Hydrologic Data Collected During the 1994 Lake Mills Drawdown Experiment, Elwha River, Washington

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 99-4215

Prepared in cooperation with
BUREAU OF RECLAMATION,
NATIONAL PARK SERVICE,
and LOWER ELWHA
KLALLAM TRIBE

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Cover: Photo of Glines Canyon Dam, Lake Mills, and Olympic National Park mountain peaks. Photo provided by National Park Service, Washington.

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Tacoma, Washington
2000

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VERTICAL DATUM

Sea Level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

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ABSTRACT

Removal of the Glines Canyon and Elwha Dams on the Elwha River in northwestern Washington has been proposed to achieve restoration of the ecosystem and native anadromous fisheries of the river. Glines Canyon Dam, located 13.4 miles upstream from the mouth of the Elwha River, forms Lake Mills, and Elwha Dam, located 4.9 miles upstream from the mouth, forms Lake Aldwell. The most serious concern associated with removal of the dams is the management of sediment that has accumulated in deltas at the upstream ends of the lakes formed by the dams. The Lake Mills Delta contains an estimated 13.8 million cubic yards of sediment, and the Lake Aldwell Delta contains an estimated 3.9 million cubic yards of sediment.

The U.S. National Park Service, the Bureau of Reclamation, the U.S. Geological Survey, and the Lower Elwha Klallam Tribe jointly conducted a drawdown experiment in April 1994 to determine the erodibility and size gradation of the Lake Mills Delta sediments, the impact of lake drawdown on sediment transport, and the impact of sediment erosion on water quality. Lake Mills was gradually lowered 18 feet over a one-week period to expose the delta deposits, held at a constant elevation for one week, and then allowed to return to its normal operating level.

The Lake Mills Delta eroded both vertically and laterally during the drawdown experiment. Eroded banks were nearly vertical, with no signs of seepage-based erosion. After the full 18-foot drawdown of the lake, delta erosion became primarily lateral, as the streambed entering the lake attained a base level limited by the lake's lowered level. Most of the eroded delta sediments were redeposited in a new lobe extending the delta about 300 feet farther into the lake at a lower elevation. The volume of delta sediment transported during the drawdown experiment was estimated to be about 300,000 cubic yards.

Two data-collection sites, one near the middle of the Lake Mills Delta and the other near its downstream end, were established to measure the effects of delta erosion on the transport of sediment and other water-quality constituents into Lake Mills. The highest concentrations of constituents measured were at the downstream site because that is where most bank erosion occurred. The maximum concentration of suspended sediment measured at the downstream delta site was 6,110 milligrams per liter (mg/L). However, most of the suspended sediment measured at that site must have been trapped in Lake Mills because suspended-sediment concentrations downstream from Glines Canyon Dam did not exceed 20 mg/L.

The average concentrations of unfiltered iron and manganese measured at the downstream delta site (23,000 µg/L and 350 µg/L, respectively) were considerably greater than their ambient concentrations measured at a site upstream from Lake Mills (200 µg/L and <10 µg/L, respectively). However, their maximum concentrations measured at sites downstream from Glines Canyon and Elwha Dams were only 960 µg/L and 80 µg/L, respectively.

INTRODUCTION

The Elwha River, on the Olympic Peninsula of northwestern Washington, drains the north slope of the Olympic Mountains and flows into the Staight of Juan de Fuca. In the early 1900's, two hydroelectric dams were constructed on the river to provide electric power for development on the Olympic Peninsula. Elwha Dam (photo, fig. 1), located 4.9 river miles upstream from the mouth of the Elwha River and constructed from 1910 to 1913, formed Lake Aldwell, capacity about 8,100 acre-feet (Federal Energy Regulatory Commission, 1993). Glines Canyon Dam (photo, fig. 2), located 13.4 miles upstream from the mouth of the river and constructed from 1925 to 1927, formed Lake Mills, capacity about 40,000 acre-feet (Federal Energy Regulatory Commission, 1993). Although the dams helped the early development on the peninsula, neither dam had fish passage facilities, and the presence of the dams has caused severe problems for anadromous fish, the ecosystem, and the Lower Elwha Klallam Tribe. Although the dams are owned by James River II, Inc., they are operated by the Daishawa America Port Angeles Paper Mill to supply about 40 percent of the power needed to run the mill (average annual generation of 19 megawatts). Both reservoirs are normally kept full and operated as run-of-the-river facilities.

