurvey was by means of Reclamation's Mini Ranger III automated survey system. Sediment core samples were taken in and above Horseshoe Bend using a gravity core sampler lowered and retrieved from the deck of the survey boat.

A study was made of Guernsey Reservoir silt runs for the North Platte R&B Program based on a sediment sampling program and comparative reservoir surveys. The study was for the purpose of determining the present and future effectiveness of the silt runs for providing sediment to the downstream distribution system. Under current operations during the silt runs some of the deposited sediment in the upper reach of the reservoir is being eroded and transported into the lower reach where a portion is redeposited in the small pool and the remainder passes downstream to the river. The silt runs will continue to be effective at providing the present level of concentrations for the next 15 years, diminishing somewhat following that period.

The analyses were completed for the 1981 sediment survey of Harry Strunk Lake on Medicine Creek in Nebraska. The computed sediment accumulation for the period of 1949-1981 is 5,850 acre-feet which equates to a sediment yield rate of 0.282 acre-foot per square mile per year. There has been some shift of capacity in the reservoir due to extensive bank erosion.

A sediment survey was completed on Swanson Lake on the Republican River in Nebraska. The four sediment ranges on the main stem nearest the dam were surveyed by hydrographic methods, the remainder by standard land surveying procedures. A set of six parallel lines were also surveyed in the vicinity of the irrigation outlet works intake to be used in producing a bathymetric topography of that area.

MISSOURI BASIN REGION

CORPS OF ENGINEERS

Missouri River Division

Kansas City District

Sediment Load Measurements. The measurement of suspended sediment was continued at 19 stations through the year. At the end of the water year, 2 stations were discontinued. The discontinued stations were the ones located at Clay Center, Republican River, and Fort Riley, Kansas River. Currently in operation are three main stem Missouri River stations and 14 tributary stations. The Missouri U. S. Geological Survey collects monthly point depth integrated and bed samples under the cooperative stream gaging program on the main stem stations of the Missouri River. The remaining stations are operated by contract observers. Because of demand, load computations are being compiled through WY 1982 for the District's stations.

Lake Investigations.

Kanopolis Lake. A third resurvey of Kanapolis Lake was conducted. The resurvey consisted of only running a portion of the flood pool and the multipurpose pool in total. The main emphasis for the resurvey was to determine the remaining storage available for water supply. No surveys of degradation ranges were made nor have density core samples been collected. Volume computations for a revised elevation capacity relationship are nearing completion.

Hillsdale Lake. Surveys of Category A and C ranges have been completed.

Long Branch Lake. Completion of all category A ranges was completed this year.

Special Studies.

1. Reconstitution of all the original lake capacity curves, using sedimentation ranges, to an exact fit from 5 feet below multipurpose pool to 15 feet above and at the top of flood control pool, has been completed with no more than 1% deviation from the original curve in volume at any other lake elevation as a criteria. A methodology was developed in this reconstitution of the capacity curves which reduces the prior trial and error computational procedures to a minimum of 2 and maximum of 3 computational runs for all future surveys. All lakes which have been resurveyed have been updated using this method.

2. Push and Shelby tube core samples were extracted from the outlet conduit at the confluence of White Clay Creek and the Missouri River at Atchison, Kansas. Laboratory testing for density, gradation, petrographic analysis, and cation exchange capacity was performed. Critical shear stresses were evaluated for the clayey material contents. A partial analysis was made

using HEC-6 and other bed load equations to determine the depth, location, and quantity of material that theoretically may be removed under the design storm runoff as modified by the numerous SCS structural controls in the watershed. Prototype profiling of the deposits indicates some surface scour and filling have occurred over time with various flows in the conduit, especially during a low Missouri River stage. However, it appears that the material is too cohesive to expect bedload formula to show significant scour or transport of the compacted material below the surface.

3. A program has been established below the Harry S. Truman project in the headwaters of the Lake of the Ozarks to monitor the rates of bank line erosion from the dam to near 30 miles downstream. Twelve downstream sites were established at key locations which had indicated a history of movement or appeared to be vulnerable to attack. These sites were sampled monthly during the calendar year. Four suspended sampling stations were established in the reach. Core samples in the Lake of the Ozarks' delta and in coves were collected to measure the "fluff" depth and compared to those collected during 1979-80. Intensive suspended sediment sampling and velocity distribution at several sites have been performed for each increase in the incremental step up of power generation. The results of the monitoring program for CY 1982 are being prepared as a separate report.

Omaha District

Sediment Load Measurements. The District operated seven suspended sampling stations during the calendar year. Of these, two are Missouri River stations, and five are major tributary stations. The U. S. Geological Survey operates the 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 five to seven point integrated samples per stream vertical at five vertical locations in the cross-section as well as one bed sample at each vertical. The samples, including the velocity measurements, 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. Papillion Creek Project. The first resurvey of Glenn Cunningham Reservoir was made and included soundings of all sediment range cross-sections. The results will be used to determine the volume and distribution of the sediment, and will then be compared to the estimate used for the initital design storage allocation for sedimentation over the life of the project.

2. Bear Creek Project. The underwater portions of the sediment ranges were surveyed, thus completing the original survey of the Bear Creek Reservoir.

3. Oahe Project. Thirty-nine cross-sections were established and surveyed on the Missouri River in the reach immediately upstream of Bismarck, North Dakota. This data, along with detailed mapping of the flood plain lands, will be used for a detailed flood hazard analysis of the reach for use in the Lake Oahe-Bismarck Area Study.

4. Garrison Project. A reconnaissance survey was made of Lake Sakakawea and included uncontrolled soundings of 15 mainstem and 22 tributary ranges. Also included was a water surface profile of the backwater reach extending upstream to the Yellowstone River.

5. Water Surface Profiles. Water surface profiles were obtained on the Fort Peck degradation reach from the dam downstream to Wolf Point, Montana, for 6-, 10-, and 14-thousand cfs steady flow conditions. A profile was also obtained on the Fort Randall degradation reach from the dam to Springfield, South Dakota, at a discharge of 31,000 cfs.

Special Studies.

1. A report was published entitled "Missouri River Bedload Evaluation Through Multi-Channel Sequential Profiles." It presents the results of a study to compute bed load transport in the Missouri River using zero crossing and spectral analysis techniques. Sequential bed profiles taken at two-hour intervals from a one-mile reach of the Missouri River at Omaha, Nebraska, on 29 August 1979, using the Missouri River Division's new Multi-Channel Profiler were utilized for this analysis. Three longitudinal lines were sounded: one near the left bank of the channel, one near the center, and the third close to the right bank. The results of the investigation confirm the potential for using sequential profiles to compute bed load transport and demonstrate an excellent means for monitoring the statistical variation and physical movement of bed forms. An updated version of this report, using 15-channels of digital data, collected at three-hour intervals, along five longitudinal lines in the same reach, in July 1982, is under way and will be published in 1983.

2. A report was published entitled "Missouri River User's Manual Sediment Transport Program ODSET". It provides instructions for use of the Omaha District Sediment Transport Package, ODSET, developed as an extension to the discussions on sediment transport analysis presented in MRD Sediment Series Report No. 19. ODSET provides a means of analyzing Missouri River at-station sedimentation data which include point-integrated (PI), depth-integrated (DI), and combined PI-DI suspended load data coded in the formats used within the District.

3. A report was completed on the sedimentation load analysis of the Platte River. The report covers analysis from the Platte River at Louisville, Nebraska on 5 October 1977. Conclusions reached from this analysis are that the present DI sampling program at Louisville should not be replaced with the special point sampling program now under way on the Missouri River at the Omaha and Nebraska City, Nebraska stations. Also, it was determined that, at least for the Platte River: (a) PI samples offer no special advantages over DI samples, provided that the measured concentrations and velocity readings

are uniformly distributed throughout the vertical water column; and (b) results of total load computations using the DI samples and the Modified Einstein Total Load Procedure are not significantly different from those obtained by integrating point measurements using Einstein's numerical integration scheme.

4. A preliminary reassessment was made of the degradation potential in the South Platte River reach in the downstream Chatfield channel improvement project. Degradation experienced in the study reach during high flows of 2,100 cfs has raised fears that degradation under design conditions would exceed the three-foot limit allowed to insure stability of proposed instream structures. The reassessment, which included use of the HEC-6 Scour-Deposition Math Model, revealed that the potential for degradation could be substantially greater than three feet through most of the channel improvement reach. However, recent foundation explorations made in the vicinity of proposed structures indicate bedrock at elevations that would prevent degradation of this magnitude. The principal concern at this point is that the improved channel alignment would still pass over areas of readily movable bed material at some intervening locations and allow degradation in exceedence of the three-foot limit considered essential through the study reach. Additional core drill data are being obtained to verify this possibility.

5. An assessment was made of shoreline erosion at Lake Sakakawea. It covers analyses of shoreline erosion data representing 30 years of historical sedimentation cross-section profile records. As shown by the prototype data, erosion characteristics and trends vary significantly from location to location. Only in a few instances could the trends be found to agree with the assumptions used in the District's conventional technique for evaluating ultimate erosion limits. Had the conventional analysis been applied at each range location, the erosion experienced to date would have exceeded the projected ultimate limit at 80 percent of the locations. Additional studies similar to this will be conducted for the other reservoirs to quantify the full severity of the problem.

6. A feasibility study for maintaining adequate water levels in McCook Lake in South Dakota was conducted under the authority of Section 22 of the Water Resources Development Act of 1974. Local lake renovation efforts have been initiated to dredge the lake to a depth not to exceed fifteen feet. These efforts will expose more permeable bed material, thereby increasing the lake-groundwater interaction. Combined local factors including degradation of the nearby Missouri River had been identified under the Section 22 request as causes for probable declines in the groundwater. This study was conducted to determine whether or not there are feasible methods of maintaining the lake level in conjunction with the ongoing dredging efforts. Methods of lake bottom sealing and selective dredging were investigated as well as that of obtaining additional sources of water to supplement the lake level.

7. An update was completed of the Omaha District's 1973 and 1980 Bismarck Groundwater Studies. The results of this study which includes an assessment of 21 groundwater wells, are being used to identify interrelationships between groundwater levels, river stages, Lake Oahe pool levels, and localized river

and lake aggradation effects. The interrelationships are defined through multiple regression analysis, although techniques such as auto-regression and Fourier analysis were also applied. Since the regression analysis failed to identify phase relationships visually evident in the data, additional more complex spectral analyses will be made during the coming year to quantify the phase relationships between the groundwater levels and the river stages.

8. Bank line erosion assessments and sediment deposition potential were made for selected recreational areas located on Lake Francis Case, Lake Oahe, Lake Sharpe and Lake Sakakawea.

9. An ultimate shoreline erosion study was conducted at the Garrison Cottage Site Area in Lake Sakakawea. The objective was to determine which lands would be adversely affected by wind-wave action and/or shoreline erosion. Early in the study it was determined that the ultimate erosion line traditionally developed using a cut-fill approach would not yield satisfactory results due to the large quantity of glacial till along the shore. Therefore, a 100-year erosion projection was made by extrapolating trends evident from 14 years of measured data. This estimate, in conjunction with an estimate of the limits of inundation due to waves, was used to determined whether or not the government property should be leased or sold.

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 daily basis at two sites on Muddy Creek near Vaughn, Mont., to monitor irrigation practices (discortinued September 30, 1982).

2. Suspended-sediment data are being collected on a bi-monthly basis at Missouri River at Toston, Mont., at Missouri River at Fort Benton, Mont., and at Marias River near Chester, Mont., as a part of NASQAN.

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

Belt Creek near Portage, Mont.
Highwood Creek near Portage, Mont.

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.

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

Missouri River at Virgelle, Mont.
Missouri River below Fort Peck Dam, Mont.

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 monthly basis at Red-

water River at Circle, Mont., Redwater River near Rickey, and at Redwater Creek near Vida, Mont., as a part of the Federal CBR program.

2. Suspended-sediment data are being collected on a bimonthly basis at East Poplar River at international boundary in cooperation with the Department of State (International Joint Commission).

3. Suspended-sediment data are being collected on a monthly basis at the following sites to define water quality characteristics of the Poplar River Basin in cooperation with the State of Montana:

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

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

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

6. 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.

7. Suspended-sediment data are being collected on a monthly basis at Hard-scrabble Creek near Culbertson, Mont., in cooperation with the Montana Department of State Lands.

Upper Yellowstone Subregion

1. Suspended-sediment data are being collected on a bi-monthly basis at Yellowstone River near Livingston, Mont., and 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-event 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 monthly and storm-event basis at Wind River near Crowheart, Wyo., at Nowood River near Tensleep, Wyo., and at Shoshone River near Lovell, Wyo., in cooperation with the Wyoming State Engineer.

4. 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.

5. 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.

6. 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, Upper Missouri Region.

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

8. 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.

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

10. Suspended-sediment data are being collected on a montly and storm-event basis at Shoshone River above Willwood Dam near Willwood, Wyo., and Ocean Drain near Midvale, Wyo., in cooperation with USBR, Upper Missouri Region.

11. Suspended-sediment data are being collected on a monthly basis (from April to September) at Cottonwood Drain near Shoshoni, Wyo., and Willwood Canal near Willwood, Wyo., in cooperation with USBR, Upper Missouri Region.

12. Suspended-sediment data are being collected on a monthly basis at Shoshone River below Willwood Dam, Wyo., in cooperation with USBR, Upper Missouri Region.

Powder-Tongue Subregion

1. Suspended-sediment data are being collected on a daily basis at Tongue River at Miles City, Mont., and at Powder River at Locate, Mont., as part of the Federal CBR program.

2. Suspended-sediment data are being collected March through September at Powder River at Moorhead, Mont., and at Powder River at Broadus, 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 in cooperation with the Wyoming State Engineer:

Goose Creek below Sheridan, Wyo.
Little Powder River above Dry Creek, near Weston, Wyo.

4. 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.

5. Suspended-sediment data are being collected on a monthly basis in cooperation with the Bureau of Land Management at the following stations:

Tongue River at Tongue River Dam near Decker, Mont.
Pumpkin Creek near Miles City, Mont.
Hanging Woman Creek at state line, near Otter, Mont.
Waddle Creek near Otter, Mont.
Trail Creek near Otter, Mont.
Corral Creek near Otter, Mont.
Locate Creek near Ismay, Mont.
Horse Creek near Birney, Mont.

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

Hanging Woman below Horse Creek, near Birney, Mont.
Otter Creek near Otter, Mont.
Otter Creek below Fifteen Mile Creek, near Otter, Mont.
Home Creek near Ashland, Mont.
East Fork Otter Creek near Ashland, Mont.
Locate Creek near Ismay, Mont.

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

Squirrel Creek near Decker, Mont.
Prairie Dog Creek near Birney, Mont.
Hanging Woman Creek near Birney, Mont.
Tongue River at Birney Day School near Birney, Mont.
Otter Creek at Ashland, Mont.
Mizpah Creek near Mizpah, Mont.

Lower Yellowstone Subregion

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

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

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:

East Fork Sarpy Creek near Colstrip, Mont.
Armelles Creek near Forsyth, Mont.
Rosebud Creek near Colstrip, Mont.
Cow Creek near Colstrip, Mont.
Rosebud Creek at mouth, near Rosebud, Mont.
Fox Creek near Lambert, Mont.
Lone Tree Creek near Sidney, Mont.
Beaver Creek at Wibaux, Mont.

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.
Rosebud Creek at reservation boundary near Kirby, Mont.
O'Fallon Creek near Ismay, Mont.
Yellowstone River near Miles City, Mont.
Yellowstone River near Terry, Mont.

Missouri-Little Missouri Subregion

1. Suspended-sediment data are being collected on a monthly basis at Missouri River near Williston, N. Dak., in cooperation with the Environmental Protection Agency (discontinued September 30, 1982).

2. Suspended-sediment data are being collected on a monthly basis at Bear Den Creek near Mandaree, N. Dak., as part of the National Hydrologic Benchmark Network (bimonthly frequency beginning in October 1982).

3. Suspended-sediment data are being collected on a bimonthly basis at Little Missouri River near Watford City, N. Dak., as part of NASQAN (quarterly frequency beginning in October 1982).

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

Beaver Creek near Ray, N. Dak. (discontinued September 30, 1982)
Deep Creek near Amidon, N. Dak.

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 bimonthly basis at Castle Creek above Deerfield Dam, near Hill City, S. Dak., as a part of the National Hydrologic Benchmark Network.

3. Suspended-sediment data are being collected on a monthly and storm-event basis at Red Water Creek at Wyoming - South Dakota State line in cooperation with the Wyoming State Engineer.

4. Suspended-sediment data are being collected on a daily basis at Belle Fourche River below Rattlesnake Creek, near Piney, 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.

5. 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 Riveriew, Wyo.
Caballo Creek at mouth, near Piney, Wyo.
Raven Creek near Moorcraft, Wyo.

Missouri-Oahe Subregion

1. Suspended-sediment data are being collected on a monthly basis at Spring

Creek near Zap, N. Dak., in cooperation with the U.S. Environmental Protection Agency (discontinued September 30, 1982).

2. Suspended-sediment data are being collected on a bimonthly 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 (quarterly frequency beginning in October 1982).

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

4. 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:

Knife River at Manning, N. Dak. (discontinued September 30, 1982)
Coyote Creek near Zap, N. Dak.
Brush Creek near Beulah, N. Dak.
Antelope Creek above Hazen, N. Dak. (discontinued September 30, 1982)
West Branch Antelope Creek near Hazen, N. Dak.
Alderin Creek near Fort Clark, N. Dak. (discontinued September 30, 1982)
Coal Lake Cl near Hensler, N. Dak. (discontinued September 30, 1982)
Buffalo Creek near Washburn, N. Dak. (discontinued September 30, 1982)
Square Butte Creek above Nelson Lake near Center, N. Dak. (discontinued September 30, 1982)
Hagel Creek near Center, N. Dak. (discontinued September 30, 1982)
S Branch Heart River near South Heart, N. Dak.
Heart River near South Heart, N. Dak.
Green River near New Hradec, N. Dak. (discontinued September 30, 1982)
Coal Bank Creek near Havelock, N. Dak.

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

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

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 U.S. Corps of Engineers.

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

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

2. Suspended-sediment data are being collected on a daily basis at the following stations in cooperation with the Lower James Conservency Sub-District:

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 U. S. Bureau of Land Management.

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 monthly and storm-event basis at the following stations in cooperation with the Wyoming State Engineer:

Little Medicine Bow River near Medicine Bow, Wyo.
Medicine Bow River above Seminoe Reservoir, near Hanna, Wyo.
Sweetwater River near Alcova, Wyo.
North Platte River at Casper, Wyo.
North Platte River at Orin, Wyo.
Laramie River near Fort Laramie, Wyo.
North Platte River at Wyoming - Nebraska State line

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 Corps of Engineers, 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 Sebilius Lake, and White Rock Creek near Burr Oak, Kans., in cooperation with the Kansas Water Office.

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.

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.

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 miscellaneous basis at Little Blue River at Hollenberg, Kans., in cooperation with the Nebraska Department of Environmental Control (discontinued September 30, 1982).

5. 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 begun in 1981 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 Avenue A, 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

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
Missouri River	Roy's Creek	Roy's Creek	Brown Nemaha	Kansas
Missouri River	Wolf River	Wolf River	Brown Doniphan	Kansas
Little Sioux River	Elkhorn #1	Direct Tribs.	Plymouth	Iowa
Little Sioux River	Corwin-Logan	Maple River Tribs.	Ida	Iowa
Little Sioux River	Big Coon	Bacon Creek	Woodbury Ida	Iowa
Platte River	Camp Creek	Camp Creek, Salt Creek	Lancaster	Nebraska
Platte River	Gering Valley	Gering Drain	Scotts Bluff	Nebraska
Platte River	Bone Creek	Bone Creek	Butler	Nebraska
Little Blue River	Balls Branch	Rose Creek	Thayer, Jefferson	Nebraska
Little Nemaha River	Upper Little Nemaha	Little Nemaha River	Lancaster, Cass Otoe	Nebraska
Little Nemaha River	South Branch	Little Nemaha River	Otoe, Johnson, Lancaster	Nebraska
Nemaha River	Middle Big Nemaha	Nemaha River	Johnson	Nebraska
Missouri River	Papillion	Papillion Creek	Washington, Douglas, Sarpy	Nebraska

b. River Basin Investigations

Major Basin	Basin Reported	State
Missouri River	Upper Missouri Tribs.	Nebraska
Missouri River	White River-Hat Creek	Nebraska

c. Conservation Operations

Name	County	State
Doerr Structure	Knox	Nebraska
McKinsey Structure	Burt	Nebraska
Bartac Gulch	Custer	Nebraska
Clear Creek	Custer	Nebraska

d. Resource Conservation and Development

Project Name	County	State
Sand Draw	Brown	Nebraska
Unick Irrigation Structure	Custer	Nebraska
Willow Creek	Brown	Nebraska

2. Reservoir Sedimentation Surveys

a. Reservoir sedimentation surveys were completed on the following:

Reservoir	County	State
Wild Rice-2	Marshall	South Dakota
Wilson Creek 5-H	Otoe	Nebraska
Oak-Middle 79-A	Lancaster	Nebraska
Big Indian 13-B	Gage	Nebraska
Aowa Creek 63-1A	Dixon	Nebraska
Thirty Two Mile Creek D	Adams	Nebraska

3. Special Studies

A joint sedimentation study was initiated by Montana State University and the Soil Conservation Service. Several small storage ponds were selected for sediment volume determination and chemical characteristics of sediment deposits. Studies ongoing during 1982, 1983, and 1984.

ARKANSAS-WHITE-RED REGION

BUREAU OF LAND MANAGEMENT

Colorado

The Badger Creek Cooperative Study.

This study is a cooperative study between the Bureau of Land Management (BLM), the Colorado Division of Wildlife, the Colorado State Land Board and Forest Service, the U.S. Forest Service, the Soil Conservation Service, the Sangre de Cristo Resource Conservation and Development Area, various other local governments, and Soil Conservation Districts. The purpose of this study is to identify sediment producing areas of this watershed. The watershed is a mixture of Federal, State, and private lands. Continuous sediment sampling is being conducted at two locations on Badger Creek. These stations are maintained by the Geological Survey, with the BLM providing partial funding.

This is the third year of the monitoring program.

Oklahoma

The Bureau financed and completed suspended sediment data collection at 12 sites in eastern Oklahoma as part of the USGS Coal Hydrology Monitoring Program. Ten sites were sampled automatically by PS-69 samplers and two sites by observers. Stations were operated and data is reported by the USGS. Data was collected to characterize sediment relationships of the coal region. About 3 years of record are currently available; a regional report will be prepared in the near future.

ARKANSAS-WHITE RED REGION

CORPS OF ENGINEERS

Southwestern Division

Albuquerque District

Sedimentation Resurveys. No reservoir sedimentation resurveys were conducted in 1982 in this region.

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. In December 1982, a sedimentation investigation was initiated to provide information pertinent to the planning and evaluation of water resources development of the Arkansas River at La Junta, Colorado. This investigation will thoroughly define all the factors involved in the production and movement of sediment within the Arkansas River Basin from the vicinity of La Junta upstream to Pueblo Dam.

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

Little Rock District

Sedimentation Surveys. Sediment ranges in Ozark Lake, Lake Dardanelle, the Entrance Channel, and Pools 2, 3, 4, 5, and 6 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 La Fave, White River, Taylor Bay, James River, Bryant Creek, North Fork, Current River, Black River, Piney Fork, Strawberry River and Little Red River. Type of records maintained are the concentration in percent of weight. U. S. Geological Survey operate 9 out of 34 stations.