The Elwha River Ecosystem and Fisheries Restoration Act was enacted by Congress and became Public Law 102-495 on October 24, 1992. The act calls for "full restoration of the Elwha River ecosystem and native and anadromous fisheries." In 1994, the Department of the Interior, which is responsible for restoration of the ecosystem, prepared a comprehensive report to Congress, "The Elwha Report, Restoration of the Elwha River Ecosystem and Native Anadromous Fisheries." The report stated that the Secretary of the Interior had determined that Congress' goals could be achieved only by removing Elwha and Glines Canyon Dams. This and four other alternative restoration plans considered and their impacts are discussed in detail in the Final Environmental Impact Statement (U.S. Department of the Interior, 1995) titled "Elwha River Ecosystem Restoration," prepared by the National Park Service and others. Implementation of the selected alternative of removal of both dams is discussed in detail in the Draft Environmental Impact Statement (U.S. Department of the Interior, 1996) titled "Elwha River Ecosystem Restoration Implementation," prepared by the National Park Service and others. Although many bureaus within the Department of Interior have contributed to the preparation of environmental impact statements and conducted scientific studies, the Bureau of Reclamation is responsible for overseeing the removal of the dams and the satisfactory disposal of the sediment accumulated behind the dams.

The most serious concern associated with removal of the dams is how to manage the sediment accumulated in each lake. Accumulated sediment in both lakes has formed deltas consisting mainly of sand-sized and gravel-sized rocks, with smaller percentages of cobbles and boulders. Sand and finer sized sediment has accumulated on the lakebeds. The Lake Mills Delta contains an estimated 13.8 million cubic yards of sediment, and the Lake Aldwell Delta contains an estimated 3.9 million cubic yards of sediment.

Another concern is protection of the quality of municipal and industrial water supplies during and following proposed dam removal. A Ranney collector well situated on the right bank terrace of the Elwha River downstream from Lake Aldwell provides an average of 28.5 ft^3/s (cubic feet per second) or 18.4 million gallons per day of water to the City of Port Angeles for municipal use (Ralph Elsworth, Superintendent of the Port Angeles Water Department, oral commun., August 1995). A nearby diversion dam also diverts up to 150 ft^3/s for use by two Port Angeles mills and a Washington State fish-rearing channel.

The primary goal of the Lake Mills drawdown experiment was to provide data to accomplish the following:

1. Define boundary conditions and calibration for sediment transport models to predict erosion of sediment from the Lake Mills Delta deposit by natural streamflow;
2. Measure the effects of Lake Mills Delta erosion on downstream sediment load in the Elwha River below Glines Canyon and Elwha Dams;
3. Determine the sizes of the largest streambed rocks that may be exposed during erosion of delta deposits;
4. Demonstrate the manner in which the erosion occurs;
5. Define water quality before and during the experiment to answer the following questions:
   a. What is the ambient water quality of the Elwha River upstream from the two reservoirs?
   b. What is the ambient water quality (as it relates to drinking water standards) downstream from Lake Aldwell?

Figure 1. Elwha Dam (left), powerhouse (center), spillway channel (right), and Lake Aldwell (background). Photograph provided by the Bureau of Reclamation.

Figure 2. Glines Canyon Dam.

c. What is the effect of the reservoirs on water quality downstream from Lake Aldwell prior to the experiment?
d. What is the effect of high sediment transport rates during delta erosion on the water quality below the dams?
e. What are the processes that affect water quality in the Elwha River?
f. What will be the needs for future water-supply treatment?

The Lake Mills drawdown experiment was designed to provide data that can aid sediment management plans and contribute to understanding and improving restoration techniques.

Purpose and Scope

This report presents the streamflow, sediment, water-quality, cross-section survey, and photographic data collected during the Lake Mills drawdown experiment. The specific types of data and samples collected were (1) gage-height and streamflow data; (2) suspended-sediment and bedload samples; (3) water-quality samples; (4) streambed-sediment, bar-deposit, delta-deposit, and lakebed-sediment samples; (5) cross-section surveys of the Lake Mills bed and delta; and (6) aerial and oblique photographs of the Lake Mills Delta.

These data can be studied to better understand sediment transport processes under the defined conditions. The data-collection program was designed to provide data for use in predictive models of sediment erosion, transport, and deposition.