Tulsa District

Sedimentation Surveys. The original survey of Copan Lake was initiated in January 1981 and completion is expected in June 1983. Reconnaissance surveys of John Redmond Reservoir, Keystone Lake, Lake Texoma, and Lake Wichita-City Lake of Wichita Falls, TX, have been completed. Contracts have been awarded for pole monument installation at Marion and Waurika Lakes with schedule completion of installation by April 1983. A detail resurvey contract of Marion Lake will be completed in January 1983. All resurvey data was obtained hydrographically using Motorola Mini Ranger III, Raytheon DSF 600 and DE 719

surveying equipment. Proposed hydrographic survey for FY 83 are pole monument installations at Pat Mayse Lake and Hugo Lake, and a detailed resurvey at John Redmond Reservoir.

Sediment Load Measurements. The suspended sampling program consists of 46 stations. Presently, there are 38 operational stations in the Arkansas River Basin and 8 operational stations in the Red River Basin. Five stations, Estelline, TX on Jonah Creek, Paducah, TX on Middle Pease River, Paducah, TX on North Fork, Wichita River, Childress, TX on Pease River and Farris, OK on McGee Creek were deleted as cost reduction measures.

Other Investigations. Recision of Reservoir Sediment Data Summary (ENG Form 1787) for the reporting of the 1979 resurvey of John Redmond Reservoir was requested. Reservoir Sediment Data Summaries for Keystone, Toronto, Robert S. Kerr, and Webbers Falls Lakes were submitted and approved. Preliminary Reservoir Sediment Summaries have been prepared on Heyburn and Oologah Lakes and should be submitted for approval in early 1983. Continued efforts in updating and revising the historical suspended sediment data for the District is being compiled for the WATSTORE data system and completion is expected in mid 1983. 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 basically complete and a review of the completed work is scheduled in FY 1983.

ARKANSAS-WHITE-RED REGION

Forest Service

Kisatchie NF

Forest personnel monitored 10 water quality stations for suspended sediment. Forty-two acres of eroding land was stabilized resulting in an estimated sediment reduction of 2100 tons annually. Two hundred and twenty acres of eroding forest lands were aerially fertilized. This treatment increases vegetative cover resulting in considerable sediment reduction. As a results of a recently completed soil monitoring project, prescribed burning on the Kisatchie soil series have been restricted.

Ozark-St. Francis NF

The Ozark-St. Francis National Forests accomplished 30 acres of watershed improvements, providing an estimated sediment reduction of 180 tons per year. Forty-six acres of previous improvements received maintenance.

Ouachita NF

Forest personnel installed water control measures and revegetated 9.6 acres of old roads and grave pits. This resulted in an annual sediment reduction of approximately 480 tons.

ARKANSAS-WHITE-RED REGION

GEOLOGICAL SURVEY

Upper White Subregion

1. Suspended-sediment data are being collected on a monthly basis at North Sylamore Creek near Fifty Six, Ark., as part of the National Hydrologic Benchmark Network (quarterly frequency began October 1982).

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 twice monthly basis at Arkansas River at Portland, Colo., in cooperation with the U.S. Bureau of Reclamation, Lower Missouri River Basin Region.

2. 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.

3. 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, 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.

Upper Cimarron Subregion

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

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 Cimmarron River at Perkins, Okla., in cooperation with the Oklahoma Conservation Commission, as a part of NASQAN.

3. Suspended-sediment data are being collected at Cottonwood Creek at Seward, Okla., (discontinued September 30, 1982), and at Cottonwood Creek near Navina, Okla., (began October 1, 1982), in cooperation with the U.S. Bureau of Reclamation.

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 Alma, Okla., in cooperation with the U.S. Corps. of Engineers (COE).

2. Suspended-sediment data are being collected on a monthly basis 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 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.

3. 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.

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 Canadian River at Bridgeport, Okla., in cooperation with the U.S. Bureau of Reclamation.

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

4. Suspended-sediment data are being collected at Canadian River at Purcell, Okla., in cooperation with the U.S. Corps of Engineers.

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 site in cooperation with the U.S. Corp of Engineers:

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 U. S. Corps of Engineers and 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 Tahleguah, 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 the following sites in cooperation with the U.S. Corps of Engineers:

Little Red River near Turkey, Tex.
Jonah Creek at Weir, near Estelline, Tex. (discontinued September 30, 1982)

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 on a quarterly basis 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 U.S. Corps of Engineers:

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.

3. 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 from 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 at McGee Creek near Farris, Okla., in cooperation with the U.S. Bureau of Reclamation

3. Suspended-sediment data are being collected on a bimonthly basis at Little River at Millwood Dam, near Ashdown, Ark., Red River at Index, Ark., and at Sulphur River south of Texarkana, Ark., as a part of NASQAN (quarterly frequency began October 1982).

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

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

6. Suspended-sediment data are being collected on a daily 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 U.S. Corps of Engineers 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
1950 Avenue A - 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
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
649 Federal Building
300 East 8th Street
Austin, TX 78701

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	Counties	State
Arkansas River	Dirty Creek	Dirty Creek	Muskogee McIntosh	Oklahoma
	Beaver Creek	Beaver Spring	Osage Cowley	Oklahoma Kansas
	Garrison Creek	Garrison	Sequoyah	Oklahoma
	North Canadian	North Deer Cr.	Potta-watomie Oklahoma Cleveland	Oklahoma
Salt Forks of Arkansas River	Bois d'Arc Cowskin	Bois d'Arc Cowskin Creeks	Kay	Oklahoma
Deep Fork Canadian River	Dry Creek	Dry Beaver Shiney N. Branch Chuckaho Dosie	Lincoln	Oklahoma
Grand River	Big & Little Cabin Cr.	Big Cabin Little Cabin Fraizer Branch West Fork Middle Fork Thompson White Oak Cool	Craig	Oklahoma
Red River	Lower Bayou	Simon Walnut Bayou	Carter Love	Oklahoma
	Waterfall-Gilford	Waterfall Gilford	McCurtain	Oklahoma
Neosho River	South Fork Cottonwood	Cottonwood River	Butler, Chase, Greenwood	Kansas

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoirs:

Reservoir	County	State
Sandstone Creek, Site No. 17	Roger Mille	Oklahoma
Owl Creek, Site No. 1	McClain	Oklahoma
Chigley Sandy Creek, Site No. 4	Garvin	Oklahoma
Mud Gulch, MG-1	Fremont	Colorado
Dry Creek	Fremont	Colorado

2. Special Studies

Erosion maps on 1/50,000 scale were prepared for the eastern part of Fremont County, Colorado.

Inventories of sheet, gully, and streambank erosion, including mapping on 1/24,000 scale maps, were made for the upper portions of Badger Creek and Currant.

TEXAS-GULF REGION

CORPS OF ENGINEERS

Southwestern Division

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

1. Approval of Cochiti Lake Resurvey Letter Report.

2. Approval of revisions to Clayton Lake, DM No. 15, Sedimentation and Degradation Ranges.

3. Approval of ENG Form 1787 (Reservoir Sediment Data Summary) for the Toronto Lake, Robert S. Kerr Lock and Dam, Webber Falls Lock and Dam No. 16 and Keystone Lake.

4. The Southwestern Division Laboratory received 521 suspended sediment samples for determination of percent sediment. There were 24 samples of bed material received to be tested for grain size distribution.

Fort Worth District

There were no sedimentation activities during CY 82. However, sedimentation surveys are scheduled at B. A. Steinhagen, Navarro Mills and Waco reservoirs for FY 83.

Galveston District

A total of 178 inplace samples were obtained from five navigation projects. These samples were analyzed to determine the quality of the sediment relative to chemical constituents which would be resuspended during dredging, disposal activities and construction. The projects sampled and the number of samples taken are as follows:

Navigation Project	No. of Samples Taken
Gulf Intracoastal Waterway	129
Sabine-Neches Waterway	23
Freeport Harbor	10
Miscellaneous	10
Corpus Christi Ship Channel	6
Total	178

TEXAS GULF REGION

Forest Service

NFS in Texas

The following sedimentation activities were accomplished in CY 1982 by the NFS in Texas:

1. One hundred and forty acres of critically eroding lands were rehabilitated in FY 1982. This resulted in an annual sediment reduction of 2,300 tons.

2. Forest personnel monitored turbidity on two projects. The results are in STORET.

3. Texas A&M University is monitoring 5 small watersheds (8-10 acres) on the Angelina National Forests. Regeneration and site preparation will take place on 4 of these watersheds in FY 1983. Quantity of runoff, nutrient load and sediment are the parameters measured.

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, TX., 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

SOIL CONSERVATION SERVICE

1. Reservoir Sedimentation Surveys

Reservoir Sedimentation Surveys were made in the following reservoirs during 1982:

Reservoir	Major Drainage	County	State
Miller's Creek Reservoir	Brazos River	Baylor and Throckmorton	Texas
Lake Stamford	Brazos River	Haskell	Texas

RIO GRANDE REGION

BUREAU OF LAND MANAGEMENT

Colorado

San Luis Study.

The objective of this study is to evaluate the watershed responses, as measured by runoff and sediment yield associated with changes in grazing intensities. Automatic sediment samplers are operated on San Luis Creek by the Geological Survey. This is an ongoing monitoring study that has been in process for several years.

Also in process, is the construction of checks dams, contours, and diversions in the San Luis Resource Area. These water control structures are a part of a plan to stabilize 350 acres of public land. These lands are presently producing excessive runoff and erosion.

New Mexico

Bureau of Land Management continued the funding of basic sediment data collection at three continuous-record stations in the Rio Puerco drainage basin, a major sediment producer to the Rio Grande. Gages are operated and reported by the USGS.

Collection of suspended sediment data is being continued as part of the upper Rio Grande and Red River Water Quality Study. The study is to characterize existing water quality and identify pollution problems for the management of the wild and scenic river. Physical and chemical water quality characteristics are measured monthly at 12 stations on the Rio Grande, Red River and other tributaries. The study is being conducted in cooperation with the USGS and data is available in WATSTORE.

A study to evaluate the impacts of intensive grazing management on runoff and sediment yield in the Rio Puerco drainage was initiated in the summer of 1981. Small watersheds were instrumented with rainfall-runoff gages and Manning automatic water samplers. This study is being conducted in cooperation with the USGS and the Forest Service.

RIO GRANDE REGION

Bureau of Reclamation

A review was made of the sedimentation aspects of the design data for Brantley Dam on the Pecos River. Approved were the 100-year sediment deposition of 116,300 acre-feet below the top of the flood control pool, a 100-year depth of sediment at the dam of 3259.4 m.s.l., the area and capacity tables for 1981 and 2081 conditions, and the tailwater water surface profiles.

A sediment distribution analysis was completed for the 50- and 75-year sediment inflows to Brantley Reservoir resulting in elevations for sediment deposition at the dam of 3238.7 and 3250.0 feet, respectively. The previously computed 100-year sediment inflow distribution resulted in an elevation of 3259.4 feet at the dam.

A survey of the "Mexican Duck Marsh" area of Elephant Butte Reservoir was completed as a means of assessing environmental effects related to reconstruction of the conveyance channel. Parallel lines spaced 500 feet apart were surveyed using an established sediment range as a reference line. The survey was accomplished by Reclamation's automated survey system.

A reservoir sediment distribution was completed by the empirical area reduction method for the Elephant Butte Reservoir on the Rio Grande. Distributing a sediment yield of 524,500 acre-feet for the period from 1915 to 1980 resulted in a revised elevation of 4259.4 at the dam for the type II reservoir.

RIO GRANDE REGION

CORPS OF ENGINEERS

Southwestern Division

Albuquerque District

Sedimentation Surveys

1. No reservoir sedimentation resurveys were conducted in 1982, however, a system of river cross-sections located below Cochiti Dam were surveyed in September and October 1982. The purpose of the survey was to continue to monitor the response of the Rio Grande to the operation of 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 processes such as channel degradation, bankline instability, armoring, and tributary sediment load influences.

2. A report describing the October 1981 resurvey of Cochiti Lake was completed in July 1982. The survey detected the formation of a significant deltaic formation of sediment deposits at the head of the permanent pool, resulting from two successive years of above normal flows. These deposits have had serious impacts on recreational uses of the project. Two additional sedimentation ranges were installed in September 1982 to aid future measurements of deposition near the head of the normal operating pool.

3. Several unsuccessful attempts were made to rectify erroneous reservoir cross-section data collected by aerial photographic methods at Jemez Canyon Dam during the October 1981 sedimentation resurvey. Further checks of ground control data and photographic data reduction methods will continue.

Sediment Load Measurements. Suspended sediment measurements were made at five stations in the Rio Grande Region. 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, Galisteo and Jemez Canyon Dams continued to be operated to control sediment flow in the Rio Grande.

RIO GRANDE REGION

GEOLOGICAL SURVEY

Rio Grande Headwaters Subregion

1. 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).

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 U.S. Bureau of Land Management (BLM).

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 bimonthly basis at Rio Grande below Elephant Butte Dam, N. Mex., as a part of NASQAN.

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

13. 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.

14. 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.

15. 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.

16. 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.

17. 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 daily basis at Rio Grande River near Brownsville, Tex., as part of the Federal CBR program and on a periodic basis as part of NASQAN.

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.

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 14 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

SOIL CONSERVATION Service

1. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were made in the following reservoirs.

Reservoir	County	State
Prop Canyon Site #1	Cibola	New Mexico
Upper Rio Hondo Site #1	Lincoln	New Mexico
Zuber Draw Site #3	Chaves	New Mexico

UPPER COLORADO REGION

BUREAU OF LAND MANAGEMENT

Colorado

Yampa Study.

As part of the Technical Investigation program, seven sediment sampling stations are located throughout the Yampa drainage basin. The objective of the sampling programs is to interpret the undisturbed natural hydrologic regime of an area which is to be strip mined at a later date. The results of this sampling effort will be used to characterize and model these basins. The stations which are being operated by the Geological Survey (GS) for this purpose are listed below:

1. Mouth of Foidel Creek near Hayden, Colorado.
2. Middle Creek near Oak Creek, Colorado.
3. Hubberson Creek near Hayden, Colorado.
4. Watering Trough Gulch near Hayden, Colorado.
5. Wilson Creek near Axial, Colorado.
6. Stokes Gulch near Hayden, Colorado.
7. Sage Creek near Hayden, Colorado.

Sediment collection has been dropped at all but the mouth of Foidel Creek near Hayden, and Sage Creek near Hayden stations in October 1982.

Badger Wash Study.

As part of the salinity program in Colorado, sediment samples are collected from Mancos shale derived soils at the Badger Wash Study Site near Mack, Colorado. Manning samplers have been placed on five sites to collect sediment and water quality information. These five sites were operated by the GS until October 1982.

1. Badger Wash observation reservoir 1-9, Prairie Dog site near Mack, Colorado.

2. Badger Wash observation reservoir No. 12, Middle Basin site near Mack, Colorado.

3. Badger Wash observation reservoir No. 12-A, West Twin Site near Mack, Colorado.

4. West Salt Creek near Carbonera, Colorado.

5. West Salt Creek near Mack, Colorado.

Salt Creek Study.

A Manning sampler for the collection of sediment and water qulity samples has been operating at Salt Creek in Sinbad Valley, Colorado, as part of the Salt Creek Salinity Control Project. Funding for this sediment collection effort will continue through Fiscal Year 1983.

Oil Shale Basin Study.

Sediment samples have been collected within the oil shale basins for the purpose of establishing a baseline. Impacts associated with oil shale development will be assessed from this baseline. The GS maintains the stations, with Bureau of Land Management (BLM) funds. Sediment samples were collected for the following stations until October 1982, at which time funding was dropped:

1. Piceance Creek below Ryan Gulch.
2. Piceance Creek at White River.
3. Parachute Creek at Parachute.
4. Dry Fork near De Beque.

Dry Wash Study.

Sediment samples are being collected on two intermittent streams, Sand Wash and Powder Wash, which are tributary to the Little Snake River in northwest Colorado. The purpose of this study is twofold. The first is to obtain an estimate of sediment yields in this arid area. The second is to test the practicality of using a single stage sediment sampler for estimating sediment yields for intermittent streams.

Also in the Colorado Region, "grab samples" are being collected on selected streams to assist in establishing a minimal level of water resource information that can be used in preparation of resource management plans. Samples are collected by BLM personnel and analyzed at the District Offices.

Utah

Moab District: Initial work was begun to map highly eroded areas within Sager's Wash in preparation for watershed activity plan development. Some planning was also accomplished in preparation for Colorado River Salinity Forum's field review later in May 1983.

Three new stream gauges for stream flow and suspended sediment were planned in four high-sediment producing streams. Four other gauges were discontinued.

Vernal District: Continued to evaluate differences in the hydrologic effects and water yield of converting pinyon/juniper woodlands to grasslands. Past years' hydrologic data have now been summarized and data sent to the Division of Resources System (D-470) for analysis and report preparation.

The Rock Springs and Vernal Districts have prepared a watershed activity plan on the 144 sq. mile Red Creek watershed. One hundred and four earth check dams were constructed as part of Utah's plan implementation commitment.

Constructed 104 earth and 2 rock check dams for reduced gully development. Also, one mile of fence was constructed to protect a revegetated gully.

Continued development of the climate vegetation growth prediction model. This model will improve management of our vegetative resources.

Wyoming

Red Creek Drainage.

Sediment control investigations identified in the Red Creek Watershed Management Plan are continuing. Plans for a demonstration sedimentation control area are being developed.

Green River.

Cooperating with Western Wyoming College on phosphorous loading levels due to sediment moving into the Flaming Gorge Reservoir.

Continuation of cooperation with Wyoming State agencies and other Federal agencies towards reducing sediment and salt loads in the upper Colorado region.

New Mexico

Suspended sediment basic data collection was included as part of the program funded by the BLM to collect water resources data in support of coal management in the San Juan Basin. Water quality data was collected at four continuous-record gaging stations and five partial-record stations. Two sites were equipped with automatic samplers and the remainder with single stage samplers. This monitoring was done in cooperation with the USGS and is a continuation of the BLM's old EMRIA Program. Two reports were completed in 1981: Resource and Potential Reclamation Evaluation - Kimbeto Study Area, Report No. 17-77; Resource and Potential Reclamation Evaluation - Ojo Encino Study Area, Report No. 19-78.

UPPER COLORADO REGION

Bureau of Reclamation

A scour study was made for the North Fork Siphon Crossing on the North Fork of the Duchesne River. It was recommended that the siphon be buried to a depth of 3 feet below the low point of the river channel to avoid damage due to scour.

The sediment transport was evaluated at the proposed Acequia Madre Diversion structure of the BIA San Juan Diversion Project, New Mexico. The rate of sediment inflow to the structure was computed for an average year and for a high flow irrigation season. A sediment transport equation was also used to evaluate the need for and the size of sluicing arrangements at the diversion structure.

UPPER COLORADO REGION

GEOLOGICAL SURVEY

Colorado Headwaters Subregion

1. Suspended-sediment data are being collected on a daily basis at Parachute Creek at Parachute, Colo., as a part of Federal sedimentation study in oil shale areas.

2. 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.

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 at the following sites on a monthly and storm-event basis in cooperation with the Wyoming State Engineer:

Green River near LaBarge, Wyo.
Big Sandy River near Farson, Wyo.
Big Sandy River at Gasson Bridge, near Eden, Wyo.
Hams Fork near Granger, Wyo.
Blacks Fork near Little America, Wyo.
Little Snake River near Dix., Wyo

3. Suspended-sediment data are being collected on a monthly basis at Vermillion Creek at Ink Springs Ranch, Colo., as a part of the USGS Coal Hydrology program.

4. 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 are being collected on a monthly and storm-event basis at Little Snake River near Dixon, Wyo. in cooperation with the Wyoming State Engineer.

2. 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.

3. 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.

4. Suspended-sediment data are being collected at several sites in the coal mining region of the Yampa River basin. Two stations are equipped with pumping samplers and where the flow is continuous, daily samples are collected. The following stations are operated at the indicated frequencies:

Middle Creek near Oak Creek, Colo.	Monthly
Foidel Creek near Oak Creek, Colo.	Monthly
Foidel Creek at mouth near Oak Creek, Colo.	Daily
Taylor Creek at mouth near Axial, Colo.	Monthly
Watering Trough Gulch near Hayden, Colo.	Monthly
Hubberson Gulch near Hayden, Color.	Monthly
Stokes Gulch near Hayden, Colo.	Daily

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

5. 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. All 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.	Daily
Piceance Creek tributary near Rio Blanco, Colo.	Peaks
Willow Creek near Rio Blanco, Colo.	Daily
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
Dry Fk. near Rangely, Colo.	Peaks
Tributary to Box Elder Gulch near Rangely, Colo.	Peaks
Corral Gulch near Rangely, Colo.	Daily
Yellow Creek near White River, Colo.	Daily

These stations are operated in cooperation with the Colorado River Water Conservation District.

6. 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.

7. Suspended-sediment data are being collected on a comprehensive level at White River near mouth near Ouray, Utah, in cooperation with the U.S. Bureau of Land Management.

8. Suspended-sediment data are being collected on a monthly basis at Yampa River below Diversion, near Hayden, Colo., in cooperation with the Environmental Protection Agency

9. Suspended-sediment data are being collected on a periodic basis at Horse Draw near Rangely, Colo., and at Horse Draw at mouth, near Rangely, Colo., in cooperation with the U.S. Bureau of Mines.

Lower Green Subregion

1. Suspended-sediment data are being collected on a monthly basis in cooperation with the U.S. Bureau of Land Management 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 Reclamination.

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.

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 U.S. Bureau of Land Management.

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 monthly basis at Fremont River near Cainville, Utah, in cooperation with the Utah Department of Natural Resources.

3. Suspended-sediment data are being collected on a daily basis at Animas

River at Farmington, N. Mex., as a part of NASQAN.

4. Suspended-sediment data are being collected on a daily basis at Chaco River near Waterflow, N. Mex. and San Juan River at Shiprock, N. Mex., as a part of the USGS Coal Hydrology Program.

5. 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.

6. Suspended-sediment data are being collected on a bimonthly 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 U.S. Bureau of Land Management 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
Bldg. 53, Denver Federal Center
Mail Stop 415, Box 25046
Lakewood, CO 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
Rm 1016 Admin. Bldg.
1745 West 1700 South
Salt Lake City, UT 84104

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

LOWER COLORADO REGION

BUREAU OF LAND MANAGEMENT

Arizona

Burro Creek Study.

Water quality data acquisition on the Burro Creek Watershed, a tributary to the Bill Williams River, continued through 1982 under contract with the State of Arizona. The principal purposes of this study are to examine water quality data, identify source areas of toxic materials, and develop strategies for water quality enhancement. This study includes monitoring suspended sediments and total dissolved solids.

Four watershed activity plans were written analyzing the effects of rangeland management decisions on watershed conditions.

San Simon Study.

The San Simon watershed has been a significant source of sediment to the San Carlos River. Nineteen detention dams have been constructed to regrade the stream channels and restore the ground water system. During the year, a monitoring plan was developed to determine the effectiveness of these structures, including installation of stream flow gauges, sediment samplers, and rain gauges.

Safford-Morenci Trail.

Four miles of the Safford-Morenci Trail received maintenance, including soil stabilization work.

Fifteen detention dams throughout the State received inspection and maintenance. Two new strutures were built. Land treatment practices aimed at reducing offsite sediment production included 1,300 acres of rangeland chaining and seeding, 1,000 acres of chemical phreatophyte control, and 250 acres of seeding maintenance.

Utah

Cedar District: Repaired 18 water control structures. Initiated design and other planning on a major erosion problem site.

LOWER COLORADO REGION

Bureau of Reclamation

A cross drainage and scour study was made for the Picacho Pumping Plant, a plant on the Tucson Aqueduct. A scour depth of 5 feet was estimated for the channel at a flow of 1,230 ft^3/s over the discharge line upstream from the pumping plant and along the dike protecting the pumping plant. Channel hydraulics were presented and a maximum floodwater depth of 5.7 feet was computed for the existing channel conditions at the 1,230-ft^3/s discharge.

A field examination was made of the Palo Verde Diversion Dam to evaluate potential sediment problems for the proposed low-head hydroelectric installation at the site. The Irrigation District was concerned as to the effect the hydro modification would have on the sediment and trash conditions they now experience. The District was advised that no significant sediment problems are anticipated with the proposed installation. However, the trash which is now hydraulically flushed from the headworks will almost certainly have to be mechanically removed from the new headworks and powerplant. A list of mechanical trash handling installations was supplied to the District.

A study was made giving the 100-year sediment projection and recommended breach elevation for Theodore Roosevelt Dam should a new dam be constructed. The 100-year sediment inflow rate of 0.469 acre-foot per square mile per year was determined from the 1981 reservoir survey. This gave a 100-year sediment volume of 268,000 acre-feet for the 5,709-square-mile drainage area. For the proposed New Roosevelt Dam with a conservation pool at 2,148 feet m.s.l. the breach elevation for the existing dam would be 1973 or 7 feet above the existing elevation of sediment at 1966 feet.

A reanalysis of the scour and riprap sizing for the Salt River Siphon was completed for conditions with a 200-year standard project flood of 110,000 ft^3/s. The study conclusions were that the crest for a weir-type structure be constructed to elevation 1286, and the depth of scour immediately downstream from such a structure was estimated to be 20 feet. The horizontal length of the scour pool from the toe of the riprap weir up to the point where the scour hole intercepts the thalweg of the existing channel was estimated to be 35 feet. A D_{50} riprap size range of 16 to 20 inches of angular, high density rock was recommended in the study along with a suggested gradation range. A riprap thickness of 48 inches was suggested.

LOWER COLORADO REGION

GEOLOGICAL SURVEY

Lower Colorado-Lake Mead Subregion

1. 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.
Las Vegas Wash near Henderson, Nev.
Las Vegas Wash near Boulder City, Nev.

2. 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.

3. 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 U.S. Bureau of Reclamation.

Little Colorado Subregion

1. Suspended-sediment data are being collected on a daily basis in cooperation with the U.S. Corps of Engineers 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 U.S. Corps of Engineers.

3. Suspended-sediment data are being collected on a bimonthly basis at Little Colorado River at Cameron, Ariz., as a part of NASQAN.

4. Suspended-sediment data are being collect on a monthly basis at Zuni River above Black Rock Res., N.Mex., in cooperation with the U.S. Bureau of Reclamation 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 bimonthly 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 U.S. Bureau of Reclamation.

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

SOIL CONSERVATION SERVICE

1. Reservoir Sedimentation Surveys

   A reservoir sedimentation survey was made on Millet Swale Reservoir in Navajo County, Arizona.

GREAT BASIN REGION

BUREAU OF LAND MANAGEMENT

Utah

Richfield District: Improved and/or maintained ground cover on approximately 5,200 acres of public lands. Initiated design and other planning on a major erosion problem site. Continued development of the climate vegetation growth prediction model. This model will improve management of our vegetative resources.

Nevada

Saval Ranch Research Project.

Cooperative work between the BLM, the U.S. Department of Agriculture (USDA) - Agricultural Research Service (ARS), and the University of Nevada-Reno.

Purpose: Evaluate livestock management effects on hydrologic response and test relationships for predicting changes in response.

Current Activities: Biweekly depth-integrated suspended sediment samples were collected at 15 mainstream stations. Sediment load-stream discharge relationships were developed for key stations for use in the context of the Saval Integration Model. Periodic grab sampling was done at two small instrumented watersheds. A longitudinal profile and 35 cross sections were resurveyed along a 4-mile reach of Mahala Creek to document the magnitude of channel cutting and filling. Rainfall simulation on 35-foot erosion plots with differing vegetation cover amounts was used to compare the measured soil loss to that predicted by the Universal Soil Loss Equation (USLE).

Findings: The stream discharge-suspended sediment concentration relationships developed for several sampling stations indicate a large amount of variability, even when rainfall runoff is not a major contribution. For 12 simulated storm events combined, the USLE under-predicted the observed soil loss by less than 5 percent. Individual plot predictions, though, ranged from 23-215 percent of the measured soil loss.

GREAT BASIN REGION

GEOLOGICAL SURVEY

Bear Subregion

1. Suspended-sediment data are being collected on a bimonthly basis at Bear River at Border, Wyo., as a part of National Stream-Quality Accounting Network (NASQAN).

2. 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 monthly 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 bimonthly 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.

Central Lahontan Subregion

1. Suspended-sediment data are being collected bimonthly at the following sites as part of NASQAN:

Walker River near Wabuska, Nev.
Carson River near Fort Churchill, Nev.
Truckee River near Nixon, Nev.

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 monthly 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.

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

Nevada State Office Chief
U.S. Geological Survey
P.O. Box 1099
Room 2094, Federal Building
Idaho Falls, Idaho 83401

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

SOIL CONSERVATION SERVICE

1. River Basin Investigations

   Sediment damages were evaluated in the St. Johns Irrigation Company Watershed in Oneida County, Idaho.

2. Reservoir Sedimentation Surveys

   A reservoir sedimentation survey was completed on Daniels Reservoir in Oneida County, Idaho.

PACIFIC NORTHWEST REGION

BUREAU OF LAND MANAGEMENT

Idaho

Remote Sensing to Identify Erosion Areas.

The Idaho State Office of the Bureau of Land Management (BLM) is experimenting with various scales of photography for using density analysis to determine eroding areas. The project is also attempting to assess vegetative cover measurement methodologies important in estimating erosion and sedimentation. Several field areas are being examined for estimating erosion condition.

Livestock-Aquatic Assessment Methodology.

This study is being conducted by the U.S. Forest Service's Forest and Range Experiment Station funded by the BLM. The objectives are to determine what characteristics will provide a reasonable assessment of livestock impacts on the aquatic system. Among the characteristics being evaluated are sediment measurements, stream sediment yield, and stream stability. This year's work includes describing the usefulness, validity, measurement error, and capability of standardization for 19 characteristics commonly collected in hydrologic and aquatic studies. Most of the characteristics relate to sedimentation. Results of the first phase of the work are available. Final results of the study will be available in 1985.

Publications:

Johnson, Clifton W. and Gebhardt, Karl A., 1981, "Predicting Sediment Yields from Sagebrush Rangelands." Proceedings of the workshop on rangeland soil loss and sediment yield. Tucson, Arizona, March 3-5, 1981.

Gebhardt, Karl A., 1981, "Use of Erosion Models on Western Rangelands." Proceedings of the workshop on rangeland soil loss and sediment yield. Tucson, Arizona, March 3-5, 1981.

Big Lost River Water Quality Improvement Project.

Project is underway on the Big Lost River in Idaho's Salmon District for the purpose of reducing sedimentation and bank erosion. The BLM has provided aerial photography, interpretation, erosion transect data, and has helped install demonstration projects. The cooperative project has various Federal, State, and local agencies and private landowners involved. Sedimentation studies are also underway under the direction of

the Geological Survey, Water Resources Division, Boise, Idaho. A preliminary report entitled, "Erosion, Channel Change, and Sediment Transport in the Big Lost River, Idaho" should be available in the near future.

Reynolds Creek Experimental Watershed.

Operated by USDA-ARS Northwest Watershed Research Center with partial funding support from the BLM, Idaho State Office.

Purpose: Conduct rangeland hydrology research on a regionally representative watershed, including development and testing of procedures for predicting the effects of livestock grazing management and range improvement practices on rangeland and hydrologic response.

Current Activities: During calendar year 1982, the ARS continued sediment data collection at four sites within the Reynolds Creek Watershed. A rainfall simulator soil loss study was conducted on 30 erosion plots with differing livestock use and vegetation cover characteristics to test the applicability of the USLE. The modified USLE was used to estimate sediment yields due to rainfall, snowmelt, and mixed events from several watersheds. Efforts are underway to extend the runoff and sediment yield relationships developed at Reynolds Creek to other gauged areas within Idaho and Columbia Plateau Province. A project completion report is to be completed in 1983.

Findings: Storm event peak runoff rate explained more of the variability in storm sediment yield than did runoff volume. Rain, snowmelt, and mixed events produced 2, 28, and 70 percent of the mean yearly sediment yield, respectively, from four long-term record watersheds. Preliminary results indicate that the USLE soil erodability factor derived from the rainfall simulation runs agrees reasonably well with the Soil Conservation Service determined values for the soil series. Further information is needed to adequately evaluate the effects of vegetation cover and surface roughness characteristics on soil loss. Application of the modified USLE for sediment yield prediction indicated a wide range of optimized parameter values between watersheds and different types of runoff events. More analysis is needed, especially where snowmelt is a major contributing factor. Bedload contribution to sediment yield is difficult to measure and predict.

Oregon

County watermasters continue streamflow and sediment data collection at 13 sites in the Umpqua, Smith, Coos, and Coquille River basins. Additional data are being collected at six gauged and numerous ungauged sites by BLM personnel.

The BLM and the USDA's Forest Service and Soil Conservation Service working closely with the State's 208 program completed a rangeland RMP statement.

Work continues on the restoration of Coal Mine Creek in the Malheur River drainage and on Bear and Camp Creeks of the Deschutes River basin.

Work continues on stockwater reservoirs design to reduce downstream sedimentation resulting from inadequate spillway designs. Hydrologic design data are evaluated utilizing a modified HYMO program.

PACIFIC NORTHWEST REGION

Bureau of Reclamation

A field review was made of the Esquatzel Coulee Channelization program in the vicinity of the town of Mesa. The channel is in excellent condition. The project office was advised that stabilizing the reach of the coulee upstream would not be significantly productive in reducing sediment inflow and deposition in the already channelized reaches. Some localized bank protection may be required to protect wildlife refuge lands.

A channel stability analysis was completed for the Owyhee River between Wildhorse Dam and the China Diversion Dam. It has been proposed that the release pattern from Wildhorse Reservoir be modified to increase the available water supply in the critical summer irrigation period. Channel hydraulics were derived from water surface profile studies in two separate reaches. Using these hydraulics and sampled suspended and bed material sediment data, the transport capability of the river was computed from the Modified Einstein and Velocity-Xi procedures. The average daily discharge for the months of April through August was determined for historic conditions and each of the four proposed alternatives. From these analyses it was concluded that none of the proposed alternatives would significantly change the sediment transport capability or the channel stability of the Owyhee River.

The flood discharge and scour study for the Priest Rapids Lateral Wasteway and Siphon was recomputed with the latest design data. The cross drainage was divided into two areas. The following scour depths were estimated at the wasteway and siphon.

Location	25-year (ft)	50-year (ft)	100-year (ft)
Wasteway	8	10	11
Siphon	5	6	7

PACIFIC NORTHWEST REGION

CORPS OF ENGINEERS

North Pacific Division

Portland District

Sediment Sampling. For post-impoundment purpose, samplings were conducted daily on Rogue River at Lost Creek Damsite. Types of records maintained are: suspended sediment, dissolved solids, temperature, turbidity, conductivity, pH, dissolved oxygen. For planning and design purpose, samplings were conducted weekly on Applegate River at Applegate Damsite, and intermittently on Cowlitz River at Kelso and Toutle River at Hwy 99 bridge. Types of records maintained are: suspended sediment, bed load, dissolved solids, temperature, etc.

Synopsis - Mt. St. Helens Sedimentation Activities (Cowlitz and Toutle Rivers) In Water Year 1981, a sediment study was developed for the Cowlitz and Toutle Rivers in the aftermath of the eruption of Mt. St. Helens. The objective was to provide estimates of sediment yield at various locations in the study area and amount and location of scour and deposition. The study is funded through FY 83.

In Water Year 1982, 23 million cubic yards of sand-size and larger material were calculated to have been delivered to the Cowlitz by the Toutle. The delivery of sand-and larger size material from the Cowlitz to the Columbia was estimated to have been 10 M.C.Y.

Reports by the District on the sedimentation project are listed below:

Advance Measures 10, July 1981.
Long-term Program for Cowlitz and Toutle River Basins, July 1981,
Mt. St. Helens Sedimentation Study FY 1981 Status Report, November 1981.
A FY 1982 year-end report was written.
An annual report will also be written and published by the end of FY 1983.

Seattle District

20 sedimentation ranges in the Tacoma (Puyallup River, Washington) flood control project were resurveyed in 1982. This project was completed in 1950, and the District is responsible for project maintenance. Sedimentation range data obtained in the period 1950 to 1982 were analyzed to determine future maintenance requirements.

Walla Walla District

Sedimentation Surveys

1. Range Surveys. Range surveys were performed in several locations during the calendar year. All surveys were performed to monitor the deposition of sediment either in a reservoir or at the mouth of a river. The

surveys were performed with a boat equipped with an echo sounder and electronic positioning equipment. Conventional surveying techniques were used where needed to extend cross-sections across areas inaccessible to the sounding boat. Surveys were performed in the following areas.

(a) Lower Granite Reservoir. The 1981 annual sediment range survey which was started in the fall of 1981 was completed in February 1982. The 1982 annual survey of all established sediment ranges was completed in September. The cross-sectional data have been reduced and plotted.

(b) McNary Reservoir. Four established sediment ranges at the mouth of the Yakima River were resurveyed. These surveys covered the area from River Mile 332 to 336 on the Columbia River and R. M. 0. 0. to 2.0 on the Yakima River. Two additional cross-sections were taken across the mouth of the Yakima River and just downstream on the Columbia River to define the channel geometry at these points. These surveys have been reduced and plotted.

(c) Asotin Creek. Four new sediment ranges were established and surveyed between R. M. 0.22 and 0.36.

2. Topographical Surveys.

(a) Lower Granite Reservoir. A total of 20 cross-sections were taken in the Swallows Park swimming area and the adjacent Snake River. Soundings were also taken inside Hellsgate Marina and in the Snake River immediately adjacent to the marina. Some limited-depth soundings were also performed in conjunction with channel dredging on the Clearwater River between R. M. 0.5 and 2.0.

(b) Mill Creek. Profile and cross-section surveys were performed on selected reaches of the stabilized channel at Walla Walla, Washington. The purpose of these surveys was to define channel bottom geometry after the high flows in the spring of this year.

3. Spot Surveys. Bed samples were obtained at 21 locations from R. M. 141.21 to 143.30 on the Snake River and at four locations in Hellsgate Marina. The purpose of the sampling was to determine the character of the deposited sediment. Samples were obtained with a BM-54 bed load sampler.

Channel bed samples were obtained at five locations and armor layer samples were collected at 12 locations between R. M. 5.5 and 11.0 on Mill Creek. The channel bed samples were one-cubic-yard samples dug with a backhoe. The armor layer samples were collected by hand or scraped from the bed using a backhoe. Sieve analysis data are available for all of the above samples.

4. Video Channel Bottom Survey. A miniature, remotely-controlled submarine was used experimentally to observe the Snake River channel bottom adjacent to both Hellsgate Marina and Swallows Park. The objective was to observe the movement of the bed material and the grain size of deposited material. The equipment consisted of a submarine equipped with a video camera and a sounding boat fitted with video viewing equipment and remote controls.

Using the equipment, sediment movement and areas of deposition could be observed. However, difficulties were encountered in controlling the submarine in the swift current and in monitoring the location of the camera.

Sedimentation Studies

1. Yakima River. This is a study to determine the long-range effect of sedimentation in the McNary Reservoir on flood levels along the Lower Yakima River. The study should be completed during the spring of 1983.

2. Lewiston Levee Evaluation. An existing HEC-6 model of the Lower Granite Reservoir is being expanded and combined with a Clearwater River model to cover the reaches of the Snake River from R. M. 107.5 to 146.87 and the Clearwater from R. M. 0.0 to 7.83. The model is presently being updated and calibrated to sediment range data. The purpose of the study is to evaluate the need for future levee construction or dredging as a result of long-term sedimentation in the upper reservoir. Preliminary results should be available by the end of calendar year 1983.

3. Swallows Park and Hellsgate Marina on the Lower Granite Reservoir. Sedimentation continues to be a serious problem in these areas. During 1982 topographic and bed material data were collected at Swallows Park. Backwater studies will be performed in 1983 to evaluate methods of increasing velocities in the swimming area.

During 1982, additional topographic and sedimentation data were collected at Hellsgate Marina. The effectiveness of a gate, installed at the downstream end of the marina to prevent flow-through during periods of high sediment loads, will be evaluated in 1983.

4. Mill Creek. Rough calculations were made to evaluate the annual sediment deposition in the Diversion Dam catchment basin upstream of Walla Walla. Studies are also continuing on the stability of the improved channel from R. M. 3.8 to 11.4 The channel is stabilized by transverse, wire-bound-rock weirs. The Waterways Experiment Station completed an HEC-6 computer model study of the channel stability during 1982. Due to difficulties with the computer model the channel is presently being evaluated with a physical model. This study should be completed during the first half of 1983.

Dredging.

1. Between July and September, 256,000 c.y. of sediment was dredged from the north side of the Clearwater River channel between R. M. 1.0 and 1.75. The total cost of this work was $822,000.

2. High flows during the spring runoff period refilled the entrance to Hellsgate Marina which was dredged in 1981. Between May and September of 1982 approximately 9,000 c.y. of sediment was removed from the interior and entrance of the Marina.

PACIFIC NORTHWEST REGION

Forest Service

Clearwater National Forest

A new erosion and sediment study initiated on Mission-Lapwai watershed near Lewiston, Idaho.

The study will evaluate the erosion from all lands and uses and the resultant sedimentation instream and downstream. Impacts on fisheries, municipal water, and navigation will be evaluated. The study will be completed in early 1985.

Intermountain Forest and Range Experiment Station

TRACING MOVEMENT OF ROAD SEDIMENTS ON FORESTED, GRANTIC WATERSHED IN IDAHO

Walter F. Megahan, Gary L. Ketcheson

Description of Study Area

A study is in progress to evaluate the effects of alternative timber harvest and road construction practices on erosion and sedimentation in the mountains of southwest Idaho. The study is located in the headwaters of the Payette River drainage on the Boise National Forest. Eight watersheds, ranging in size from 70 to 440 acres in size are included in the study. Watershed slope gradients range from 40 percent - 80 percent and are covered primarily with Ponderosa-pine and Douglas-fir timber. The shallow, coarse-textured soils are highly erodible and are typical of the granitic parent materials found in the 16,000 square mile Idaho Batholith. Annual precipitation ranges from about 25 inches at the lowest elevation (5,000 feet) to 45 inches at the highest point (7,000 feet). About 65 percent of the precipitation occurs as snowfall; the remainder is rain caused by summer convection storms and frontal storms in the spring and fall.

Methods

The tracing study was initiated in April 1982 to trace road sediment movement in second order channels. Objectives of the study were:

1. To determine what channel morphologic features characterized instream sediment movement over time.

2. To determine the residence time of sediment in transit in sample channel reaches.

3. To verify previous measurements of channel storage changes in the study channels.

Sample reaches were located in four streams representing a range in channel gradients from about 4 to 11 percent. Sample reaches extend from a sediment basin at the drainage mouth of a point 200 feet upstream. Recording stream gages provide a continuous measure of flow for each stream. Sediment production for each watershed is measured as total yield in sediment basins and as instantaneous sediment rate using DH-48 and Helley Smith samplers for suspended and bedload sediment measurements.

Tracer consisted of fluorescent dye dissolved in a solution of vinyl plastic and acetone. Four sediment sizes of 0.25 to .5, 0.5 to 1.0, 1.0 to 2.0, and 2.0 to 4.0 mm were treated with four different color dye solutions. A composite sample representing equal particle numbers for each sediment size class was used for injection. Total weight for each composite tracer sample was 20 pounds.

Tracer was injected as a slug in the stream on April 9, 1982, just prior to the spring snowmelt. Following high water spring snowmelt, each sediment basin was carefully cored in a grid pattern prior to flushing in late May. Later in the summer, detailed channel surveys including profiles and cross sections were made and core samples were taken throughout each test reach.

Instantaneous sediment samples along with all cores were analyzed for tracer particles after drying using a counting procedure under ultraviolet light. Total counts were made on all instantaneous samples but core samples required subsampling. Data analysis is just beginning, however, our impressions to date is that the technique has promise for tracing sediment movement in upland channels.

Overview of the Horse Creek Administrative-Research Studies

The Horse Creek studies in north-central Idaho are designed to measure the changes in sediment production and streamflow resulting from various logging road construction and timber harvesting activities. All management activities are occurring in the 4,169 acre Main Fork watershed while an adjacent 3,561 acre undisturbed watershed serves as a control. Within the Main Fork watershed are 15 small (60-400 acre) watersheds, ten with southern aspects and five with northern aspects. Thirteen watersheds will receive management treatments and two will serve as controls. Treatments in these small watersheds consist of varying road design standards, road erosion stabilization measures, logging methods, and harvest intensities. Small detention reservoirs and, in some instances, automatic pumping water samples are used to obtain sediment production data. Type H and Parshall flumes are used to measure streamflow. Additional measurements are made of onsite erosion, sediment production in the vicinity of the activities, channel characteristics, and several aquatic populations.

At present, all management activities have been confined to the south aspect watersheds. Roads were constructed in six watersheds in 1978 and 1979. Tractor logging in three of the roaded watersheds and skyline logging in an additional watershed were completed in 1983. Skyline and helicopter logging are scheduled for four watersheds in the next 2 years. Four of the north aspect watersheds will be logged using long line multispan systems beginning in 1985. Completion of the analysis and reporting of all the road related studies for the 3 to 4 year period following construction should be accomplished by the fall of 1983.

Pacific Northwest Forest and Range Experiment Station

Pacific Northwest Forest and Range Experiment Station, Portland, Oregon - Report of cooperative research under the direction of Robert Beschta, forest hydrologist, Oregon State University, entitled "Bedload Sediment Transport and Channel Morphology of a Southeast Alaskan Stream," MS thesis completed June 1982 by Margaret Estep. This research at Trap Bay, Chichagof Island, was conducted to (1) quantify short-term sediment transport and channel morphologic changes, (2) relate measured sediment transport rates to major hydrologic parameters, and (3) evaluate how bedload transport influences morphology of the channel. This is the first quantitative work of its kind done in southeast Alaska on small, forested, second-order watersheds. Regression relationships were developed between bedload transport, coarse particulate organic matter transport, and stream discharge during major storms.

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 near Copeland, 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.

4. 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

Upper Columbia Subregion

1. 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.

2. 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.

3. Quarterly suspended-sediment data are being collected at the following sites as part of NASQAN:

Clark Fork below Missoula, Mont.
Flathead River at Flathead, British Columbia, Canada
Flathead River at Columbia Falls, Mont.

4. 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 Minam 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., at Klickitat River near Pitt, Wash., and at Deschutes River near Biggs, Oreg., 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 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 7 sites in the Toutle River Basin, 4 in the Lewis River Basin, and 1 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 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

SOIL CONSERVATION SERVICE

1. Determination of erosion rates and sediment yields was made in the following watershed:

a. Public Law 566

Major Drainage	Watershed	Stream	County	State
Crooked River	Juniper Canyon	Juniper Canyon	Crook	Oregon
Upper Snake	Roy East		Power	Idaho
Upper Snake	Sand Creek		Bonneville	Idaho
Lower Snake	Thorn Creek		Latah	Idaho

b. Resource Conservation and Development

A streambank erosion control study was completed in Big Lost River Butte County, Idaho.

Water quality monitoring in the Summit Watershed in Power County, Idaho included sediment as one of the parameters.

2. Non-Point Pollution Studies (PL-08)

a. A grant was awarded to install demonstration plots to study erosion and sediment yields from furrow irrigated croplands in Malheur County, Oregon.

b. Case studies are being carried out on individual farms in each SWCD within a five county area. These studies are for determination of erosion and subsequent impact of sediment on water quality by farming operation.

Subregion	County	State
Mid-Columbia	Wasco, Sherman, Gilliam, Morrow, Umatilla	Oregon

An ongoing study to determine the impact of specific conservation practices on water quality, specifically to determine erosion rates and sediment yields by practice was continued in Umatilla County, Oregon.

c. RCWP (PL-208)

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 is scheduled for termination in 1986.