Previous Investigations

In a drawdown experiment conducted by Hosey and Associates from September 6 to October 17, 1989, the lake was drawn down 18 feet over a 4-week period and then held constant for 2 more weeks. During this period lake inflow ranged from 240 to 650 ft^3/s. Delta sediment deposits were sampled from drill holes. Lakebed deposits were sampled by means of a piston core sampler and were analyzed by conducting thickness probe tests. A total of eight delta cross sections were surveyed five times during the drawdown experiment. Stereo aerial photographs of the delta were taken on September 29 and October 15, 1989. A brief summary of this drawdown experiment and most of the data collected are presented in a report by Hosey and Associates (1990a).

Other studies have been made of sediment deposits in both Lake Mills and Lake Aldwell (Hosey and Associates, 1990b; and Gilbert and Link, 1995). A study was also made of the alluvium distribution in the Elwha River channel from Glines Canyon Dam to the Strait of Juan de Fuca (Gilbert, 1996). A study was made of beach geomorphology in connection with removal of Elwha and Glines Canyon Dams (Schwartz, 1994).

Acknowledgments

The Lake Mills drawdown experiment was undertaken as a cooperative effort by engineers, scientists, and technicians of several federal agencies and members of the Lower Elwha Klallam Tribe. Agencies involved in the experiment included the Bureau of Reclamation (Reclamation), the U.S. Geological Survey (USGS), the National Park Service (NPS), and the Lower Elwha Klallam Tribe.

A special thanks is owed to Francis G. Charles, Tribe Chairman, and to Jeff Bohman, Director of Natural Resources for the Lower Elwha Klallam Tribe, for providing crucial logistical support during this experiment. James River II, Inc., owner of the Glines Canyon Dam, and the Daishawa America Port Angeles Paper Mill, operator of the dam, collaborated with the agencies conducting the experiment. Daishawa America changed its normal reservoir operations to make the drawdown experiment possible. Funding for the drawdown experiment was provided by the National Park Service, Olympic National Park, Washington.

The participation of many members of the Lower Elwha Klallam Tribe in the data collection is greatly appreciated. Tribal members that participated were Duke Charles, Guy Charles, Butch Ditlefsen, Mel Elofson, Raz Hepfer, Banjo Muck, Jim Muck, Greg Romero, Sammie Sampson, Verna Sampson, Shane Skerbeck, Duane Stephan, Rory Sullivan, and Pete Taylor.

Uncredited photos were taken by Dallas Childers, U.S. Geological Survey.

DESCRIPTION OF THE AREA

The Elwha River, a coarse-bedded stream on the Olympic Peninsula of northwestern Washington, drains the north slope of the Olympic Mountains and flows into the Staight of Juan de Fuca (map, fig. 3). The river is about 45 miles long and has a drainage area of 321 square miles, 83 percent of which are within Olympic National Park. The discharge of the river is the fourth highest of the streams on the Olympic Peninsula.

The Elwha River flows through Rica Canyon, a narrow bedrock canyon where river widths range from about 40 to 130 feet, before entering Lake Mills. Reservoir widths in Lake Mills range from about 1,000 to 2,000 feet. A wide delta consisting of sand, gravel, cobbles, small boulders, and large woody debris has formed at the upstream end of Lake Mills and extends upstream into Rica Canyon. As the river enters Lake Mills from the mouth of Rica Canyon, it splits into two principal channels (noted in this report as the left and right channels as one looks downstream). Between the two channels is an island vegetated with alder trees about 10 years old.

Geology

The Crescent Formation, consisting mostly of oceanic basalt of early and middle Eocene age, forms a horseshoe-like belt around the north, east, and south sides of the complex mountainous core of the Olympic Peninsula. Overlying the basalt are marine sedimentary rocks of upper Eocene to Miocene and minor Pliocene age. The complex core has two distinct terranes. The slatey eastern core consists of pervasively sheared Eocene to early Oligocene age rocks, while the non-slatey western core of Eocene to Miocene rocks is locally stratigraphically continuous but exhibits generally complex folding and faulting (Tabor and Cady, 1978a; Tabor, 1987; Galster and Coombs, 1989; Babcock and others, 1994).

Upstream from Lake Mills, the Elwha River Basin lies entirely within the eastern core. Exposed formations in the basin are known informally as the Elwha and Grand Valley assemblages. These consist mainly of sandstone, slate, and phyllite, with basalt, conglomerate, and other rock types in lesser amounts (Tabor and Cady, 1978b).