Effects of Best Management Practices (BMP's) are being monitored and evaluated for Tillamook Bay Drainage Basin, Tillamook County, Oregon. Evaluation of sediment yield from agricultural lands was completed for the basin in CY 1982.

3. Reservoir Sedimentation Surveys

A reservoir sedimentation survey was made in the following reservoir:

Major Drainage	Watershed	Stream	County	State
Powder River	Wolf Creek	Wolf Creek	Union	Oregon

Field work for the above reservoir survey was completed in CY 1980. The report is 90 percent complete.

CALIFORNIA REGION

BUREAU OF LAND MANAGEMENT

California

Bakersfield District: A study monitoring natural erosion and accelerated erosion due to off-road vehicle (ORV) use and past mining practices was continued in the Clear Creek area. The problem is compounded by the fact that the highly erosive serpentine soils contain high levels of asbestos fibers.

Susanville District: As a part of the Tuledad/Homecamp Grazing Management Program bank erosion control structures were installed along Fitzhugh Creek. Structures installed on Bare Creek in Calendar Year (CY) 1981 were modified and improved during CY 1982. In addition, sediment accumulations in stockpond reservoirs are being monitored to improve the predictive capabilities of the Universal Soil Loss Equation (USLE). Also, as a part of monitoring, the clay mineralogy of suspended sediments in streams is being used to aid in identifying the sources of sediments within the watersheds.

Ukiah District: Alders were planted on about 40 acres of disturbed riparian habitat and grass was seeded on one-half mile of abandoned logging road in the Nooning Creek drainage to stabilize eroding soils. Grass was also seeded on 20 acres at Queens Peak Mine to reduce erosion. Prescribed burning was done near Cow Mt. partly to reduce the possibility of severe wildfires and the resulting flooding and severe erosion. In addition, measurement of sediment was continued at three sediment detention dams installed the previous year in the Redding Resource Area.

California Desert District: Activity plans for three Areas of Critical Environmental Concern (ACEC) were developed and implementation of projects which will improve water resources was started. The ACEC's were Fort Piute, Salt Creek, and Harper Dry Lake. Also, a prescribed burn for the Thing Mt. Project was initiated to improve wildlife habitat, improve range forage and reduce the probability and intensity of large-scale wildfires, therefore, reducing long-term sedimentation.

CALIFORNIA REGION

CORPS OF ENGINEERS

South Pacific Division

Los Angeles District

Sediment Analyses

1. San Luis Rey River Project. Sediment transport study conducted in conjunction with the Phase II General design Memorandum was completed. The hydraulic design of the proposed improvement was analyzed to ensure that the project would function properly under sediment loads imposed by a variety of flow conditions. The sediment analysis was conducted in two phases: a preliminary analysis and a detailed sediment routing analysis. The detailed sediment routing analysis was conducted by applying the HEC-6 computer program. This program was used to simulate the transport of sediment in the project for the design flood, the 25-year and 100-year frequency floods, and the historical flows that have occurred over the past 25 years. As a result, the detailed sediment routing analysis indicated general trends of aggredation and degradation in the project reach of the river.

2. Arizona Canal Diversion Channel Project. Work continued on a sediment transport study conducted in conjunction with the Feature Design Memorandum. The design of the proposed channel was analyzed to: (a) verify that the project would convey the design flood with the anticipated inflowing sediment loads; and (b) assess the effect of any long term sediment deposition on the performance of the project. Detailed sediment routing analysis was conducted by applying the HEC-6 computer program. The inflowing bed material load from the four significant tributaries was estimated using the Meyer-Peter-Mueller transport function, the wash load from the tributaries and from the direct overland flow was estimated using the Modified Universal Loss Equation. To date the study has revealed that the project would not function properly as originally designed for two reasons: (a) severe deposition would occur in the channel immediately downstream of the confluence with the largest tributary, causing a large loss in conveyance and significant backwater upstream; and (b) a minor amount of deposition of very coarse material would occur downstream of the confluence with the smaller tributaries, causing a higher value of roughness than was orignally allowed for. As a result, the project design has been modified to include sedimentation basins at the mouths of the four tributaries to prevent at least the coarse sediment from entering the channel. A sediment transport analysis of the modified design is currently in progress.

Sedimentation Survey. Reservoir Sedimentation Data Summary Sheets are completed for Cogswell, Eaton Wash and Puddingstone Flood Control Basins.

Sacramento District

Suspended Sediment Sampling. Routine samples of lake outflows were collected and analyzed at 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 the Cottonwood Creek Basins.

Sediment Study. A feasibility scope sediment transport study on the Truckee River in the vicinity of Reno, Nevada was performed by the Hydrologic Engineering Center for a proposed channel improvement project. The study included a data search, bed samples and analysis and an analysis of project effects. Complete information on this study can be found in HEC Special Project Memo #82-4.

San Francisco District

All sedimentation activities in the District during Calendar Year 1982 were related to the construction of the Warm Springs Dam and Lake Sonoma Project on Dry Creek, a tributary to the Russian River. Activities consisted of collecting and analyzing sediment transport data at three locations downstream 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 attributed to the Warm Springs Dam Project. A draft report presenting the results of the study has been prepared. A final report is scheduled to be completed in Calendar Year 1983.

CALIFORNIA REGION

Forest Service

The Forest Service carried out restoration work on 1,874 acres of watershed. This consisted of gully restoration, closure of unneeded roads and log landings, and streambank stabilization. In addition, using Soil Conservation Service Emergency Watershed Protection Funds, the loss of at least 30,000 tons of soil was prevented.

A total of 293 acres of fish habitat was improved, consisting of spawning bed improvement and channel stabilization.

Pacific Northwest Forest and Range Experiment Station

The Chaparral project of the Pacific Southwest Station currently maintains six gauged watersheds on the San Dimas Experimental Forest. Debris production is also monitored on four of these watersheds. The data is stored and maintained at the Riverside Fire Laboratory and is available to the public.

In addition, there is an active research program in flooding and sedimentation within the project. The project continued its active support and cooperation with the California Institute of Technology on their project, sediment management for coastal southern California mountains, coastal plains, and shoreline. This project was completed on September 30, 1982, and reports are currently being published. A joint project on soil slips with the Geological Survey, USDI, was agreed upon, but actual work begins in 1983. Individual studies of fire effects on soil texture and the role of heat shock fungi in mitigating post fire erosion have been published. Research is continuing on post fire erosion processes, sediment movements in small basins, and steepland erosion processes.

CALIFORNIA REGION

GEOLOGICAL SURVEY

Klamath Northern California Coastal Subregion

1. Data collected between 1973 and 1982, in cooperation with the National Park Service, in the Redwood Creek basin is currently being summarized and interpreted. The objective of this work is to characterize the physical processes responsible for deliverying sediment to and through stream systems in this rapidly eroding terrane.

2. The Grass Valley Creek project is a continuing total-load data-collection program in cooperation with the California Department of Water Resources. The study was begun in 1976 to determine the amount of sediment contributed by Grass Valley Creek to the Trinity River below Lewiston Dam.

3. The Hoopa Indian Reservation data collection program has been implemented to assemble information on sediment transport related to impacts of timber harvest on fisheries.

Sacramento Subregion

1. The Cottonwood Creek project is a continuing data-collection program for the U.S. Corps of Engineers. Sediment data are being collected to determine sediment discharge at two dam sites and at a site near the mouth of Cottonwood Creek.

Central California Coastal Subregion

1. A one-year project aimed at assessing the impact of a major storm event on sediment transport and stream-channel geometry in the Santa Cruz Mountains was completed. Results of this study suggest that major channel effects, although localized, were primarily the result of sediment supplied by mass movement processes operating during the storm.

2. A resurvey of Loch Lomond Reservoir in the San Lorenzo River Basin in Santa Cruz County has been undertaken following landslides and sediment deposition related to storm events in January 1982.

3. The Carmel River Valley study is designed to document the changes in channel morphology and to provide sediment-transport information. Hydrologic data are being collected at three main stem sites and at miscellaneous sites on three Carmel river tributaries. An estimate of total-sediment discharge will be made at the main stem sites. This work is being done in cooperation with the Monterey Peninsula Water Management District.

Southern California Coastal Subregion

1. The project, "Effects of river modifications and control structures in the Santa Clara River Basin, Ventura and Los Angeles counties, California," is in progress. The study will document the effects of river control structures and of sand-and-gravel mining on streamflow, phreatophyte growth, channel morphology,

and sediment transport in the Santa Clara River basin. Sediment delivery to the shoreline and sediment size, quantity, and relation to beach stability will also be examined.

2. 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 in the California Department of Boating and Waterways, who are cooperators on this project.

3. Measurement of annual sediment discharge is being used to test the trap efficiency of two new siltation basins located in downstream reaches of San Diego Creek. Collection of these data together with an assessment of factors controlling sediment yield in upper portions of the watershed are being undertaken to allow the City of Newport Beach to effectively manage factors which may have detrimental impacts on the physical and biological habitat of Newport Bay.

San Francisco Bay Subregion

1. The Cull Canyon Project is a data-collection program to determine major sources of sediment upstream from Cull Canyon Reservoir. The study is being made in cooperation with the Alameda County Flood Control and Water Conservation District.

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

District Chief, WRD
U.S. Geological Survey
Room W-2235, Federal Bldg.
2800 Cottage Way
Sacramento, CA 95825

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
Coyote Creek	Lower Silver Creek	Lower Silver Creek	Santa Clara	California
St. Johns and Kaweah River	Woodlake-Antelope	Antelope Creek	Tulare	California

b. River Basin Investigations

Fall River--Shasta County, California:

An erosion survey was made on the Fall River Watershed. Types of erosion inventoried included sheet and rill, roadsides, streambanks, and construction sites. An inventory of erosion on forested lands was made. Sediment movement in the Fall River Channel was monitored in 1981 and completed during 1982.

Spanish Grant Drainage District--Stanislaus County, California:

The study to determine effects of conservation practices on erosion was continued. Twelve tailwater sumps were surveyed to determine sediment accumulations. This was the second year of a three-year study.

Northern Monterey County:

A short duration study to determine erosion and sedimentation rates on agricultural lands located on steep hillsides of weakly indurated, shallow soils on ancient sand dunes. Various practices are used to stabilize field roads. Cross-sections were established on the roads to assess the relative effectiveness of the practices. A watershed-wide erosion and sedimentation inventory is being performed to estimate the impacts of the accelerated erosion on the Elkhorn Slough, a newly established preserve.

2. Reservoir Sedimentation Surveys

Reservoir sedimentation surveys were started in the following reservoirs:

Reservoir	Counties	State
Mustang	Merced and Stanislaus	California

Sediment measurements have been made for the period 1975-1982 but accumulations have not been calculated.

Matanzas	Sonoma	California

Sediment measurements have been made for the period 1972-1982.

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 to collect and evaluate sediment-transport and river hydraulic data in the Tanana River near Fairbanks, Alaska, was continued in 1982. Suspended-sediment and bedload data are being collected in the Tanana River at six sites near Fairbanks, Alaska. The Corps of Engineers will use 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 Fairfbanks, Alaska.

Report [in Preparation:] Burrows, R. L., 1980-81, Sediment Transport in the Tanana River near Fairbanks, Alaska, 1982, U.S. Geological Survey, open-file report 82-...., 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-sediment 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 [in Review]: Wilcox, D. E., Occurrence, Distribution, and Sources of Trace Metals in Surface Waters and Stream Sediments of Healy and Lignite Creek Basins, Alaska, U.S. Geological Survey, WRI.

3. Suspended-sediment data are being collected on a periodic basis at the Yukon River at Pilot Station, Alaska, as a part of NASQAN.

4. 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, as a part of NASQAN.

2. Suspended-sediment data are being collected on a periodic basis at

Kuskokwim River at Crooked Creek, Alaska, as a 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. The cooperative program with the U.S Army Corps of Engineers was continued through 1982. Suspended-sediment data were collected on upper Bradley River (entering Bradley Lake) near Homer, Alaska, and Bradley River (Bradley Lake outlet) near Homer, Alaska. These data are in support of a hydroelectric power study by the Corps and will be used in evaluating reservoir storage capacity and structure design.

3. 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.

4. The collection of suspended-sediment data on a periodic basis on the Kenai River at Soldotna, Alaska, was funded by the U.S. Army Corps of Engineers.

5. Suspended-sediment data are being collected on a periodic basis at Talkeetna River near Talkeetna, Alaska, as part of the National Hydrologic Benchmark Network.

6. 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.

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

Peters Creek near Birchwood, Alaska
Willow Creek near Willow, Alaska
Deception Creek near Willow, Alaska
Deshka River near Willow, Alaska
Yentna River near Susitna Station, Alaska
Russell Creek near Cold Bay, 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 monthly basis at Honolii Stream near Papaikou, Hawaii, as a part of the National Hydrologic Benchmark Network.

2. Suspended-sediment data are being collected on a daily basis at one site in the Wailuku River basin, Hawaii, in cooperation with the State of Hawaii, Department of Land and Natural Resources.

Maui Subregion

1. Suspended-sediment data are being collected on a monthly basis at Kahakuloa Stream near Honokohau, Hawaii, as a part of NASQAN.

Molokai Subregion

1. Suspended-sediment data are being collected on a monthly basis at Halawa Stream near Halawa, Hawaii, as a part of NASQAN.

Oahu Subregion

1. Suspended-sediment data are being collected at the following sites:

   (a) Waikele Stream, Hawaii, on a daily basis as part of the Federal CBR program.

   (a) Kalihi Stream, Hawaii, on a monthly basis as a part of NASQAN.

   (b) Kamooalii Stream near Kanheohe, Hawaii, on a daily basis in cooperation with the U.S. Corps of Enginners.

   (c) Kipapa Stream and Moanalua Valley in cooperation with the State of Hawaii, Department of Land and Natural Resources.

Kauai Subregion

1. Suspended-sediment data are being collected on a monthly 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 bi-monthly basis when flow is above normal at 59 sites in cooperation with the Puerto Rico Environmental Quality Board.

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

Rio de la Plata at Toa Alta, P.R.
Rio Grande de Manati near Manati, P.R.
Rio Grande de Anasco near San Sebastian, P.R.
Rio Grande de Patillas near Patillas, P.R.

3. Suspended-sediment are being collected on a weekly basis at Rio Tanama near Utuado, P.R., in cooperation with the Puerto Rico Environmental Quality Board.

4. Suspended-sediment are being collected on a daily basis at Rio Fajardo near Fajardo, P.R., in cooperation with the Army Corps of Engineeers.

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, PR 00936

LABORATORY AND OTHER RESEARCH ACTIVITIES

ARIZONA

Research activities at the Southwest Rangeland Watershed Research Center, in Tucson, Arizona include the following:

1. Rainfall simulator studies were conducted on erosion plots representing arid and semiarid rangeland areas of the Southwest to provide basic information on erosion processes and to develop parameter values for the Universal Soil Loss Equation (USLE) and for simulation models such as CREAMS, SPUR, KINEROS and EPIC. Cooperative research between USDA-ARS, at Tucson and Boise, and the University of California, at Los Alamos and Los Angeles, has enabled the coordination of data collection at selected sites in Arizona, New Mexico, Nevada and Idaho. Specialized experiments associated with this research activity include studies to relate rock fragment cover and erosion rates, and to test soil loss ratios suggested by the USLE handbook.

2. Laboratory and field experiments were used to investigate raindrop-size distributions for thunderstorm rainfall in southeastern Arizona. Annual erosivity values (R), calculated for 12 years of record at two sites near Tombstone, Arizona, suggested R-values about 15% higher than suggested by the Laws and Parsons relationship based on data from Washington, D.C.

3. Research is being conducted to evaluate the accuracy and reproducibility of an automated method to measure particle-size distributions of soil and sediment samples. The method utilizes a forward-scattering laser beam to measure particle-size distribution, specific surface area and mean volume diameter of sediment particles. Preliminary analyses have shown a strong correlation between this method and traditional laboratory methods of analysis.

4. Increased efforts have been made to develop and evaluate simulation models to compute erosion and sediment yield on rangelands and to relate erosion rates to rangeland productivity. International Biological Program validation site data were used to evaluate the extension of the CREAMS model to arid rangelands, and USDA-ARS data from the Walnut Gulch Experimental Watershed were used to evaluate the hydrologic component of the ARS Range Resource Model (SPUR). These efforts are producisng modified parameter estimates and estimation techniques for arid and semiarid rangelands. A mathematical model, called EPIC (Erosion-Procuctivity Impact Calculator), was developed to determine the relationship between soil erosion and soil productivity throughout the United States. The EPIC model is composed of physically-based components for simulating erosion, plant growth and related processes, and economic components for assessing the cost of erosion and determining optimal management strategies. Efforts are underway in Tucson, Arizona to test the model under rangeland conditions and to assess the long-term impacts of erosion on productivity of rangelands.

For additiona information, contact Kenneth G. Renard, Research Leader, Southwest Rangeland Watershed Research Center, 442 East Seventh Street, Tucson, AZ 85705

AGRICULTURAL RESEARCH SERVICE

GEORGIA

Research activities at the Southern Piedmont Conservation Research Center, Watkinsville, Georgia include the following:

1. A cooperative agreement was established between the University of Georgia's Geography Department and the Agricultural Research Service to study close-range photogrammetric techniques to measure gully erosion in agricultural fields. Plots were established to represent gullies that were formed from concentrated flow. Metal cubes (≈1cubic meter) were designed to test portable controls that could be used within the plots during photographing. A mobile platform was designed for evaluating camera positions over the site during photographing. Methodology has been established from these sites to assess and graphically represent rates and volumes of erosion as determined from photogrammetrically derived XYZ terrain coordinates. Also we have developed certain specifications for control distribution, camera configuration, control point and marker size, and optimum photographic acquisition distances for specific accuracy requirements. Software packages have been developed which provide 1) XYZ terrain coordinates from XY image coordinates of both control and observed points, 2) graphical output of profiles, spot heights, contours and planimetric features, and 3) data and maps depicting changes in profiles, areas and volumes.

2. A rainfall simulator study was conducted on 7.4 percent plots with fluted coulter and conventional tilled-planted soybeans in a small grain stubble on Southern Piedmont soils. Both tillage procedures are difficult to perform following winter-spring cattle grazing because of increased surface soil compaction. Coulter in-row chiseling 20 cm deep in rye stubble effectively controlled runoff ($\leq$13%) on 7.0% sloping rainulator plots (10.7 and 21.4 m slope lengths) until the top soil water content approached 14.2% ($\sim$0.1 bar suction). In-row chiseling and soil cover (rye mulch as well as rye mulch plus 68% soybean canopy) collectively reduced soil losses during rainulator runs to an average of $\leq$0.5 metric tons/ha on both slope lengths. Increased slope length led to increased runoff even with low soil water contents during soybean canopy development. Removing crop residues and destroying the chisel slot with complete tillage caused soil losses to exceed 40 metric tons/ha. Runoff weighted nutrient losses were positively related to soil losses. Increased slope length consistently increased nutrient losses during all tillage-soil cover sequences. Most nutrient loss variation was accounted for by treating soil loss as an independent variable during the rye mulch cover period. Phosphorus losses were better correlated to soil losses among tillage-soil cover sequences than the cations. Coulter in-row chisel planted soybeans through rye residues following winter-spring cattle grazing of rye effectively controls runoff as well as soil loss and some nutrient losses.

For additional information contact Adrian W. Thomas, Research Leader, USDA-ARS, Southern Piedmont Conservation Research Center, P. O. Box 555, Watkinsville, GA 30677.

AGRICULTURAL RESEARCH SERVICE

IDAHO

Research activities at the Northwest Watershed Research Center, Boise, Idaho, include the following:

1. Rainfall simulator-erosion measurements were made on 38 sagebrush rangeland plots on the Reynolds Creek Experimental Watershed in southwest Idaho and the Saval Ranch in northern Nevada. Plot treatments were rototilling, vegetation clipping, grazing, and nongrazing. Soil losses on undisturbed plots were less than previously estimated by the USLE because of depression storage and well distributed cover. Soil erodibility factor, K, values were in reasonable agreement with values established by the Soil Conservation Service; however, cover management factor, C, values were generally less. Rainfall simulator soil loss was about 0.2 tons per acre on grazed plots with about 35 percent bare ground and about 0.03 tons per acre from similar ungrazed plots with 31 percent bare ground. A thorough analysis of the data from this study is in progress.

2. Analysis of sagebrush-grass vegetation on study plots shows that clumps of well-rooted grass and shrubs are about randomly distributed on sagebrush rangelands of the Reynolds Creek Experimental Watershed. The short distance between these vegetation clumps prevents continuous and deep rills from forming. For example, a grazed site with 35 percent bare ground shows only about 1.5 feet between well-distributed clumps of well-rooted vegetation. This natural vegetation cover, roots, and distribution appears very effective in controlling rill erosion on sagebrush rangeland.

3. Sediment yield at four long-term sediment sampling stations in 1982 ranged from near normal to about 2.8 times the average of record, while runoff was about twice the average. Water year runoff and sediment yields from stations on Reynolds Creek were the second or third highest in a 20-year record. Records from years with greatest floods are critical to hydrologic analysis and model verification.

4. Analysis of watershed runoff and sediment yields by the Modified Universal Soil Loss Equation using runoff and sediment data by individual events, separated into rainfall, snowmelt, and mixed rainfall-snowmelt categories, explained about 60 percent of the variance in snowmelt sediment yield, about 70 percent of the variance in rainfall sediment yield, and about 80 percent of mixed event sediment yield. Equation coefficients and exponents ranged widely between rainfall, snowmelt, and mixed events and between watersheds. Additional study is needed before applying the MUSLE to other watersheds with predominantly snowmelt runoff and sediment yield.

5. Erosion and sediment yield instrumentation and data quality were evaluated and reported in a national ARS data quality summary. Success of drop-box weirs, bedload sampling, and sediment yield analysis were emphasized.

For additional information contact Clifton W. Johnson, Hydraulic Engineer, USDA-ARS, Suite 116, 1175 South Orchard, Boise, Idaho 83705.

AGRICULTURAL RESEARCH SERVICE

INDIANA

Research activities at the National Soil Erosion Laboratory, West Lafayette, Indiana include the following:

1. Recent regulations for USDA financial assistance to farmer installation of erosion control practices require that the reduction in soil loss from installation of a practice be estimated. Only recently has the USDA-Soil Conservation Service (SCS) recognized that erosion in natural waterways can be large and comparable to sheet and rill erosion in some fields. Although the Universal Soil Loss Equation can be used to estimate sheet and rill erosion, no comparable method is available for estimating erosion in natural waterways. However, theoretical analysis of rill erosion processes and data from field rill erosion experiments provided a method that can be used to estimate this type of erosion. Equations from this analysis were included in the CREAMS model which is being adopted by SCS for use in their planning and technical programs.

2. Numerical procedures were developed to calculate raindrop impact pressures and jetting velocities as a function of time after drop impact. The finite difference method for solving the dynamic equation of linear elasticity was used to simulate deformation patterns of a soil material under raindrop impact. High-speed photography was used to develop relationships between splash angle and soil shear strength and splash weight. Combining the results of the computer simulation and the laboratory studies, we proposed a new concept of describing the mechanism of soil detachment from raindrops impacting on saturated soil surfaces.

3. Fallout from atmospheric weapons testing in the 1950's and 1960's deposited plutonium over all of the United States. Since plutonium is strongly associated with soil particles, plutonium is moved through the environment by erosion and sediment transport by surface runoff and flow in streams and rivers. The U.S. Department of Energy (DOE) is concerned about the rate that plutonium is being lost from the landscape and collecting in oceans at the outlet of major rivers. Equations were derived for the effect of tillage and nonuniform erosion along a slope on plutonium concentration in the soil. These equations were combined with erosions rates estimated by the USDA-Soil Conservation Service and values for sediment delivery and enrichment ratios to estimate plutonium delivery from selected river basins. Estimated plutonium delivery agreed well with measured values. The results show that erosion is removing plutonium very slowly, and since much sediment is deposited between its point of origin and river outlets, much plutonium on eroded soil is being redistributed on the landscape. This accomplishment meets needs of the DOE for identifying erosional differences in selected major river basins affecting delivery of fallout plutonium to oceans at the river outlets.