The headwaters of the Elwha River are in the highly glaciated mountains east and southeast of Mount Olympus, the highest peak on the Olympic Peninsula. The river flows through a glaciated U-shaped valley where thick glacial deposits are perched several hundred feet above the valley floor on both sides of the valley (Bliton, 1989). The Elwha glacier, which no longer exists, probably once extended to the mouth of the river.

Climate and Hydrology

The maritime climate of the area is characterized by mild, wet winters and relatively cool, dry summers. At the Elwha Ranger Station, 1.4 miles downstream from Glines Canyon Dam, at an altitude of 360 feet above mean sea level, the average annual precipitation during the period 1944-1991 was about 56 inches, ranging from about 50 to 80 inches per year (National Oceanic and Atmospheric Administration, 1991). Within the basin, annual precipitation ranges from 220 inches along the upper reaches of the Elwha River to about 50 inches near the river's mouth. Half the annual total normally falls during November through January. At the Elwha Ranger Station, average monthly temperatures range from about 36°F in January to about 63°F in August. Within the basin, daily temperature extremes range from below freezing to greater than 80°F.

The average daily discharge of the Elwha River at the McDonald Bridge gage (station 12045500), located between the Glines Canyon and Elwha Dams, is 1,494 ft^3/s for the 80-year period of record through 1994 (Wiggins and others, 1995). The average daily discharge each year at this station is adjusted for the change in storage in Lake Mills during the year in order to approximate the natural flow of the river. The amount of variation in daily-mean discharge during the year is illustrated by the graph in figure 4 for the 1994 water year in which the average daily discharge was 1,083 ft^3/s. Figure 4 illustrates the increase in flow that results from snowmelt in late spring and early summer. Minimum flows typically occur during late summer and early fall and range from about 300 to 500 ft^3/s. High flows typically occur from November through February, associated with rainfall or rain on snow events, and from May through June, associated with

Figure 3a. Study area in the lower Elwha River Valley and locations of streamflow and sediment data-collection sites ELBR, ELWP, ELDM, and ELWS. The USGS station number and name for each site are given in table 1a. The types of data collected at each site are given in table 1b.

Figure 3b. Locations of streamflow and sediment data-collection sites ELWW, ELD1, and ELD2. Aerial photograph was taken on April 16, 1994, at time of full 18-foot drawdown of Lake Mills. Elwha River is flowing from south to north and has divided into a right (east) channel and a left (west) channel in the delta area. Photograph provided by the Bureau of Reclamation.