4. A four year project studying erodibilities of reclaimed coal mine soils has been completed and is in the process of data analysis. Soil materials varied widely from one site to the next, and these reacted much differently to the energy and drop impact of simulated rainfall and to water flowing in rills. Shaley overburden was least erodible; materials high in coarse silt and fine sand were highly erodible. Erodibility of these materials was underestimated using the USLE. Interactions were found between soil erodibility and slope length and steepness. Analyses are continuing and should be nearly complete by October 1, 1983.

For additional information contact William C. Moldenhauer, Research Leader, USDA-ARS, National Soil Erosion Laboratory, Purdue University, West Lafayette, IN 47907.

AGRICULTURAL RESEARCH SERVICE

IOWA

Research activities at the Watershed Research Program in Treynor, Iowa, and Columbia, Missouri, include the following:

1. Annual sediment delivery ratios averaged 21 percent and varied from 1 to 46 percent for watershed 1 (75 a) from May to April 30 for the 9-year period from 1969 to 1978. R-values for the USLE were determined from recording raingages and annual soil loss was calculated using the USLE. Annual R-value exceeded Wischmeier's R-value of 160 for southwest Iowa 7 of the 9 years and resulted in a large soil loss estimate for most years. One year had an R-value of 300, yet sediment yield was less than 1 t/a, indicating that timeliness, intensity, and duration of rainfall all interact to impact sediment delivery. Measured sediment yield from sheet-rill erosion was less than 2 t/a for 5 years and was 8, 12, 20 and 26 t/a for the remaining years, resulting in an 8 t/a average for the period.

2. The characteristics of aggregates eroded from two soils on watershed 3 were studied using simulated rainfall. The mean aggregate diameters (D_{50}) for interrill erosion were 44 and 34 μm for the Monona (Typic Hapludolls) and the Ida (Typic Udorthents) soils, respectively, and reflected differences in wet aggregate stability and the clay and organic carbon contents of the soils. The D_{50} sizes of the eroded aggregates increased as rilling occurred because the high transport capacity of rill flow did not limit the transport of large aggregates. Eroded aggregates >50 μm contained more clay and total N than either the aggregates <50 μm, when analyzed as a single fraction, or the matrix soil. This finding indicates that nutrient enrichment of sediment does not occur simply because of an increase in the proportion of small aggregates transported, but rather occurs for all particle sizes. The effect of aggregation on phosphate sorption-desorption isotherms was evaluated by comparing isotherms for natural and mechanically dispersed aggregates. We found that aggregation restricted the accessibility of phosphorus sorption sites for aggregates >250 μm.

For additional information contact Allen T. Hjelmfelt, Research Leader, USDA-ARS, North Central Region, 207 Business Loop 70 East, Columbia, MO 65201

AGRICULTURAL RESEARCH SERVICE

MARYLAND

Research activities at the USDA Hydrology Laboratory in Beltsville, Maryland include the following:

1. A cooperative case study was made with SCS personnel to evaluate a computer based approach to estimating runoff curve numbers using Landsat remotely sensed data. The test site was a 298 km^2 river basin in Connecticut. SCS conducted parallel analyses and preliminary results indicate the remote sensing approach to be timely, accurate, and cost-effective. Sensitivity analyses were conducted to evaluate the effects of curve number estimation errors, such as might be encountered using remote sensing. Analyses showed that for the range of expected errors, the effects on runoff estimation are minor.

2. A tool for monitoring the extent of major floods has been developed using data collected by the NOAA-6 Advanced Very High Resolution Radiometer (AVHRR). A basic understanding of the spectral returns in AVHRR Channels 1 and 2 for water, soil, and vegetation has been reached using a large number of NOAA-6 scenes from different seasons and geographic locations. A look-up table classifier was developed based on analysis of the reflective channel relationships for each surface feature. The classifier automatically separated land from water and produced classification maps which were registered to a global coordinate system. Testing of the classifier was completed for a number of acquisitions.

3. The SCS does a great deal of urban hydrology throughout the United States. Previous research indicated that the SCS method produced results with a bias. A data base composed of 51 small urban watersheds under 4,000 acres (1,600 ha) in the United States was used in this study. The annual maximum flood series were used to develop Log Pearson Type III frequency curves, from which peak discharge estimates were estimated for the following return periods: 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year. The bias and accuracy of the SCS methods using the urbanization factors (i.e., the lag factors for the graphical method and the peak factors for the chart method) were evaluated using the Log Pearson Type III estimate as the expected true value. The results indicate that no urbanization correction factors were needed for the graphical method when time of concentration was determined using the velocity method. Modifications to the urban adjustment factors used in the chart method were developed.

For additional information contact Dr. A. Rango, Chief, USDA-ARS Hydrology Laboratory, Room 139, Building 007, BARC-West, Beltsville, Maryland 20705

ARGICULTURAL RESEARCH SERVICE

MINNESOTA

1. Current work at the St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minnesota, is on data analyses of the local scour caused by a cantilevered spillway or culvert pipe discharging onto a bed of cohesionless sand. The analyses show that the scour hole contours, expressed as a percentage of the maximum depth of scour, can be reduced to a single set of elliptical contours for all 6 discharges, all 7 scour periods, all 5 sizes and 2 gradations of bed material, and all 7 pipe heights if suitable normalizing parameters are chosen. These analyses were limited to those data where the discharges were insufficient to cause "beaching," i.e., excessive widening of the surface of the scour hole. The normalizing parameters have been described mathematically. The developed relationships are being checked against the original data to see how well the mathematical model represents the data.

2. An analytical method has been developed that predicts the asymptotic dimensions of the scour hole, that is the scour hole dimensions at infinite time. A paper describing this method was published in the American Society of Civil Engineers Hydraulics Division Journal Vol. 107, No. HY3, March 1981, pp. 327-337.

3. To obtain the maximum disturbed dimensions of the scour hole, 47 tests were made for non-beaching flows in which the bed material suspended in the plume of the jet was removed. These scour holes are significantly larger than those holes in which the disturbed and suspended material was not removed.

4. Preliminary results of these tests are given in, "Plunge Pool Energy Dissipator for Pipe Spillways," by Clayton L. Anderson and Fred W. Blaisdell, Proceedings of the Conference on Applying Research to Hydraulic Practice, August 17-20, 1982, Jackson, Mississippi, American Society of Civil Engineers, 1982, pp. 289-297.

5. Tests were begun to determine the shape of the self-formed scour between the exit of straight drop spillway stilling basins and the downstream channel. For farm size structures this scour shape can develop naturally and be stabilized with vegetation. For large structures environmental, esthetic, and public concern over safety and erosion requires prior shaping and stabilization. The objective of the study is to provide information for pre-excavating and armoring the space between the basin exit and the downstream channel needed to complete the energy dissipation begun in the stilling basin.

For additional information contact Fred W. Blaisdell, Research Leader, ARS, USDA, St. Anthony Falls Hydraulic Laboratory, Third Avenue SE at Mississippi River, Minneapolis, Minnesota 55414.

AGRICULTURAL RESEARCH SERVICE

MINNESOTA

Research activities at the NORTH CENTRAL SOIL CONSERVATION RESEARCH LABORATORY at Morris, Minnesota, include the following:

1. Preliminary evidence suggests that soil aggregate stability is altered following soybeans or sunflowers when grown in normal rotation. Field plots with 4 replicates each of corn-soybean and wheat-sunflower rotations were established to study the effect of microbial activity and soil organic matter on soil aggregate stability. Sampling and analyses were initiated during the 1982 growing season. Weekly samples were collected for total organic matter, water soluble organic matter, and microbial respiration rate measurements.

2. Simulated rainfall was applied to 8 of these plots in 1982 and soil loss, runoff, and sediment size distribution were measured. Stability of in situ aggregates and eroded aggregates was measured in the laboratory using a drop tower procedure. Results of the erosion and aggregate stability tests will be correlated with organic matter and microbial activity in the soil. Also, in the fall of 1982 a study of the rate of residue decomposition was initiated on the plots. Litter bags containing residue were placed at depths of 0, 4, and 8 inches and will be retrieved biweekly for 6 months.

3. Similarly to procedures in 1981, surface roughness was measured weekly on 15 different transects each for a plowed and a chiseled surface over a period of 10 weeks on a silt loam soil. As expected, both mean elevation and random roughness decreased throughout the period. Relations are now being developed to describe changes in consolidation and random roughness as a function of storm kinetic energy.

4. Rainfall was measured and its kinetic energy calculated. When random roughness is plotted against cumulative kinetic energy, the result is linear for the rougher plower surface with rainfall kinetic energy accounting for about 95 percent of the observed differences. For the smoother plowed and disked treatment, random roughness decreased logarithmically with cumulative kinetic energy accounting for about 70 percent of the observed differences.

5. Infiltrometer runs were conducted on each surface condition at various times since the tillage operation. Each run consisted of a "dry run" at antecedent soil moisture conditions at a rainfall intensity of 63.5 mm/hr for 2 hours, and a "wet run" 24 hours later at the same intensity for 1 hour. Before each run, samples and data were collected to evaluate the parameters required by the Green and Ampt infiltration equation as modified by Mein and Larson (GAML).

6. Infiltrometer runs were also made on plots having three different tillage and residue management treatments in continuous corn. Results indicate that no-till produced more runoff and soil loss than either conventionally tilled or conservation tilled (chisel plow) corn.

7. Detailed analyses of sediment particle sizes continue to be done as an integral part of all erosion studies. This data, accumulated from several different soil, tillage, and cropping conditions, is being correlated and analyzed to refine the relationships between sediment particle size and type and amount of vegetative cover, topography, and soil type which are currently being used in sediment transport models.

8. The stability of soil aggregates is a significant factor affecting soil erodibility. A method was developed and tested to characterize the stability of soil aggregates under the forces of impacting water drops as compared to the forces of flowing water. The method involves subjecting soil aggregates of different size ranges to a known amount of water drop energy in a raindrop tower and measuring the change in aggregate size by a wet sieving procedure. An effort is now being made to correlate this aggregate stability with the rate of rill and interrill erosion of various soil types.

9. The specific nature of the processes responsible for the commonly observed reduction in erosion under a crop canopy are being investigated. High speed photography was used to study the impact of simulated raindrops on different types of vegetative canopy and the resulting changes in droplet velocity and kinetic energy. The effect of these changes on soil detachment and soil properties, such as infiltration rates and surface sealing are also being investigated. The work is being done in the drop tower using a portion of a recently constructed portable infiltrometer system.

For additional information, contact Robert A. Young, Agricultural Engineer, USDA-ARS, North Central Soil Conservation Research Laboratory, North Iowa Avenue, Morris, MN 56267.

AGRICULTURAL RESEARCH SERVICE

MISSISSIPPI

Research activities at the USDA Sedimentation Laboratory in Oxford, Mississippi include the following:

1. Conservation tillage in north Mississippi reduced total (sum of solution and sediment) plant nutrient losses in runoff from corn, even though solution nitrogen (N) and phosphorus (P) concentrations in runoff were greater than from conventional-till and sediments were enriched several-fold in N and P. Plant nutrient losses were reduced by conservation tillage because of the significant reductions in soil loss. Soil losses from corn grown for grain were reduced more than 92% by reduced and no-till practices. Corresponding total losses of N and P were reduced about 70 and 80% respectively. The results of this study illustrate the potential conservation benefits of reduced-till and no-till practices to control soil and total plant nutrient losses. The impact of higher concentrations of soluble P in runoff from conservation tillage on downstream receiving waters must be weighed against the reductions in sediment and total plant nutrient losses, and in losses of valuable topsoil.

2. Primary productivity in a lake is reduced by sediment concentration. Ecological studies of Lake Chicot in Arkansas have demonstrated that the lake was sediment-limited in spring and early summer, a phenomenon which may be common in bodies of water influenced by agricultureal runoff. Primary productivity was negatively correlated with suspended sediment concentration. A three year condition-response study involving two basins of the watershed, indicated that primary productivity was markedly reduced when the suspended sediment concentration became light-limiting (20-30 mg/L). This information will be helpful in modeling lake productivity and in quantifying the effects of sediment pollution.

3. Relationships of sediment yield and runoff with rainfall were defined using data from two adjacent watersheds in the Mississippi Delta. Because of the varying conditions of antecedent soil moisture and tillage, these data were stratified into monthly periods. The resulting prediction equations can be used for predicting sediment yield from flatland watersheds at locations where climate, cropping and management conditions are similar to those in this experiment.

4. A system of subfactors for computing the C factor in the universal soil loss equation was proposed for cotton. These subfactors are multipliers that represent the effects of land use residual, incorporated residue, tillage intensity and recency, macroroughness, canopy and cover. They show the need for assessing the variation of soil erodibility throughout the year because of the variation in soil water content.

5. Simulated rainfall was used to obtain soil loss data from erosion plots on 0.1% slopes with different surface water depths. Maximum erosion rates occurred under an average depth of about 0.2 cm. Little change in erosion rates occurred for depths greater than about 2 cm. These results

help explain the mechanics of erosion on low slopes and suggest that manipulation of surface water depths might be used for erosion control.

6. Cropping and management (C) values for use in the USLE were derived by crop stage and annual periods for no-till corn grown for silage or grain, and for reduced-till corn grown for grain. The low C-values for the conservation tillage treatments reflected an 80 to 95% reduction in soil loss compared to that from conventional tillage. The C-values in Table 5 of Agricultural Handbook 537 for these treatments are 3 to 6 times larger than those derived from Holly Springs, MS data.

7. Six years of data from erosion plots at Holly Springs, MS and ten years of data from plots at Morris, MN were used to show that monthly values of soil erodibility are high in the cool part of the year and low in the warm and dry part. Erodibility was periodic (cosine curve) for both Mississippi and Minnesota, with maxima on February 4 and April 14, respectively. This finding allows the development of subfactors for the C-factor in the USLE which must have the same effect on erosion for all parts of the year.

8. Plots treated alike in 1981 and 1982 showed that plots eroded for 11 years by conventional tillage produced over two times more soil loss than similar plots previously used for no-till treatments. Crop yields were about 400 lb/a seed cotton less from the eroded plots. This partial data set suggests a large benefit to soil conservation and crop yields from minimum tillage.

9. Combination of vegetations, bank shaping, and structural materials are being evaluated for streambank erosion control in northern Mississippi. Preliminary findings indicate that for channels subject to degradation, grade controls should be installed before or with any bank protection. With few exceptions, survival and growth of the vegetation has been good, even though the study period contained a summer drought and several large storm flows. Native species survived and grew better than introduced species. Studies of erosion protection and plant maintenance are continuing.

10. Average annual sediment yield from Pigeon Roost Creek Watershed and its 8 subwatersheds in North Mississippi ranged from 3.4 t/a for a 2.5 sq mi subwatershed to 8.8 t/a from a 31.3 sq mi subwatershed. During the period 1957 to 1976 when the data were taken, land use was generally improving. However channel erosion remained significantly high, being 87% and 32% of the sediment yield for the above subwatersheds, respectively, during the period 1971 to 1976.

11. The density of wet sand-sized aggregates eroded as sediment from aggregated soils was found to be about 2.0 g/cm^3. This density is considerably greater than the dry-aggregate densities of 1.6 to 1.8 g/cm^3 that are currently used in some erosion/sedimentation models, but it is much less than the density of primary-particle sediment.

12. A mathematical solution to the Richards equation was obtained for a semi-infinite homogeneous soil profile for pre- and post-ponding surface conditions. The solution, based on a spectral series analysis approach,

yields an implicit expression for ponding time as a function of antecedent soil water content, rainfall amount until ponding time, rainfall intensity at ponding time, and soil hydraulic properties. The solution also relates infiltration under post-ponding conditions to ponding depth. This solution will be helpful in furthering deterministic formulations of the rainfall/runoff process.

13. Research has continued on the use of vegetation for stabilizing eroding streambanks. Measurements and evaluation of plantings of woody and grassy vegetation were made in 9 treatment areas on 2,900 linear feet of formed straight channel bank and in 20 treatment areas on 2,140 linear feet of formed bendway banks. Replantings were made during March and April 1982 to improve the stand conditions on several of the sites located on the bendway studies. An evaluation of the survival rate and erosion control effectiveness of most species of vegetation will require a long period of time. At this early stage in the study, alamo switchgrass, bahiagrass, serecia lespedeza, bristly locust, indigo bush and native black willow have given the best stand and growth rates of the twenty vegetative plants undergoing testing. A management program consisting of site maintenance will continue to be an important part of the overall study.

14. Design criteria for low-drop structures have been developed. Empirical equations were developed from hydraulic model tests for design of low-drop grade-control structures. The equations were developed in dimensionless form for generalized design criteria and can be used to dimension the stilling basin size and the location and size of the baffle plate for maximum energy dissipation. A definition in hydraulic terms, separating low-drop from high-drop structures, was developed from the data. The definition is expressed in terms of relative drop height, H/Y_c, where H is the absolute drop height, Y_c is the critical depth of flow at design discharge. Mathematically, they are separated by:

$$\text{Low drop, } H/Y_c \leqq 1.0; \text{ and High drop, } H/Y_c > 1.0.$$

Model studies are being continued to develop more economical methods for constructing low drop structures.

15. Sediment transport in flow transitions. A flume model study is being initiated to define the distribution of the flow velocity and sediment concentration in critical-flow structures typical of those installed on Goodwin Creek. The results from this study is expected to define criteria to use in rating the structures for the average dischages concentration of sediment in terms of single-point, automatic samples. Basic information of the mechanics of sediment transportation in the near-bed region and in flow transitions is also sought.

16. Criteria for modeling equilibrium alluvial channel processes were defined. The average heights of bed forms relative to the flow depth, the friction factor for flow over alluvial beds, and the concentration of bed material in transport are all uniquely related to the Froude number of the flow for specified bed materials. This verifies that small scale studies can be used to model processes of larger alluvial channels. The small model studies are particularly advantageous in that measurements

therein can be obtained with greater accuracy and ease, time scales of variations are shorter requiring shorter observation times for valid determinations of data means, and the expenses for conducting the tests are less.

17. Three methods of determining the migration speeds of bed forms were shown to be compatible. Previous research under this project showed that a cross-spectral analysis of pairs of temporal records of bed elevation would give the most rigorous method for determining the migration speed of bed forms. Unfortunately, signal loss and extraneous echos induce high frequency components that make practical application of the method difficult. Two simplified variations of the method were found to give valid estimates of average bed-form speeds. The first uses time or distance shifts giving the maximum correlation of minimum absolute deviation between paired records along with the actual distance or time shift between the records to estimate the dune speeds. The second method uses the ratio of temporal to spatial frequencies at the peak rate of contribution to the mean frequency for temporal and spatial spectra as an estimate of the average dune speed. These alternate methods avoid the problem of anomalous high-frequency components and require less computational effort.

18. Variable sediment trap efficiency was demonstrated. Measurement of sediment inflow and outflow from a small sediment detention reservoir are being made to determine the reservoir's sediment trap efficiency. Even though the reservoir trapped about 75% of inflowing sediment, monthly trap efficiencies varied widely ranging from about 20 to 100%. This suggests that overall or long term trap efficiency of these structures may not apply to short term conditions such as a single storm or a series of storms.

19. An automatic data acquisition system has been made operational. All 14 streamflow gaging stations are now operational in the Goodwin Creek Research Watershed. Runoff, sediment, and precipitation data are being obtained on a regular and continuing basis. Additional hydrologic data are being obtained at selected locations. Most of the data are obtained automatically and transmitted to the Sedimentation Laboratory by radio. A unique system has been developed to access current data from the watershed by telephone. In response to incoming calls, a small computer with telephone interface accesses the most recent data in the main telemetry computer. Rainfall and water stage data are read over the phone through a voice synthesizer. This current information is highly benefical to researchers and storm duty crews during non-working hours.

20. 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 charateristics 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 last year in a 2.2 mile 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. To date, partial records have been gathered on four storms and complete records have been collected on eight storms. Preliminary observations suggest channel form relief, in the form of moving sand and gravel bars, is slight in the late winter and spring, especially in straight reaches, and grows continuously through the summer and fall. Bar relief started out last year at about 2 feet and grew to over 4 feet by November. Continued observations should indicate whether the phenomena is a seasonal one or merely represents transit of a sediment accumulation zone slowly moving through the system. Preliminary data analysis 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.

21. 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) postsettlement 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.

22. The evaluation of possible relations between soil classification units and the deeper valley-fill (depositional) units was continued. This study is cooperative with SCS. Flood-plain soil series in the northern Mississippi study areas include the somewhat poorly drained Gillsburg and Arkabutla (both Aeric Fluvaquents); the moderately well drained Collins (Aquic Udifluvent) and Oaklimeter (Fluvaquentic Dystrochrept); and the well drained Ariel (Fluventic Dystrochrept), Vicksburg and Morganfield (both Typic Udifluvents). Initial results indicate good agreement between the soil-drainage classes and the proximity of the dense early-Holocene massive silt to the flood-plain surface. Well-drained soils are located at sites where the massive silt has been severely truncated or completely removed and somewhat poorly-drained soils are located at sites where the massive silt is less than about 0.5 m below the flood-plain surface. Moderately well-drained soils are located at intermediate sites. Fluvents and Ochrepts have both developed on the late-Holcene or historic deposits. The presence or absence of bedding reflects conditions of the depositional systems. Oaklimeter and Ariel soil series developed on deposits which formed at sites relatively distal to high velocity flows whereas bedded materials were deposited in more proximal environments and formed the Morganfield and Vicksburg series.

For additional information contact Neil L. Coleman, Laboratory Director, P. O. Box 1157, Oxford, Misssissippi 38655; telephone 601-234-4121.

AGRICULTURAL RESEARCH SERVICE

MISSOURI

Research activities at the Watershed Research Program in Treynor, Iowa, and Columbia, Missouri, include the following:

1. DEPOSITS model was tested on bottom-withdrawal reservoir. An attempt to verify Brune's and Heinemann's C/I vs. trap efficiency curves with the use of the DEPOSITS model was not successful. The shape of the C/I curve generated by the model was quite different and varied greatly depending on the particle size of the sediment. At present it appears to be more feasible to first predict the size of particles trapped in a given impoundment and then with an assumed particle-size distribution, estimate the percentage of sediment trapped. In this manner, the method of predicting the size of particle trapped is independent of the soils or sediment coming from the watershed and relies solely on the hydrodynamics of the reservoir.

2. A new sampling system integrated with temperature measuring system was developed and installed on a flood detention reservoir. When the water level rose above a preset level, three samplers (in three locations) automatically took samples from several depths while a data logger recorded sample temperature, date and time, and wind speed and direction. The data from the magnetic tape cassette was quickly printed out in the laboratory as the samples were prepared for analyses after each storm. This system provided the type of data not available in the past and will help predict movement of sediment in reservoirs which is essential in controlling water quality.

For additional information contact Allen T. Hjelmfelt, Research Leader, USDA-ARS, North Central Region, 207 Business Loop 70 East, Columbia, MO 65201

AGRICULTURAL RESEARCH SERVICE

OKLAHOMA

Research activities conducted by the Water Quality and Watershed Research Laboratory, Durant, and Chickasha, Oklahoma, include:

1. The effect of sheet erosion of the surface 15 cm of eight virgin and cultivated soils on the content of P, N, and C forms, was estimated by comparing the nutrient contents of 0-75 cm (uneroded) and 15-90 cm (eroded) depths. Sheet erosion of the surface 15 cm of soil would reduce the inorganic P, organic P, available P, mineralizable N, and organic C contents of the virgin soil profiles by an average of 15, 18, 25, 46, and 31%, respectively, while increasing P sorption index by 51%. The percent decrease in these P, N, and C forms (16, 2, 9, 35, and 22%) in the cultivated soil profiles following sheet erosion was smaller than for the virgin profiles. In general, simulated sheet erosion affected the P status of the soil profiles less than that of N.