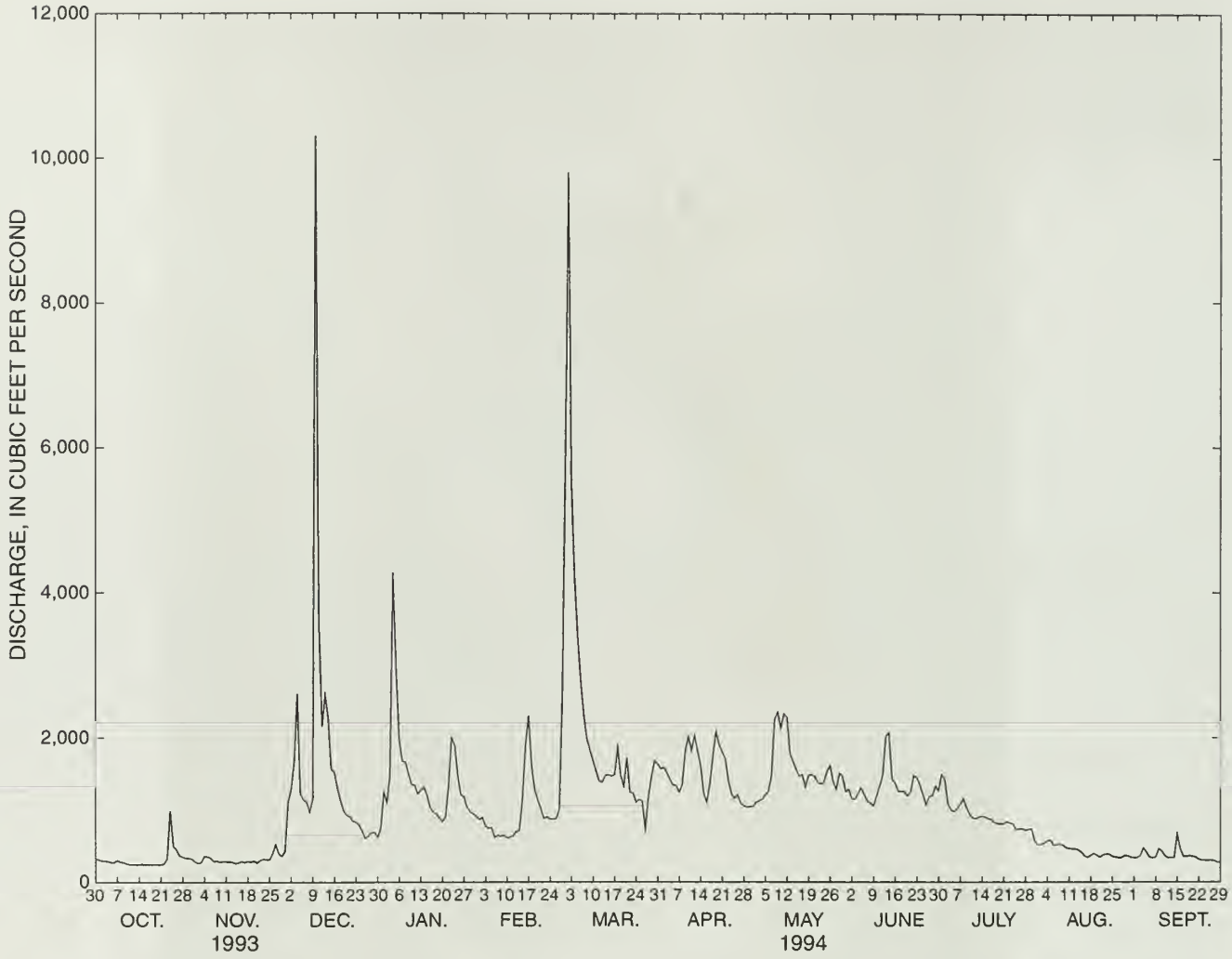


Figure 4. Daily streamflow record at site 12045500, Elwha River at McDonald Bridge (ELWP), for the 1994 water year.

snowmelt. The 2-year flood discharge of the Elwha River at the McDonald Bridge gage is about 13,000 ft^3/s (Federal Energy Regulatory Commission, 1993).

The Elwha River drops about 4,500 feet in elevation from its source to its mouth. Its slope is steepest at the headwaters (about 16 percent upstream from river mile 43) and is less steep downstream (Hosey and Associates, 1988). The river flows through several steep, narrow, bedrock canyons between wide alluvial reaches of mild slope. The widest floodplain and mildest slope of the river are near its mouth.

The watershed upstream from Lake Mills lies entirely within a federally designated wilderness area and within Olympic National Park. In that reach, the river bed consists of sand, gravel, cobbles, boulders, and bedrock outcrops.

The alluvial reaches of the upper Elwha River are dynamic. Bank erosion and channel migration create gravel and cobble bars that erode and later reform (Hosey and Associates, 1988). Downstream of the dams, which trap the coarse sediment, most sand and finer gravel have been winnowed out and transported downstream; these once-dynamic reaches are now relatively static and armored, and the river bed consists primarily of cobbles, boulders and bedrock (Gilbert, 1996).

Lake Aldwell has accumulated an estimated 3.9 million cubic yards (mcy) of sediment. At Lake Mills the accumulation amounts to about 13.8 mcy of sediment. Of the total at Lake Mills, 7.0 mcy are in the delta; 1.5 mcy are in Rica Canyon (above the delta), Cat Creek fan, and Boulder Creek fan; and about 5.3 mcy are on the reservoir floor and prodelta area (Gilbert and Link, 1995, tables 1-3).

Prior to dam construction, an extensive delta had formed at the mouth of the Elwha River. Over thousands of years, strong ocean currents in the strait transported sediments from this delta eastward to form Ediz Hook, a spit of land that protects the natural harbor at Port Angeles. With completion of Elwha Dam in 1913, the amount of sediment reaching Ediz Hook from the Elwha delta was significantly reduced, and the Hook began to erode. This required placement of large boulders along the Hook's shoreline to protect it from erosion. However, this protection measure requires long-term maintenance.

DESCRIPTION OF THE DRAWDOWN EXPERIMENT

The Lake Mills drawdown experiment, in April 1994, was conducted to determine the erodibility and size gradation of the delta sediments and the impact of lake drawdown on sediment transport downstream from Lake Mills. The ambient water quality and the impact of sediment erosion on subsequent water quality were also studied.