2. An experiment established last year in a sloping wheat watershed at El Reno, OK, to evaluate the effect of long-term erosion on variability and interrelations of soil properties, water storage, and crop production is in progress. Following properties have been measured on 180 soil cores: color, bulk density, particle size distribution, organic matter content, pH, available P, and soil water retention at different negative tensions. Weekly soil water measurements were made in a wheat watershed. A one meter-square area was harvested around each access tube for dry matter yield. The experiment will continue for two more years. A more intensive study of soil-water-plant relationships will be made this summer for a sorghum crop. The data are being analyzed using the concepts of autocorrelations, cross-correlations, variograms, and Fourier-spectrum to study the spatial interrelationships.

3. Sediment, nitrogen, and phosphorus concentrations were measured in runoff from 25 agricultural watersheds in the Blackland Prairie, High Plain, Reddish Prairie and Rolling Red Plain land resource areas of Oklahoma and Texas. Periods of study were 4 to 5 years and treatments included fertilization, cultivation, and burning. Annual N and P losses were less than 5 and 2 kg/ha, respectively. Annual cropland sediment discharge was considerably greater than that from grassland but none of the croplands yielded more than 3100 kg/ha, well within the SCS tolerable annual losses for the associated soils. It should be noted, however, that all the cropland watersheds involved recommended-practice treatments.

4. Involved in the Little Washita MIP during 1982 were 13 grassland, cropland, roadside, and gully watersheds. The two new peanut watersheds will give needed water quality information for the sandy, erosive soils in the north reach of the Little Washita. Emphasis has continued to focus on assessing the impact of BMP's on water quality. To date, major BMP effort has concerned wheat production. For a two-year period stubble

mulch wheat (BMP) compared to conventional wheat reduced annual erosion from 3400 to 2700 kg/ha, runoff from 12.9 to 11.1 cm and N and P losses about one-fourth to one-half. Gullies and roadside ditches continue to be high sediment producers in the Little Washita, with yields up to 80-160 metric tons/ha not uncommon.

5. Computer simulations and analysis of interflow pathways, rates and source areas in a sloping layered soil with a seepage face were completed. A manuscript was prepared, processed and accepted for publication. A further analysis was made of the applications of the study to the design of vegetative sediment trap or a buffer strip, as a subsoil layer of high hydraulic conductivity greatly increases infiltration and interflow near a seepage face. Provision for closely-spaced french drains, thus, will reduce greatly runoff and will increase trapping of sediment. Theories and computer programs have been developed for obtaining simplified solutions for some cases of interflow in a partially-saturated sloping field.

6. Based on field observations by the Soil Conservation Service (SCS) and growth analysis data from the Durant location, four accessions of Spartina patens have been selected for further evaluation (PI-415140, PI-434408, PI-415138 and PI-422110) by the SCS. This terminates the work on this species at the Durant location. A cooperative study among the SCS, the Durant location, and the Biology Department at Midwestern State University (Wichita Falls, TX) has been established to determine the taxonomic relationships among 44 accessions of Elymus virginicus. Field press collections of panicles, stems and leaves were made at Americus, GA, and are under study at Midwestern. In addition, 17 accessions of E. canadensis were collected for comparative purposes. A character list is currently under development as a basis for a numerical taxonomy study of the group. Seedlings of Elymus virginicus have been propagated for both taxonomical and physiological studies starting early in 1983.

7. Studites on the effects of infiltration rates, soil surface shaping, and surface clods on the release of applied chemicals to runoff were completed and analyzed. Decrease in infiltration rate increased chemicals transferred to runoff by 1 to 2 orders of magnitude. This increase was greater when the hydraulic conductivity of the soil surface layer was greater. It appears that turbulence generated in soil water by raindrop impacts causes transfer of chemicals from below the thin soil surface mixing zone. This also explains the tremendous increase in chemicals transferred to runoff from a cloddy surface. The commonly used model of complete mixing between rainwater and soil solution in a certain mixing zone was not valid. A new model with degree of mixing decreasing exponentially with soil depth was developed, tested, and found to satisfactorily explain the experimental results. Two manuscripts were prepared, processed, and accepted for publication.

8. Soil and sediment characteristics, including fallout ^{137}Cs, were considered in evaluating upland erosion and impoundment deposition in studies conducted cooperatively at White Clay Lake Watershed, Shawno Co., WI; Treynor Watersheds, IA; Allerton Lakes, University of Illinois, Urbana; and four flowage reservoirs in Wisconsin (WIS. DNR). The study of Wolf Lake, MS, was completed, a manuscript was prepared and published.

9. A mathematical model of light penetration, temperature dynamics, suspended sediment concentration, and light/nutrient limited algal growth has been completed. An evaluation of the model components is in progress. Preliminary results have indicated that inclusion of a Richardson's number criterion may be needed to regulate model predictions of mixed-layer deepening under strongly stratified conditions. Sensitivity analysis has shown that the carbon:chlorophyll ratio and maximum photosynthetic rate per unit chlorophyll affect predictions of algal chlorophyll, and that variability in these parameters introduce uncertainty in predictions.

10. The effects of age of Chlorella cultures on flocculation were determined. The maximum settling velocity was more than twice as great with cultures in the declining stage rather than the exponential growth phase. This indicates formation of larger algal-clay clusters, which may result from leakage of intercellular compounds from the older cells. Two pairs of comparable turbid ponds were selected to test the effectiveness of algal-clay flocculation in the field. One pond of each pair was fertilized with N and P, and the other was left unfertilized as a control. Greater amounts of N and P (up to 100 kg/ha of pond surface) were required for the more turbid ponds. Algal growth was stimulated in both fertilized ponds, leading to sedimentation of algal-clay clusters and a significant reduction in turbidity.

11. With 3 years of observation 2 SCS impoundments are rated eutrophic according to widely recognized criteria even though little or no fertilizer is used in the pond watersheds. The impoundments have annual mean total P >35 μg/L, annual mean chlorophyll >8 μg/L, and mean Secchi disk visibility <1.5 m. Concentrations of P in rainfall were frequently high enough to cause eutrophication, and concentrations of both soluble and total P in runoff were consistently higher than those in rainfall. However, the concentrations of P in outflows from the impoundments were much lower than in inflows, indicating that upstream impoundments may significantly reduce P inputs to major reservoirs and lakes.

12. The range of growth and reproductive characteristics of 10 accessions of marsh-hay cordgrass were determined. This grass is of interest to SCS for streambank, channel, and shoreline stabilization. Studies over a 2-year period allowed selection of 4 promising accessions for further field tests by SCS. One of the accessions was chosen for seed production, another for reproduction by rhizomes. The best of the accessions may eventually be released for general use.

13. Applicability of the SCS curve number procedure was tested on the 1620 acre area draining into West Bitter Site 3 Flood Water Retarding structure. SCS runoff curve numbers varied between 57 and 96 for the impoundment watershed with an inverse relation between precipitation amount and curve number. This was apparently caused by partial area runoff from impervious and semi-impervious areas. A comparison of measured event runoff versus event runoff computed by curve numbers 66, 82, and 92 for antecedent condition I, II, and III, respectively, gave an R^2 of only 0.44. However, the total computed surface runoff for 8 years of record was less than 1 percent below the measured runoff. The curve numbers method is considered a good tool for predicting long term runoff for the watershed.

14. The SWRRB model development has continued with additional testing on measured basins up to 200 square miles in size. Both simulated input data and measured input data for rainfall, air temperatures and solar radiation were used in these tests. All four options of input (1) measured single rain gauge, (2) measured multiple rain gauge, and (3) simulated single rain gauge, and (4) simulated multiple rain gauge were used. Good results were obtained with all options. The better comparisons with measured flow, and sediment transport were found when measured multiple rainfall and simulated multiple rainfall estimates were used. Two small unit source watersheds C4 and C5 at Chickasha were used to test SWRRB on small single area and single land use basins. Results were similar to those obtained with runs made using the CREAMS model.

15. The mathematical model, RESQUAL, was modified for use between storm events and during low flow events. This portion of the model is complete and operating and will become a component of the ARS watershed model, SWAM. The temperature, light penetration, density current, and light limited algal growth components of the program RESQUAL have been adapted for use on agricultural impoundments. Development of the nutrient and pesticide components has been initiated. Data was collected for 5 months on Spring Creek Watershed for use in the model.

16. Technology transfer activities by laboratory personnel working one-half time for the past two years was partially responsible for the acceptance of CREAMS as an analytical tool for routine use in SCS planning and program evaluation procedure. In June 1982 after evaluation of the models application to several SCS projects, the Deputy Chief for Technology and Applications issued a National Bulletin formalizing the use of CREAMS, and outlining the training procedures and workshop needs for all of SCS. The significance of this accomplishment is the culmination of nearly four years of research by a national group, nearly 40 ARS scientists and engineers to produce and effect usage of a non-point water quality evaluation tool for user agencies. National workshops have been presented and are planned in all national regions of SCS in 1983 and 1984.

17. Sediment yield from the total gully and roadside watersheds in the Little Washita averaged 35 and 73 tons per acre, respectively, and were the highest measured from any of the unit source watersheds. Yields from that area occupied by only the gullies averaged 316 tons per acre and the area

occupied by only the roadside areas averaged 826 tons per acre. Contributions from these areas made up 88 and 95% of the yield from the gully and roadside watersheds, respectively. Sediment yield from a conventional tilled wheat watershed with a 3% slope has averaged 7 tons per acre and is 11 times higher than on adjacent idle land watershed. A comparison of stubble mulch and conventional tilled wheat on adjacent watersheds shows an average runoff of 5.05 and 5.80 inches, respectivley. Sediment yield was lower from the stubble mulch one year and approximately the same another year. However, average yields from both watersheds are less than 2 tons per acre. Two watersheds were instrumented at the Oklahoma State University Caddo Peanut Research Station near Fort Cobb, Oklahoma.

18. Cooperative work on determining the sedimentation rates in impoundments using the cesium-137 method was continued through 1982. The Lakes Larto and Saline studies in central Louisiana were completed and a report was submitted to the Corps of Engineers, Vicksburg District. The studies on sedimentation rates in Lake Overholser and Northeast or Zoo Lake is underway. The Oklahoma State Water Quality personnel are sampling the lakes. A preliminary study was conducted for the Fish and Wildlife Service, Yankton, South Dakota office of the Columbia National Fishery Research Laboratory. The Wildlife people are concerned with rates of sedimentation in pothole wetlands of eastern South Dakota. Two profiles were submitted for Cs-137 analyses. The results showed sedimentation rates since 1954 were low (<0.35 cm/yr) and had not varied since that time in a grassed area. The second profile, from an area originally farmed, showed a decrease in sedimentation rates dropping from 5.0 cm/yr during 1955-1958 to not more than 0.8 cm/yr for the period 1965-1982. This reduction was assumed due to the conserving influence of grass cover. Three sediment profiles from Lake Bonnie, Goldsboro, Maryland, were submitted to the laboratory to determine if in fact rapid deposition was occurring. The Maryland SCS were concerned because of the local "reports." Two of the profiles submitted had deposition rates of less than 0.5 inch/year (Cs-137 dating). The third profile examined showed a recent sedimentation rate of less than 0.33 inch/year although from 1954 to 1964 the rate was in the order of 1.25 inch/year. A sediment survey of Ft. Cobb Reservoir, Caddo County, Oklahoma, was initiated in cooperation with the Oklahoma State Conservation Commission and the Bureau of Reclamation, USDI and their location section, the Ft. Cobb Master Conservancy District. Five ranges were chosen where the original survey monuments could be located and cross sections were taken using an electronic fathometer mounted on a pontoon boat. This gave a very good indication of the area of fill along these lines. Midway up the lake from the dam the cross sectional area has been reduced by less than 7 percent while in the upper northwest fork the area has been reduced by about 52 percent. The northeast fork indicates a fill of 33.5 percent. These accumulations have occurred since July 1960 when the USBR originally surveyed the lake.

For additional information contact J. Roger McHenry, Director, USDA, ARS, Southern Region, P.O. Box 1430, Durant, OK 74702.

AGRICULTURAL RESEARCH SERVICE

TEXAS

Research activities at the Grassland, Soil and Water Research Laboratory in Temple, Texas include the following:

1. The first phase of a dynamic sediment detachment-transport model was developed and tested. The dynamics of water and sediment transport are treated as a series of steady states in such a manner that mass of water and sediment are conserved. This transforms partial to ordinary differential equations of the first order, allowing analytic solutions for sediment concentrations at any time and position on the plane. The processes simulated include rainfall detachment, sediment deposition, and entrainment of sediment by runoff.

2. A mathematical model called EPIC (Erosion-Productivity Impact Calculator) was developed to determine the relationship between soil erosion and soil productivity for the U.S. EPIC is physically based and uses readily available inputs. It continuously simulates the processes involved simultaneously and realistically, using a daily time step. EPIC is capable of computing the effects of management changes on outputs. The model components include hydrology, weather, erosion-sedimentation, nutrients, plant growth, tillage, soil temperature, and economics. Tests have been conducted for over 150 sites in the U.S.

3. Conservation tillage has been shown to be a workable principle on wet clay soils. Crop yields are not significantly different from conventional tillage yields. Controlled-traffic can be used with no-tillage to produce improved soil properties and reduced sediment losses.

For additional information contact Clarence Richardson, Research Leader, USDA-ARS, Southern Region, P. O. Box 748, Temple, TX 76503

AGRICULTURAL RESEARCH SERVICE

OREGON

Research activities at the Columbia Plateau Conservation Research Center in Pendleton, Oregon, include:

1. Runoff and soil erosion data have been collected at a permanent erosion site in a wheat-pea rotation for the past 6 years. Conventional tillage practices similar to those found in a wheat-pea rotation are followed. All plots, including 2 in permanent fallow are moldboard plowed cross-slope in late summer. Seeding operations are performed in an up-and-down slope direction using a double disk drill. The final up-and-down direction is done to give the USLE P factor a value of 1. After 6 years of monitoring, the wheat-pea plots have shown a soil loss of only 8 tonnes/ha/year while the continuous fallow plots have lost 27 tonnes/ha/year. The largest single year soil losses were observed during 1980 on the wheat-pea plots, when excessive soil compaction drastically reduced the infiltration rate and produced large runoff volumes and consequent soil loss. November to April precipitation has been above normal for 5 of the 6 years. A small change in management on the wheat-pea rotation such as cross-slope seeding should reduce average yearly soil loss to well below the soil loss tolerance of 7 tonnes/ha per year. A frequency analysis of 53 years of November through April precipitation shows that the chance of observing a November-April precipitation total greater than that observed in 1977-78 (352 mm) is about 9 percent. This indicates that yearly soil losses larger than those observed are associated with relatively rare, very wet winters and/or specific micrometeorological and hydrologic conditions. For this reason the experimental plots will be maintained in anticipation of observing some extreme events.

2. Runoff and soil erosion data is also being collected from farmer-operated fields throughout 5 northeastern Oregon counties in dryland and wheat production. Data from three complete erosion seasons show that 57 percent of the observed events involved frozen soils, 57 percent involved snowmelt and 49 percent involved both snowmelt and frozen soils. Because frozen soils and snowmelt are the key factors in large soil loss events, a data base has been assembled from the erosion monitoring sites and testing of a soil frost simulation model has begun. The model used in the algorithm described by Cary (USDA-ARS; Snake River Conservation Research Center, Kimberly, Idaho) with modified inputs. The model simulates the presence or absence of frozen soil correctly about 80 percent of the time. For additional verification of the soil frost model, soil thermistors have been installed (10, 15, 20 cm deep) at 6 sites in northeastern Oregon and 1 site in southeastern Washington. These are read as often as possible but not less than once a week. Soil temperature at 2 inches is monitored continuously. A physically based hourly snowmelt model has been formulated, calibrated, and verified. The model is applicable to rain on snow events as well as snowmelt in the absence of rain. Preliminary results for both types of events are encouraging.

3. Data from 3 field experiments on the role of surface residue as a mediator of soil frost are being analyzed. Soil frost penetration was significantly greter in conventionally tilled (moldboard plowed) plots than in no-till winter wheat plots. Frost penetration was three times greater in depth and frozen soil layers were present twice as long in the conventional tillage system as compared to the conservation tillage system. However, the persistence of soil frost is linked to both surface residue and the weather conditions during the thaw. Surface residue does not appear to influence soil frost persistence during clear sky, high air temperature conditions. When cloudy skies and lower daytime temperatures are accompanied by freezing or near-freezing nights, adequate surface residue favors more rapid soil thawing.

For additional information, contact John F. Zuzel or R. R. Allmaras, USDA-ARS, P.O. Box 370, Pendleton, OR 97801.

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 is being 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, are being 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 meters 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 and data is being analyzed.

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 ACTIVITIES

Bureau of Reclamation

Development of the water-sediment routing model continued under contract with Colorado State University. The steady flow hydraulic capability of the model was tested using observed data and other available steady flow computer programs.

A physical model is being used to help develop fuse plug design criteria for pilot channels to initiate breaching, for the angle of impervious cores and the cohesionless material zone in the interior of embankments, which control the rate of lateral erosion after the initial breach.

A study is being done to help determine the ability of ramp flume water measuring device to pass sediment and to determine the deposit depths that they can tolerate without effecting their calibrations. These ramps have a 3:1 sloped approach to a broad crested weir. A correction factor similar to that for side bank stability was found for uphill flow. Computed average tractive shear values along the ramp have been related to the location at which different sizes of sediment will go over the ramp flume.

The general study concerning local scour due to impinging jets in basins continued. Scaling analyses and pressure have been obtained in a hard form basin to provide a base for subsequent scour test simulations of cohesive and rock basins both homogenious and jointed.

The results of clay erosion test for the Riverbank Stabilization Program for the Columbia River downstream of the Third Coulee Powerplant have been summarized in a draft report along with tractive shear results. The limitations of shear test devices are discussed. The report will be published by fall, 1983.

A laboratory study is being conducted to determine the effects of non-Newtonian fluid properties on the transport of calcium carbonate slurry transport. Settling velocity and the vertical concentration distribution of the slurry across the pipeline are being studied.

An erosion flume is being equipped to determine tractive shear by direct force measurement on small samples of soils. It is planned to calibrate the erosion flume with a Preston tube pressure measurements.

A technical guideline for determining reservoir sedimentation and resulting downstream channel effects was published for use by Reclamation in the planning and design of storage reservoirs.

A technical guideline on procedures for monitoring reservoir sedimentation was published for use by Reclamation in planning and conducting sediment surveys.

CORPS OF ENGINEERS

Coastal Engineering Research Center

BARRIER ISLAND SEDIMENTATION STUDY. The general objectives of this program are to gain a better understanding of the sedimentation and erosion processes operating along barrier island coasts of the U. S. Five independent but related substudies are in progress and described below:

1. "Sources of Barrier Island Sediments" - Involves collecting sediment samples along the coasts and across the inner continental shelf, and using geophysical equipment to identify areas of erosion that might contribute to a coastal sand budget. Natural sediment tracers and side-scan sonar data used to determine onshore/offshore sediment transport.

2. "Back-barrier Marsh Sedimentation" - Involves coring and mapping to understand processes and environmental conditions needed to form and maintain biologically productive marshes. Results used to objectively evaluate impacts of engineering works on marsh processes.

3. "Formation and Evolution of Capes" - Involves analyses of historic charts and detailed sedimentological studies of cores to determine natural conditions needed for shoreline accretion to form capes.

4. "Historic Shoreline Changes and Sea Level Effects" - Involves a cooperative agreement with NOAA-NOS to reduce all available historic coastal charts to a common scale to show accurate changes in shoreline position. The regions being studied are Cape Henry, VA to Cape Hatteras, NC, Sandy Hook, NJ to Cape May, Cape Henlopen, DL to Cape Charles, VA and Cape Romaine, SC to the Savannah River. The second part of this study involves using cores to document how the shoreface has changed shape and position in response to holocene sea level rise.

5. "Recent Changes in Sea Level Elevation" - Involves a thorough review of climatic and sea level literature world-wide over the past several decades to determine the changes in sea level elevation in the past several centuries. Attempts will be made to make the most reliable and accurate quantitative predictions of sea level rise for the next century.

WAVE-SAND INTERACTIONS IN A WATER TUNNEL. In a CERC sponsored study, Karl Lofquist of the National Bureau of Standards has concluded data collection and analysis of oscillatory-flow energy loss due to naturally rippled sand beds. Results will be fully documented in a technical report to be published by CERC during 1983.

STORM EROSION STUDIES. The purpose of this study is to develop methods for predicting storm-induced beach changes. During the first phase of the study, measured beach changes will be empirically related to storm parameters. Available data include storm change surveys conducted by this study between November 1975 and March 1978, and similar data collected under CERC's Beach Profiling Program between 1962 and 1977. Included in the study are 11 east

coast beaches located between Cape Cod and North Carolina. All these data include surveys only of the above mean sea level beach. Wave data for the storms occurring before January 1976 have been obtained from the WES east coast wave hindcast model.

A new field study, which began in 1981, seeks to investigate nearshore changes due to storms. Two profile lines located at CERC's Field Research Facility are being surveyed bi-weekly and after storms out to a depth of about 10 meters using the Coastal Research Amphibious Buggy (CRAB). Accurate position and elevation are determined with an electronic survey system. The data from the first two years of surveys indicate that beach changes occurring in water depths less than 6 meters. Most of the observed profile changes result from the exchange of sediment from the beach to the nearshore bar and on/offshore oscillations of the bar.

SAND AGITATION AND TRANSPORT BY NEARSHORE WAVES. Research progress on several aspects of this topic has been documented in articles recently published by Robert Hallermeier of CERC. These include: "Hindered Bedload Settling as an Explanation of Sand Bed Planation by Water Waves", Nature, Vol. 297, pp. 53-55, 6 May 1982; "Bedload and Wave Thrust Computations of Alongshore Sand Transport", Journal of Geophysical Research, Vol. 87, pp. 5741-5751, 20 July 1982; and "Oscillatory Bedload Transport: Data Review and Simple Formulation", Continental Shelf Research, Vol. 1, pp. 159-190, November 1982.

SCALE MODELING OF COASTAL SEDIMENT TRANSPORT. A research plan has been developed to evaluate the state of the art in movable-bed modeling of sandy shores at small scales. Tests conducted in the CERC Large Wave Tank and data collected at the Field Research Facility, Duck, N. C. are used as the prototype. Models at scales of 1/16, 1/30, 1/53, 1/77 and 1/106 of the Large Wave Tank tests have been conducted, and distorted-scale tests are now being run. The accuracy of profile developments will be used to optimize design of a 3-dimensional model for a prototype site; the similarity of resultant effects will comprise a cruciual test, because it will be necessary to distort the model. A paper by William Seelig of CERC documenting first analysis of results has been submitted for ASCE publications, and indications are that undistorted models with scales larger than 1/60 can accurately model the rates of beach erosion and accretion by water waves.

BEACH PROFILE STUDIES. The objectives of these studies are to observe the response of beaches to waves and tides of specific intensity and duration and to develop predictive techniques for estimating storm - induced beach changes.

During the 1982 calendar year emphasis continued on the preparation of locality reports summarizing data collected since 1962, and the publication of the user's guide for the Beach Profile Analysis System (BPAS).

Draft reports were completed for Fair Field and Misquamicut Beach, Connecticut, and Jones Beach, New York. These reports document beach profile recovery following the Great East Coast Storm of March 1962 and document subsequent response to artificial beach fill and groin construction projects.

The 8-volume BPAS User's Guide was published as CERC TR 82-1.

CORPS OF ENGINEERS

The Hydrologic Engineering Center

Work at the Hydrologic Engineering Center (HEC) continues to focus on the maintenance and improvement of the mathematical model HEC-6, "Scour and Deposition in Rivers and Reservoirs".

The HEC conducted a four-day training course and workshop on the theory and application of computer program HEC-6 in St. Louis on 21 through 24 June 1982. Approximately forty students participated from several districts and divisions. The HEC also conducted a regularly scheduled training course or "Sediment Transport," during the two weeks of 6 through 17 December 1982. Guest lecturers included experts from the Corps of Engineers, the Soil Conservation Service, California Institute of Technology, the University of California and private industry.

Several on-going sediment investigations to assist four different Corps district offices were initiated in 1982. They include studies to evaluate possible project related sediment problems on the Arkansas River in Colorado, the Santa Ana and San Luis Rey Rivers in California, the Truckee River in Nevada, the Animas River in New Mexico, and the Holbrook River in Arizona. Special Projects Memo No. 82-4, "Watershed Sedimentation Investigation for the Truckee River Basin, Verdi to Vista" (MacArthur, 1982), summarizes the results of HEC's evaluation of sediment related problems that may occur along the Truckee River as it flows from Lake Tahoe, California through downtown Reno in Nevada.

The HEC participated in a study coordinated by the National Academy of Science to evaluate the use of computer-based models for the prediction of flood levels in alluvial rivers. A final summary report entitled: "An Evaluation of Flood-level Prediction Using Alluvial River Models" will be available from the National Research Council early in 1983.

CORPS OF ENGINEERS

Waterways Experiment Station

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 alignmnent for navigation channels.

During 1982, accumulation of prototype data was continued and an approach for developing a hypothesis was outlined. ASCE approval for conducting a Rivers '83 specialty conference on the subject of alluvial river migration and meandering was secured and planning begun. The conference is scheduled for Oct 83 in New Orleans and is expected to make an invaluable contribution to this long-neglected subject at 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 of the Corps of Engineers is being developed. Guidance for conducting a qualitative analysis of a flood control channel's response due to channel modification by a flood control method and guidance concerning data requirements for a flood control channel project analysis were prepared for addition to Hydraulic Design Criteria (HDC). For assistance in synthesizing stage-discharge data in the absence of needed field data, two computer

programs for the Conversationally Oriented Real-time Programming System (CORPS) have been written. These programs are: H9110 - Flow Resistance Over Movable Beds by Einstein's Method and H9111 - Flow Resistance Over Movable Beds by the Method of White, Paris and Bettess. Also produced during 1982 was a contractor's report on the state of the art of designing stable flood control channels.

Title of Study:

Sedimentation Engineering Manual

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

The 3 technical chapters of an engineering manual to update the Corps' "Reservoir Sedimentation" manual were prepared. Subjects are "Sediment Yield," "River Sedimentation," and "Reservoir Sedimentation."

Title of Study:

Sediment Traps for Reduced Shoaling

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

Sediment Traps for Reduced Shoaling study is a portion 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 methods that will allow effective sediment traps to be designed to reduce maintenance dredging in estuarine navigation channels and turning basins. Accomplishments during Calendar Year 1982 include the following:

1. A coastal district and division survey of current practice of using and designing sediment traps was completed.

2. A draft report on present sediment trap utilization and methods was begun.

A final report incorporating the annotated bibliography and the present sediment trap utilization methods will be published in 1983.

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 Improvement of Operations and Maintenance Techniques (IOMT) research program. This study was a new work unit 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 remedies can be designed.

During CY 82, a general research plan was drawn up and initiated. The plan seeks ways to improve knowledge in six related areas--deposition processes, erosion processes, settling velocity, bed consolidation, rheology of sediment suspensions, and field and laboratory methods to measure significant parameters. Draft documents on rheology of suspended sediments and on settling velocity were completed. Laboratory flume tests to confirm procedures and compare with earlier work were started. Work was underway in other task areas.

Title of Study:

Numerical Prediction of Navigation Channel Shoaling

Conducted for:

Office, Chief of Engineers

Summary of Accomplishments:

A system of 2-dimensional, horizontal plane computer programs is being packaged under the name TABS-2 for general use in sedimentation studies. These codes calculate the movement of sediment concentrations in the water column, the exchange of sediment with the bed and the resulting change in bed elevation with respect to time. Either sand or silt/clay sediment can be analyzed.

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 calendar year 1982 include:

1. Construction of a facility for testing wear and flow properties of dredge pipe.

2. Completion of a draft report summarizing physical and operating characteristics of portable hydraulic dredges.

3. Completion of literature review on pipeline transport of high density slurries.

Future work will include comparative testing of the wear and flow properties of high density polyethylene and steel pipe, publication of the report on portable hydraulic dredges, laboratory investigations into energy requirements for high density slurry transport, 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:

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 overdepth 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. Accomplishments during 1982 include the following:

1. The process of selecting channels having adequate data available for the analysis of the effectiveness of advance maintenance was continued.

2. The analysis of some site specific projects in the Portland District was completed.

3. The analysis of site specific projects along the Gulf and East Coast was continued.

4. An ETL draft on present available analytic and empirical techniques for predicting the effect of advance maintenance and dredging requirements has been initiated.

Future work includes completion of the selection of advance maintenance entrance channels to be evaluated and analysis of the selected projects. Development of an empirical model to predict the effectiveness of advance maintenance in reducing dredging frequency and/or costs in entrance channels will be completed.

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. This 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 littoral and onshore-offshore movement of sediment.

During CY 82, 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 initiated a new 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.

B. Colorado State University completed the study, sponsored by FHWA, to investigate scour at culvert outlets in various bed material. The study includes four bed materials; a uniform sand, a uniform gravel, a sand-gravel mixture, and a sand-silt-clay mixture. The study includes tests with various culvert diameters ranging from 4 to 15 inches to test the adequacy of modeling assumptions in developing design guidelines for much larger field installations. The final report was published and distributed in 1982. FHWA Hydraulic Engineering Circular No. 14 "Hydraulic Design of Energy Dissipators for Culverts and Channels," which will incorporate results from the CSU report in a revision to the chapter on "Estimating Erosion at Culvert Outlets," is still being reviewed for reprinting.

   Ruff, J. F., Abt, S. R., Mendoza, C., Shaikh, A., and Kloberdanz, R., "Scour at Culvert Outlets in Mixed Bed Materials," FHWA/RD-82/011, Federal Highway Administration, Washington, D.C. 20590, September 1982. NTIS No. PB83 152538.

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 titled "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 titled "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 is being developed.

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 Corp. in cooperation with the Pennsylvania State University continued the FHWA study titled "Flow Control Structures for Highway Stream Crossings." The research will evaluate present application of spur and conduct laboratory flume studies to refine design guidelines for use by highway engineers.

C. A key to the proper design of a highway crossing or utilization of protective measure is a clear understanding of stream stability. A stream classification scheme is provided in the FHWA research report titled "Countermeasures for Hydraulic Problems at Bridges," FHWA report number FHWA/RD-78/162. To make utilization of this stream classification scheme more readily usable by highway engineers, the USGS prepared an FHWA research report titled "Stream Channel Stability Assessment," which was published in 1982. The report identifies in a step-by-step manner the operations necessary to make a good evaluation of stream stability and what this may mean in terms of highway design.

Brice, J. C., "Stream Channel Stability Assessment," FHWA/RD-82/021, Federal Highway Administration, Washington, D.C. 20590, January 1982. NTIS No. PB83 118190.

D. The USGS continued the FHWA 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 will be used to field validate methods of roughness coefficient estimation which have been developed theoretically and only laboratory tested. The study will strive to attain quantitative methods that are relatively simple to apply and result in accurate estimates; at a minimum it will provide comparative methods that will make present estimates more consistent.

E. 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.

F. The FHWA initiated a study on 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-type 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 in 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. The Virginia Highway Research Council completed work on "Efficiency of Erosion Control Practices" for the Virginia Department of Highways and Transportation (VDHT) under the HP&R program. Current VDHT erosion and sediment control practices were evaluated. Optimum erosion and sediment control will be determined using the highest practical design and construction procedure and maintenance of control technology. The final report was published in 1982.

Wyant, D. C., "Efficiency of Erosion Control Practices of the Virginia Department of Highways and Transportation," Virginia Department of Highways and Transportation, Richmond, Virginia 23219, 1982.

C. 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 1982, 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 1982.

Middlebrooks, P. B. "Centipedegrass Planting for Mowing Reduction," Georgia Department of Transportation, 1981.

Miller, J. F., and P. B. Middlebrooks, Jr., "Herbicide Development and Usage for Highways," Georgia Department of Transportation, 1981.

Huffine, W., Reed, L. W., and C. E. Whitcomb, "Selection, Establishment and Maintenance of Roadside Vegetation," FHWA-OK-81-5, Oklahoma Department of Transportation, Oklahoma City, Oklahoma. NTIS No. PB82 192998.

Stadtherr, R. J., et al., "Establishment of Ground Cover for Non-Mowable and Locked-in-Areas on Louisiana Interstate Highways," Louisiana Department of Transportation, Baton Rouge, Louisiana, 1981.

Verkade, S. D., and D. F. Hamilton, "Use of Mycorrhizal Inoculation for Plant Establishment on Highways," Indiana State Highway Commission, Indianapolis, Indiana, 1982.

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 FWHA 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 1983.

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 for two stream sites in Wisconsin and North Carolina, and is underway for a lake site in Wisconsin.

C. The Pennsylvania State University, sponsored by the Pennsylvania Department of Transportation, completed the HP&R study on "The Impact of Stream Relocation of Fish Populations - Bull Creek." This research studies fish populations, bottom fauna, and water quality in Bull Creek before, during, and after stream relocation for construction of the Allegheny Valley Expressway.

Cooper, E. L., "The Impact of Stream Channel Relocation on Fish Populations and Bottom Fauna With Emphasis on Movement of Fishes Through Long Culverts," FHWA-PA-81-019, Pennsylvania State University, State College, Pennsylvania. NTIS No. PB82 202524.

D. The California Department of Transportation is completing the HP&R study on "Modeling of Transportation Pavement Runoff." This study will use data developed on the completed California study "Water Pollution Aspect of Particles which Collect on Highway Surface."

E. The California Department of Transportation continued another HP&R study on "Mitigation of Highway Related Chemical Water Quality Pollutants."

Winters, G. R. and J. L. Gidley, "Evaluation of Stream Channel Relocation Impacts and Mitigation Measures on Aquatic Biota," FHWA/CA/TL-81-01, CALTRANS, TRANSLAB, Sacramento, California, June 1981.

F. The University of Washington in Seattle completed the HP&R study on "Highway Stormwater Runoff Quality" sponsored by the Washington Department of Transportation.

G. The Alaska Department of Transportation and Public Facilities initiated an HP&R study to evaluate the effectiveness of roadway drainage structures for fish passage.

H. The Center for Natural Areas of Maine was completing an FHWA study on Valuation of Wetlands. Draft reports on a method of assessing the functional values of wetlands was reviewed. 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.

I. An administrative contract was initiated 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 initiated 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 has undertaken 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. An administrative contract was initiated by FHWA to investigate highway maintenance activities, identify potential hazards to water quality, and develop guidelines for effective mitigation alternatives.

N. The Minnesota Department of Transportation published a report on highway runoff characteristics as part of their ongoing research program.

Pederson, D., "Characteristics of Urban Highway Runoff, (Phase I)," FHWA-MN-81-6, Minnesota Department of Transportation, St. Paul, Minnesota, November 1981. NTIS No. PB82 203050.

O. Interactions of the highway system with wetlands is receiving attention. A study on the impacts of highway development in tidal flats was published by FHWA in 1982.

Diaz, R. J., et al., "Examination of Tidal Flats, Vol. 1-3," FHWA/RD-80/181-183, FHWA, Washington, D.C., June 1982.

P. The use of constructed ponds to replace impacted wetlands was published by the University of North Dakota for the North Dakota Department of Transportation.

Rossitar, J. A., and R. D. Crawford, "Evaluation of Constructed Ponds as a Means of Replacing Natural Wetland Habitat Affected by Highway Projects in North Dakota, Final Report and Executive Summary," FHWA-ND-RD(2)79(A) and FHWA-ND-RD(2)79(B), University of North Dakota, Grand Forks, North Dakota, March 1981. NTIS Nos. PB82 202328 and PB82 202326.

If more information is desired about these research studies, inquiries should be addressed to the sponsoring agencies.

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

Activities. During 1982, project personnel studied a fluid-density gage and its applications to sediment sensing. J. V. Skinner and J. P. Beverage rewrote sections of Report X that presents results of laboratory tests designed to measure the gage's response to temperature, dissolved solids, and sediment particle-size distribution. Illustrations for this report, which should be published in 1983, are being drafted. The density gage has a few undesirable features; but, in general, it shows enough potential to justify a field test, which will be run during 1983 at a site near Madison, Wisconsin.

Joseph J. Szalona, Beverage, and Don Benson designed the PS-83, a new pumping sampler. The sampler, which holds 24-pint containers, is small (22" x 22" x 34") and lightweight (35 pounds). The sampler is powered by a single 12-volt battery and is controlled by a solid-state circuit. During 1983, a few test models will be checked in field trials.

Szalona tested an instrument that senses suspended-sediment by measuring the absorption of infra-red radiation. The device is sensitive to low sediment concentrations but is also quite sensitive to particle size. The draft report is ready for technical review.

Szalona and Skinner worked on a device that senses the minute pressures created by sediment particles as they settle through a water column. The device, which is of the bellows type, has adequate sensitivity but it lacks stability; an improved laser-type pressure sensor is being studied. Skinner drafted a report that explains mathematical procedures for converting the pressure record to a particle-size distribution.

Benson modified the single-stage U-73 sampler so that it can be used for trace-metal studies. The modified sampler, which is stocked by the project, is constructed entirely of plastic. Benson also developed three special nozzles for the D-77 suspended sampler. Field personnel now have a choice of four different bore diameters and can thereby match sampling rate to stream-flow conditions.

The project developed a special tail fin and hanger bar that can be attached to a DH-48 to convert the sampler to hand-line operation. Since the assembly is light-in-weight, it can be used only to sample low-velocity flows. The project is stocking plastic sample bottles for the DH-76.

Don Benson and LaVerne Fanjoy prepared a working model and drawing of a new plastic hand-held sampler termed the DH-81. To date, the lowest bid for the mold is $15,000. The project is seeking additional bids.

During 1982, the demand for special parts, repair, and modernization of old-style samplers showed a marked increase.

The following table lists major pieces of equipment that the project supplied to governmental and educational institutions:

	Instrument	Sold since 1940	Sold during 1982	Inventory, Dec. 1982
DH-48	Hand sampler	3303	33	266
DH-75P	Hand sampler	141	2	14
DH-75Q	Hand sampler	134	6	19
DH-59	Hand-line sediment sampler	1384	9	35
DH-76	Hand-line sediment sampler	291	6	7
D-49	Depth-integrating sampler	900	0	0
D-74	Depth-integrating sampler	426	3	42
D-74AL	Depth-integrating sampler	146	1	7
P-61	Point-integrating sampler	285	6	17
P-63	Point-integrating sampler	46	2	5
P-72	Point-integrating sampler	60	0	22
BMH-53	Bed-material hand sampler	363	3	69
BMH-60	Bed-material hand sampler	285	2	36
BM-54	Bed-material sampler	225	4	13
SA	Particle-size analyzer	92	0	5
PS-67	Pumping sampler	42	0	0
PS-69	Pumping sampler	354	2	8
CS-77	Chickasha pumping sampler	43	4	0
SS-72	Sample splitter	41	1	10
BP-76	Power supply	153	16	10

A catalog and manuals for the above equipment, are available by request.

Status of Reports

Report X - "A Fluid-Density Gage for Measuring Suspended-Sediment Concentration" by J. V. Skinner and J. P. Beverage	The text has been reviewed and the report is scheduled for publication in 1983
Report Y - "Development of a Bag-Type Suspended-Sediment Sampler" by J. J. Szalona	Published
Report Z - "Theory and Operation Manual for the Autopipet Semiautomatic Pipet Withdrawal Apparatus" by J. P. Beverage	Report is being printed
Report BB - "Theory of the Manometric Method for Particle-Distribution Measurements" by J. V. Skinner	In colleague review
Report CC - "Test of an Infra-Red Light-Emitting Turbidimeter" by J. J. Szalona	In colleague review

Report DD - "Progress Report: Vibrating U-Tube Fluid Density Gage" by J. P. Beverage — In colleague review

Report EE - "Theory and Design of Vibration-Type Sediment Sensors" by J. V. Skinner — In preparation

For additional information and copies of published reports contact:

Project Leader
Federal Inter-Agency Sedimentation Project
St. Anthony Falls Hydraulic Laboratory
Hennepin Island & Third Avenue S.E.
Minneapolis, Minnesota 55414

GEOLOGICAL SURVEY

CR74-098 Sediment Transport Phenomena

Project Title: Measurement and Prediction of Sediment Transport Phenomena
WRD Project No.: CR74-098
Project Chief: Hubbell, David W.
Headquarters Office: Lakewood, Colorado
Field Location: Topical Research

Problem: In alluvial streams, for every different hydrologic condition, the bed configuration, sediment transport, and hydraulic characteristics mutually change to achieve a quasi-equilibrium. The changes affect the ability of the stream to convey given quantities of water, accommodate navigation, transport and dilute solid and solute wastes, support aquatic biota, and perform a variety of other similar functions. As yet, the relationships between pertinent hydraulic and sedimentologic variables are not completely understood, hence the extent to which important variables, particularly bed-form roughness and sediment transport, will change in response to natural or man-induced alterations to the flow regime can not be predicted with reliability. As a result, optimum utilization and management of a waterway usually is not assured and, often, modifications intended to enhance the utility of a waterway are ineffective or have adverse effects. Lack of understanding is due in part to inadequate instrumentation for measuring the bedload transport. This problem is particularly acute in areas where resources are being mined for energy development.

Objective: To provide a more complete understanding of sedimentation phenomena in alluvial streams and the response of such streams to imposed changes through the use of improved instrumentation and better understanding of the relationships between hydraulic and sedimentologic variables, particularly (1) the relationships between the factors that most influence the formation and alteration of bed forms and the transport of bedload and bed-material load and (2) the interrelationships between bed-form characteristics and the transport of bedload and bed-material load.

Approach: Initially, existing data will be analyzed to related bed-form characteristics and hydraulic and sedimentologic variables, and one or more bedload samplers will be developed to permit accurate measurements of bedload transport. The development of bedload samplers will be accomplished through a comprehensive testing and calibration program with prototype samplers in a specifically designed laboratory facility capable of continuously measuring the discharge of bedload particles from 2 to 64 mm in diameter under different flow conditions. Later, data on bed-form characteristics, sediment transport, and other pertinent variables will be collected as required, to meet specific needs; acoustic instrumentation, including side-scan sonar, will be employed to measure bed configuration and movement, and suitable bedload samplers, as well as suspended-load

samplers, will be used to define transport rates. Tracer techniques also may be applied. Finally, data will be analyzed to define criteria for predicting bed form and to provide a better understanding of sediment transport phenomena. Both sand-bed and gravel-bed streams will be studied.

FY-1982 Progress: The design of a cascade-type sieving apparatus and automated weighing system for rapidly analyzing the particle-size distribution of coarse-grained sediment samples was completed, and a unit was constructed and tested. Tests showed that defined particle-size distributions agreed closely with comparable distributions from standard "rotap" analyses but that a size distribution could be analyzed and computed in 5-7 minutes as compared with 30-40 minutes for a rotap analysis. Following testing, 1750 bedload samples were routinely analyzed; the samples had been collected in 1981 during four constant-flow runs in the bedload sampler calibration facility at SAFHL for the purpose of testing various versions of the Helley-Smith bedload sampler and the VIV sampler with bed material that approximated a natural mixture. Sample analyses were completed at an average rate of 70-80 samples per man-day. Defined particle-size distributions were used in association with gross sampled rates to determine sampled rates for individual particle-size ranges.

FY-1983 Plans: Analysis of data from calibration runs with 2.1 and 23 mm bed materials, as well as the bed-material mixture, will be continued to verify that the analytical procedure used to define sampler calibration curves is valid for all bed material and to define calibrations curves for all tested samplers and all tested particle-size ranges. Curves for each sampler defined from tests with the unigranular bed materials will be compared with size-equivalent curves defined from the bed-material mixture runs in an effort to develop a generalized calibration curve for each sampler and to understand why curves differ so that operational calibration curves can be provided for the most promising samplers. In addition, efforts will be made to complete the compilation of basic hydraulic and sediment data, including detailed information on bed forms, from all calibration runs.

Completed Reports:

Hubbell, D. W., Stevens, H. H., Jr., Skinner, J. V., and Beverage, J. P., 1981, Recent refinements in calibrating bedload samplers, in Water Forum '81: American Society of Civil Engineers, Proceedings of the San Francisco Specialty Conference, August 1981, p. 128-140.

GEOLOGICAL SURVEY

CR75-102 Sediment Movement in Rivers

WRD Project No: CR75-102
Project Title: Movement and Storage of Sediment in River Systems
Project Chief: Meade, Robert H.
Headquarters Office: Lakewood, Colorado
Field Location: Topical Research

Problem: Sediment moves through a river system in response to specific events and changing conditions in the drainage basin. The movement of sediment is usually discontinuous. Episodes of movement are separated by periods of storage that can range from less than a year to more than one thousand years. Understanding the movement and storage of sediment in rivers is important to navigation, flood control, and other aspects of river engineering, as well as to the prediction of the fate of contaminants adsorbed on sediment particles.

Objective: To assess: (1) changes in river sediment loads over periods of decades or longer, and the factors (natural or artificial) that cause the changes; (2) rates at which sediment is stored in river systems and the residence times of sediment particles in storage; (3) sources, pathways, and sinks of sediment particles in river systems.

Approach: (1) Long-term changes in sediment loads are being assessed from data previously collected by U.S. Geological Survey (USGS) and other agencies; (2) sediment storage is being assessed by repeated (annually) surveys of selected river channels, and by comparing old and new maps and aerial photographs of rivers and their flood plains in the upper Missouri River Basin; (3) sources, pathways, and sinks are being assessed by intensive field studies (including tracer studies) of selected rivers.

1982 Progress and Results: Continuing studies show patterns of sediment aggradation in a 90-km reach of the Powder River of southeastern Montana. During the large flood of 1978, the river removed sediment from the channel and deposited it on the flood plain in such a way that this reach of the valley gained sediment -- that is, more sediment was deposited on the flood plain than was scoured from the channel. During the moderately high (but less than bankfull) flows of 1982, the river removed sediment from the low-water channel and deposited it on bars and islands in such a way that this reach of the channel gained sediment -- that is, more sediment was deposited on the bars and islands than was scoured from the low-water channel. The processes of aggradation are active at all stages of the river where significant amounts of sediment are being moved: the locus of aggradation is on the flood plain during large overbank flows, and within the channel during flows less than overbank.

Movement and storage of fluvial sediment in the Amazon River system is being studied in conjunction with investigators from the University of Washington (Seattle) and the Instituto Nacional de Pesquisas da Amazonia (Manaus, Brazil). During the high-water period of April-May 1982, the sediment discharge decreased through the reach of the Amazon mainstem between 400 and 1200 km below the Peru-Brazil border, from nearly 3 x 10^9 kg per day at the upper end of the reach to about 2 x 10^9 kg per day at the lower end. Water discharge increased through the same reach, from about 70,000 m^3 per s to nearly 100,000 m^3 per s. This reach borders an extensive flood plain onto which the river was flooding at the time, and the downriver decrease in sediment discharge seems to be due mostly to the loss of material by overbank deposition onto the flood plain.

Studies of the sediment in the Orinoco River were begun in 1982 in cooperation with the Venezuelan Ministerio del Ambiente y de los Recursos Naturales Renovables. Although the substantial water discharge of the Orinoco (exceeded in the world only by that of the Amazon and Zaire Rivers) is derived from rivers that drain both the Andes Mountains and the Guayana Shield, the sediment in the Orinoco is derived mainly from the Andes. During most years, the maxiumum concentrations and discharges of suspended sediment in the Orinoco will precede the maximum discharge of water by a period of weeks or even months. A likely explanation for the separation of the maxima is that the sediment which enters the Orinoco in large quantities from tributaries during the annual rise is ponded and stored in the lower (backwater) reaches of the tributaries during the peak flows on the mainstem, to be remobilized at times when the tributaries are no longer dammed by the high waters of the mainstem.

Publications Since Last Report(1981-82):

Meade, R. H., 1981, Man's influence on the discharge of fresh water, dissolved material, and sediment by rivers to the Atlantic coastal zone of the United States, in Martin, J. M., Burton, J. D., and Eisma, D., editors, River inputs to ocean systems: United Nations Environment Programme, p. 13-17.

Meade, R. H., 1981, A cautionary note on the absence of steady state between soil erosion, sediment transport in rivers, and the delivery of river sediment to the oceans, in Martin, J. M., Burton, J. D., and Eisma, D., editors, River inputs to ocean systems: United Nations Environment Programme, p. 309-310.

Meade, R. H., Emmett, W. W., and Myrick, R. M., 1981, Wavelike movement of bedload, East Fork River, Wyoming, U.S.A., (Abs.), in Modern and ancient fluvial systems, sedimentology and processes, abstracts: University of Keele, U.K., p. 81.

Nordin, C. F., Jr., and Meade, R. H., 1981, Discharge of organic carbon from rivers--estimates and sources of errors (Abs.): EOS (American Geophysical Union Transactions), v. 62, no. 45, p. 867.

Fitzgerald, M. G., and Nordin, C. F., Jr., 1981, Sand waves of the Amazon River (Abs.): EOS (American Geophysical Union Transactions), v. 62, no. 45, p. 870.

Nordin, C. F., Jr., and Meade, R. H., 1982, Deforestation and increased flooding of the upper Amazon: Science, v. 215, p. 426-427.

Meade, R. H., 1982, Sources, sinks, and storage of river sediment in the Atlantic drainage of the United States: Journal of Geology, v. 90, no. 3, p. 235-252.

Emmett, W. W., Myrick, R. M., and Meade, R. H., 1982, Field data describing the movement and storage of sediment in the East Fork River, Wyoming. III. River hydraulics and sediment transport, 1980: U.S. Geological Survey Open-File Report 82-359, 289 p.

Meade, R. H., Myrick, R. M., and Emmett, W. W., 1982, Field data describing the movement and storage of sediment in the East Fork River, Wyoming. IV. Bed elevations, 1980: U.S. Geological Survey Open-File Report 82-360, 197 p.

Milliman, J. D., and Meade, R. H., 1983, World-wide delivery of river sediment to the oceans: Journal of Geology, v. 91, no. 1, p. 1-21.

GEOLOGICAL SURVEY

CR75-187: Bedload Transport Research

WRD Project No: CR75-187
Project Chief: Emmett, William W.
Headquarters Office: Lakewood, Colorado
Field Location: Topical Research

Problem: Of all processes operating in river channels, and especially of those of practical concern to engineers and others interested in river channel behavior, perhaps the least knowledge is available regarding the hydraulics and mechanics of bedload transport. Before continuing advances in river channel behavior can be made, some understanding of the behavior of bedload sediment must be made.

Objective: (1) Define spatial and temporal variations in bedload transport rate for a single stage of flow; (2) define change in average magnitude of transport rate over a range in hydraulics of flow; (3) define change in average magnitude of transport rate over a range in channel geometry; and (4) analyze the data to evaluate the applicability of available bedload equations, suggest new coefficients for the existing equations, or propose new relations for predicting rates of bedload transport.

Approach: To use the conveyor-belt bedload-transport facility on the East Fork River near Pinedale, Wyoming, as a control to evaluate variability factors in bedload transport and to field calibrate the Helley-Smith bedload sampler; to use the calibrated Helley-Smith sampler in the systematic collection of bedload samples, along with the concurrent measurements of streamflow hydraulics, from a variety of sand- and gravel-bed streams, and, within the laws of general physics, stochastically develop empirical relations of bedload transport and interpret the physical significance of the developed relations.

Initiate at the conveyor-belt bedload-trap research facility a tracer study utilizing fluorescent particles to evaluate (1) residence time of sediment, (2) average speed of particles, (3) depth of bed material involved in transport, (4) dispersion of bed material, (5) short-term channel changes accompanying sediment transport, (6) influence of availability of sediment on transport rate, and other related aspects of sediment transport.

FY-1982 Progress: Completed 1979-1980 field data collection and compilation on East Fork River as related to fluorescent tracer study. Daily bedload measurements at frequently spaced sections along a reach of river demonstrate significantly different relations of bedload to discharge from one section to another. Collected and overviewed collection of bedload data from a variety of rivers to provide data base necessary to evaluate universality of East Fork River behavior. Published and released basic-data reports related to the 1979-1980 field effort on the East Fork River.

FY-1983 Plans: In collaboration with L. B. Leopold, prepare comprehensive interpretative report related to the 1967-1980 period of study on the East Fork River.

Completed Reports:

Emmett, W. W., and Seitz, H. R., 1973 (1974), Suspended and bedload sediment transport in the Snake and Clearwater Rivers in the vicinity of Lewiston, Idaho - March 1972 through June 1973: U.S. Geological Survey Basic-Data Report, 78 p.

----- 1974, Suspended and bedload sediment transport in the Snake and Clearwater Rivers in the vicinity of Lewiston, Idaho - July 1973 through July 1974: U.S. Geological Survey Basic-Data Report, 76 p.

Emmett, W. W., 1974, Channel aggradation in western United States as indicated by observations at Vigil Network sites: Zeitschrift fur Geomorphologie, Suppl. v. 21, p. 52-62.

----- 1974, Channel changes: Geological Society of America, Geology, v. 2, no. 6, p. 271-272.

----- 1974, Channel aggradation in western United States: Abstract, Proceedings, Twelfth Annual Engineering Geology and Soils Engineering Symposium, p. 273.

----- 1974, Hydrologic environment of the upper Salmon River area, Idaho: Abstract, Transactions American Geophysical Union, v. 55, no. 2, p. 77.

----- 1975, The channels and waters of the upper Salmon River area, Idaho: U.S. Geological Survey Professional Paper 870-A, 116 p.

Leopold, L. B., and Emmett, W. W., 1976, Bedload measurements, East Fork River, Wyoming: Proceedings, National Academy of Sciences, v. 73, no. 4, p. 1000-1004.

Emmett, W. W., 1976, Bedload transport in two large, gravel-bed rivers, Idaho and Washington: Proceedings, Third Federal Interagency Sedimentation Conference, p. 4-101 to 4-114.

Druffel, L., Emmett, W. W., Schneider, V. R., and Skinner, J. V., 1976, Laboratory hydraulic calibration of the Helley-Smith bedload sediment sampler: U.S. Geological Survey Open-File Report 76-752, 63 p.

Mahoney, H. A., and others, 1976, Data for calibrating unsteady-flow sediment-transport models, East Fork River, Wyoming, 1975: U.S. Geological Survey Open-File Report 76-22, 293 p.

Leopold, L. B., and Emmett, W. W., 1977, 1976 bedload measurements, East Fork River, Wyoming: Proceedings, National Academy of Sciences, v. 74, no. 7, p. 2644-2648.

Emmett, W. W., and Leopold, L. B., 1977, A comparison of observed sediment-transport rates with rates computed using existing formulas: in Geomorphology in Arid Regions (D. O. Doehring, Ed.), Proceedings, 8th Annual Geomorphology Symposium, State University of New York, Binghamton, New York, Sept. 23-24, 1977, p. 187-188.

Emmett, W. W., 1978, "Overland Flow" in Hillslope Hydrology (M. J. Kirkby, Ed.), John Wiley and Sons, p. 145-176.

Emmett, W. W., Burrows, R. L., and Parks, Bruce, 1978, Sediment transport in the Tanana River in the vicinity of Fairbanks, Alaska, 1977: U.S. Geological Survey Open-File Report 78-290, 28 p.

Emmett, W. W., and Thomas, W. A., 1978, Scour and deposition in Lower Granite Reservoir, Snake and Clearwater Rivers near Lewiston, Idaho, U.S.A.: Journal of Hydraulic Research, v. 16, no. 4, p. 327-345.

Emmett, W. W., 1979, A field calibration of the sediment trapping characteristics of the Helley-Smith bedload sampler: U.S. Geological Survey Open-File Report 79-411, 96 p.

----- 1979, Aspects of bedload transport in rivers (abstract): Program with abstracts, 32nd Annual Meeting, Rocky Mountain Section, Geological Society of America, v. 11, no. 6, p. 271.

Burrows, R. L., Parks, Bruce, and Emmett, W. W., 1979, Sediment transport in the Tanana River in the vicinity of Fairbanks, Alaska, 1977-78: U.S. Geological Survey Open-File Report 79-1539, 37 p.

Emmett, W. W., 1980, A field calibration of the sediment trapping characteristics of the Helley-Smith bedload sampler: U.S. Geological Survey Professional Paper 1139, 44 p.

----- 1980, Bedload sampling in rivers: International Symposium on River Sedimentation, Chinese Society of Hydraulic Engineers Preprint, Beijing, China, March 24-29, 1980, p. E8-1 to E8-24.

Emmett, W. W., Myrick, R. M., and Meade, R. H., 1980, Field data describing the movement and storage of sediment in the East Fork River, Wyoming. Part I. River hydraulics and sediment transport, 1979: U.S. Geological Survey Open-File Report 80-1189, 43 p.

Meade, R. H., Myrick, R. M., and Emmett, W. W., 1980, Field data describing the movement and storage of sediment in the East Fork River, Wyoming. Part II. Bed elevation, 1979: U.S. Geological Survey Open-File Report 80-1190, 172 p.

Meade, R. H., Emmett, W. W., and Myrick, R. M., 1981, Movement and storage of bed material during 1979 in East Fork River, Wyoming, USA: Erosion and Sediment Transport in Pacific Rim Steeplands, International Association of Hydrological Sciences Publication 132, p. 225-235.

Emmett, W. W., 1981, Measurement of bed load in rivers: Sediment and Erosion Transport Measurement, International Association of Hydrological Sciences Publication 133, p. 3-15.

Meade, R. H., Emmett, W. W., and Myrick, R. M., 1981, Wavelike movement of bedload, East Fork River, Wyoming, USA: Abstracts, Symposium or Modern and Ancient Fluvial Systems Sedimentology and Processes, University of Keele, UK, p. 81.

Emmett, W. W., Myrick, R. M., and Meade, R. H., 1982, Field data describing the movement and storage of sediment in the East Fork River, Wyoming. Part III. River hydraulics and sediment transport, 1980: U.S. Geological Survey Open-File Report 82-359, 287 p.

Meade, R. H., Myrick, R. M., and Emmett, W. W., 1982, Field data describing the movement and storage of sediment in the East Fork River, Wyoming. Part IV. Bed elevations, 1980: U.S. Geological Survey Open-File Report 82-360, 197 p.

GEOLOGICAL SURVEY

CR82-271 Erosion and Sediment Yield

Project Title: Relation of erosion to sediment yield
WRD Project No.: CR82-271
Project Chief: Hadley, Richard F.
Headquarters Office: Lakewood, Colorado
Field Location: Topical Research

PROBLEM: Studies of erosion and sedimentation processes on upland areas that include detachment, entrainment, hillslope, colluvial, or valley storage, and ultimately transport to streams indicate a gross disparity between the quantity of material eroded and the sediment loads transported by streams. Recognizing that this observation generally is based on relatively short periods of record, it is still evident that there is a real need to understand the linkage between erosion from upland slopes and river channel-transport processes. This linkage has been termed simply sediment delivery by several investigators, but their results are generally estimates based on mean values for several years of data. Little is known about the precise source of the sediment or the timing of the processes involving transport and temporary storage in the system.

OBJECTIVES: The objectives of this study are: (1) determination and measurement of sediment sources, including rill and interrill areas of upland hillslopes; (2) measurement of sediment contribution from mass movement on upland hillslopes; (3) measurement of colluvial and hillslope storage of sediment; (4) measurement of valley storage in fans, channels, floodplains, and terraces; (5) measurement of sediment storage in reservoirs; (6) determination of the climatic parameters that are important in the erosion, transport, and deposition processes in a given climate; and (7) produce a sediment budget that defines the relation between erosion on upland areas and in-channel sediment yield. These objectives should provide an understanding of the erosion-transport system in a small basin. If all the objectives are accomplished, we should be better able to evaluate the impacts of land disturbance and land use.

APPROACH: There is considerable data available for both surface-water hydrology and sediment yield for small drainage basins in the Cheyenne River basin. There are also data for basin morphology of several small basins and their relationship to hydrologic parameters. There are, however, very little quantitative data available on hillslope processes, storage of sediment enroute to channels, or timing of erosion processes. Most of the data represent mean values of sediment yields for periods of 5 to 15 years. These data were collected in the 1950's and published in Water-Supply Paper 1531 in 1961. The hydrologic system in the study area is typical of a semiarid environment. The streams are generally ephemeral and the question of timing of events is probably as important as the questions of sources of sediment and delivery. Transport processes are commonly episodic; many basins are in disequilibrium. Material may be eroding rapidly in some areas and accumulating elsewhere in the basin. The paths that the sediment takes and the timing are the unknowns in this system.

In order to answer these questions, study observations and data collection can be divided into hillslopes and valley and channel segments. A. Hillslope segments: 1. Survey hillslope profiles with erosion pins to measure surficial erosion and aggradation; 2. Install Gerlach troughs on hillslopes to measure sediment and runoff from slope segments of various lengths and degree of slope; 3. Establish hillslope transects on contour, normal to the slope, to monitor erosion and aggradation from rill and interrill areas, as well as sediment movement by mass wasting; 4. Monitor surficial sediment movement using fluorescent particles placed on hillslopes of various lengths, gradients, and exposure; 5. Use a land-portable rainfall simulator to determine sediment detachment by raindrop impact. B. Valley and channel segments: 1. Survey cross sections on colluvial slopes, floodplains, and valley floors to monitor erosion and aggradation of material transported from upstream; 2. Measure sediment trapped in alluvial fans where they exist. In addition, additional data will be collected on the soil and rock types, vegetal cover, and drainage-basin morphometry. Precipitation data will be collected at the study site using a recording rain gage and several standard nonrecording gages.

FY 1982 PROGRESS: In April 1982, a small basin in southwestern Niobrara County, Wyoming, was selected for study of sediment sources and sediment yield. The basin has a drainage area of about 0.25 mi^2 with a dam and reservoir at the lower end. The reservoir was surveyed for sediment deposition and hillslope and channel transects were installed throughout the basin.

The literature on erosion and sediment yield for recent years has been reviewed and a summary is in preparation as an open-file report.

FY 1983 PLANS: The open-file report on recent research in erosion and sediment yield will be completed. Additional study basins will be selected in the Cheyenne River basin of east-central Wyoming and field observations established for survey.

COMPLETED REPORTS:

Hadley, R. F., 1982, Measuring and predicting soil erosion and sediment yield, *in* Hadley, R. F., and Walling, D. E., eds., Erosion and sediment yield: Some methods of measurement and modelling: Norwich, England, Geobooks, Ltd., 21 p. [in press].

GEOLOGICAL SURVEY

CR82-273: Interface of Hydrologic and Biologic Processes in Rivers

WRD Project No: CR82-273
Project Chief: Andrews, Edmund D.
Headquarters Office: Lakewood, Colorado
Field Location: Topical Research

Problem: In general, it is quite difficult to describe the future stability and productivity of a river ecosystem following a significant physical alteration of its watershed. Two fundamental deficiencies exist: (1) The dynamics of stream channel change are poorly understood, especially the rate at which the several hydraulic variables adjust to new conditions. The greatest shortcoming of our present knowledge in this area is the longitudinal sorting of bed-material particles. (2) The specific physical characteristics essential to the growth and maintenance of most organisms are not known in sufficient detail.

Objectives: Field research will describe the sequence and rate of change in the physical aspects of the aquatic ecosystem as a result of watershed alteration. Investigations will concentrate on understanding the component processes, especially bed-material sorting, required for a physically-based water and sediment routing model for gravel-bed streams.

Three small self-formed gravel-bed streams with an active streamflow gage and suspended-sediment sampling program have been selected for study. A model for longitudinal sorting of bed-material will be developed for these streams using measured bedload transport rates, tracer particles, and probabilistic fluid mechanics. At one of the selected study reaches, Sagehen Creek, there is presently an active, long-term investigation of the relation between the physical characteristics of the stream and the stability and productivity of the aquatic ecosystem.

FY-1982 Progress: Bedload transport sampling and particle tracer observations begun in the spring of 1981 on Sagehen Creek, California, were expanded in 1982. Over one hundred bedload transport measurements were made in the winter and spring of 1982 at discharges ranging from bankfull up to the second highest peak in 30 years of record. These observations show the gravel size bed material is entrained at slightly less than the bankfull discharge, which is equalled or exceeded approximately 2 percent of the time. Furthermore, bed-material particles of nearly all sizes are entrained within a narrow range of flow. Thus, bed-material transport occurs rather frequently over a period of years. Bed-material transport rates, however, are relatively small, except at the most extreme floods. General motion of the river bed appears to be quite rare. Even at a flow 10 times the bankfull discharge, relatively few particles, but including all sizes available, were entrained at any time.

FY-1983 Plans: The bedload transport sampling and particle tracer observations begun in the spring of 1981 on Sagehen Creek will be continued and expanded in 1983, in order to understand the longitudinal sorting of coarse bed-material. A detailed analysis of the data collected in 1981 and 1982 will be made.

Completed Reports:

Andrews, Edmund D., 1981a, Bed-material mobility in self-formed gravel bed streams in Colorado and its effect on channel stability: Second International Symposium on Modern and Ancient Fluvial Systems: Sedimentology and Processes, Keele, United Kingdom, Sept. 21-15, 1981, p. 3.

----- 1981b, Assessment of stream channel response to altered streamflow and sediment load, in Proceedings, Workshop on Downstream river channel changes resulting from diversions or reservoir construction, D. B. Simons, R. M. Li, P. Lagasse and R. T. Milhous, eds., U.S. Fish and Wildlife Service, Washington, D.C., p. 102-108.

----- 1981c, Entrainment of gravel and cobbles from a non-uniform streambed: Transactions, American Geophysical Union, v. 62(45), p. 858.

----- 1982a, Bank stability and channel width adjustment, East Fork River, Wyoming: Water Resources Research, v. 18(4), p. 1184-1192.

----- 1982b, Adjustment of the East Fork River to bedload sediment contributed by Muddy Creek: Field Guide, First Annual Meeting, American Geomorphological Field Group, p. 57-68.

----- 1983a, Entrainment of gravel from naturally sorted riverbed material: Bulletin, Geological Society of America, (in press).

----- 1983b, Hydraulic geometry of gravel-bed rivers in Colorado: Bulletin, Geological Society of America, (in press).

GEOLOGICAL SURVEY

IL82-048 An Evaluation of Bedload Data in Illinois

WRD Project No.: IL82-048
Project Chief: Graf, Julia B.
Headquarters Office: Urbana, Illinois
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 curves, for comparison with transport computed by indirect methods, and for evaluation of the suitability of bedload sampling sites.

Objectives: (1) To evaluate data collected at 9 gaging 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 methods (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 suitability of bedload sites.

FY-1982 Progress: Analysis of bedload data has shown that most samples provide useful information about the transport of sand-sized sediment in Illinois streams. Samples provided the basis for bedload transport curves for three of the nine studied streams. For three others, samples made possible the selection of an appropriate method for computing bedload discharge from channel and hydraulic variables. For two streams, sampling problems prevent the data from being analyzed at this time. In one, large amounts of material finer than the bag mesh size were collected by the sampler and in the other, very coarse bed materials and/or very high flow velocities appear to have interferred with the operation of the sampler. The project was completed, except for report, in September 1982. A final report, "Bedload discharge in nine Illinois streams," by Julia B. Graf, has been prepared for release in the WRI series.

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 a 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-1982 Progress: Hydrographs of sediment discharge were plotted for 18 stations. Regression analyses of sediment concentration versus water discharge were done to select the 12 stations to be evaluated.

FY-1983 Plans: Sediment discharge-water discharge relations (transport equations) will be developed for 12 stations. These relations and 1 year's water discharge will be used to synthesize a sediment-discharge hydrograph which will be shifted to every 28th, 14th, and 7th day's published value to evaluate the applicability of the shift-control sediment method to Illinois sediment data. One station will be selected for evaluation by nine people in order to investigate the subjectivity of the method. A report will be prepared for release in the WRI series.

GEOLOGICAL SURVEY

WRD Project No.: WA82-273
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 informtion available for natural non-Newtonian slurry flows (mudlfows 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 relations 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 flow that occur periodically during the summer downstream from the Shoestring Glacier. Instrumentation will include vertical still 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

runup elevations by assuming complete conversion from potential to kinetic energy. Channel parameters will be determined from field survey, 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.

1982 Progress:

An explosive eruption of Mount St. Helens on March 19, 1982, caused the nearly instantaneous melting of a large volume of snow in the crater. Subsequently, a flood of roughly 4×10^6 m^3 of water and hot volcanic ejecta cascaded down the north flank of the volcano, eroding and incorporating enough additional rock debris into the flow to transform it into a debris flow within 2 km of the crater breach. This lahar, with an initial peak discharge estimated to be in excess of 14,000 m^3/s, entered the North Fork Toutle River and flowed 30 km downstream as a coherent debris-flow slurry. This event provided an excellent opportunity to study the flow behavior and deposits of a large debris flow as it experienced dilution, through addition of river water and sediment deposition, on its journey downstream. It was possible, in fact, to identify the point at which it changed from a debris flow to hyperconcentrated stream flow. A brief paper describing the eruption and lahar has been submitted to Science; a more detailed manuscript on the flow dynamics is in preparation.

The study of the initiating mechanisms and flow behavior of the large, high velocity east flank lahars that were triggered by the May 18, 1980, eruption has been completed. A paper intended for journal publication is currently in the review process.

Additional very useful data on the rheology of small channelized debris flows were collected at the Shoestring site on the southeast flank of Mount St. Helens. The photographic techniques proved very successful; the sonar rangefinders and in-channel pressure transducers did not operate as hoped, due to the extremely difficult conditions encountered at the remote site. Modifications to improve their operation are planned.

1983 Plans:

Continued data collection is planned at the Shoestring site for the 1983 field season. It is hoped that the third phase of the project, laboratory testing, can be started by the end of 1983. An Open-File report on progress to date at the Shoestring site is in preparation.

GEOLOGICAL SURVEY

4753-27250 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 Cowlitz 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 that 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 longitudinal 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 facies 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-1983 PROGRESS AND RESULTS: The sedimentologic analysis of the modern and ancient lahars and associated runout deposits was completed. Several modes of longitudinal change were defined: formation of a lahar by deflation of a wet, fluidized pyroclastic surge, bulking of a flood surge with sediment to form a lahar, and downstream debulking of lahars to form lahar-runout flows. The largest lahar in the history of the watershed formed from erosion of stream-channel sediment by a flood surge resulting from avalanche blockage of an ancestral Spirit Lake. Peak discharge of this flow exceeded 100,000 m^3/s, and flood plains were inundated to depths exceeding 30 m. The inundation area of this flow was mapped as an indication of the area at risk from a modern breakout of avalanche-blocked Spirit Lake.

FY-1984 PLANS: The major project report, a Professional Paper on lahars and lahar-runout flows in the Toutle-Cowlitz River system, will be completed.

COMPLETED REPORTS:

Scott, K. M. and Janda, R. J., 1982, Preliminary map of lahar inundation during the Pine Creek eruptive period in the Toutle-Cowlitz River system, Mount St. Helens, Washington: WRI 82-4067.

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