The drawdown experiment was planned for a period of relatively high streamflow to mimic, as much as possible, the likely high flows and corresponding high rates of delta erosion expected if one or both of the two Elwha River dams were removed. Therefore, the drawdown experiment was scheduled for April, when snowmelt and the high flows that it often produces usually begin.

The lake drawdown began with a full lake at 8:00 am on April 9, 1994. During the experiment, the lake's water level was lowered 18 feet over a 1-week period from April 9 to 16, 1994, and then held at constant elevation for 1 week before lake refilling began on April 23, 1994. The water level was drawn down by releasing water through the power plant and spillways. Drawdown rates were about 3 feet per day for the first 5 days (April 9 to 14), for a total of 15 feet. The lake was drawn down 2 feet between April 14 and 15 and 1 foot between April 15 and 16. A drawdown of 18 feet was reached at 8:00 am on April 16, 1994. After 1 week at the 18-foot drawdown level, the lake was refilled at a rate of 1 to 2 feet per day. The lake was refilled to its pre-drawdown elevation on May 7, 1994.

HYDROLOGIC DATA COLLECTED DURING THE DRAWDOWN EXPERIMENT

Data were collected during the drawdown experiment to determine streamflow discharge, suspended-sediment discharge, bedload discharge, and water quality. Also, samples of sediment deposits were collected at many sites to determine the distribution of sediment according to physical characteristics such as particle size and its associations with chemical, biological, and other constituents.

Streamflow and Sediment Discharge

Streamflow data were collected at five sites, suspended-sediment data were collected at seven sites, and bedload data were collected at three sites (tables 1a and 1b, map in figure 3a, and photo in figure 3b). The four-letter site code names given in tables 1a and 1b refer to gaging stations and other data-collection sites in this report. Tables 2-14 are located at the end of the report.

The range of daily flows at ELWP during the drawdown experiment was from 1,110 to 2,090 ft^3/s, flows that are equalled or exceeded 56 and 20 percent of the time, respectively, on average. Daily flows at ELWW, a gaging station that was established just a few weeks prior to the beginning of the drawdown experiment, ranged from 890 to 1,760 ft^3/s during the experiment.

Descriptions of the data collection sites and the types of data collected at each one are as follows:

1. The ELWW gage site was established to provide streamflow discharge and total sediment (suspended plus bedload) discharge upstream from the Lake Mills Delta. A staff gage and temporary recording gage with submersible pressure sensor were installed at this site. The ELWW gaging station, located 0.2 miles upstream from Cat Creek, gages total river flow. The ambient water quality is exceptionally good at this site because the area upstream from it is relatively pristine.
2. Temporary gaging sites ELD1 and ELD2, located on the delta's right channel, were established to provide streamflow discharge and total sediment (suspended plus bedload) discharge at the delta. No recording equipment was installed at either site. No flow or sediment measurements were

Table 1a. Lake Mills drawdown experiment streamflow and sediment data-collection sites

Site[1] code name	Station number	Data-collection site
ELWW	12044900	Elwha River above Lake Mills, near Port Angeles, Wash.
ELD1	12044910	Elwha River Delta site 1 at Lake Mills, near Port Angeles, Wash.
ELD2	12044920	Elwha River Delta site 2 at Lake Mills, near Port Angeles, Wash.
ELBED[2]	12045000	Lake Mills bed near Glines Canyon Dam, near Port Angeles, Wash.
ELBR	12045200	Elwha River at Altaire Bridge, near Port Angeles, Wash.
ELWP	12045500	Elwha River at McDonald Bridge, near Port Angeles, Wash.
ELDM	12046100	Elwha River below Elwha Dam, near Port Angeles, Wash.
ELWS	12046300	Elwha River diversion below Elwha Dam, near Port Angeles, Wash.

[1] Four-letter code names are used to simplify note-taking in the field and are compatible with computer software used in the U.S. Geological Survey sediment laboratory. Where possible, code names are the same as those used in telemetry of data by the DRGS (Down-Receive Ground Station).

[2] The location of site ELBED is shown on figure 14; all other data-collection sites are shown on figures 3a and 3b.

Table 1b. Types of data collected at streamflow and sediment data-collection sites during the Lake Mills drawdown experiment

		Types of Data Collected				
Site[1] code name	Station number	Continuous stage measurement	Streamflow measurements	Suspended-sediment samples	Bed-load samples	Water-quality samples
ELWW	12044900	X	X	X	X	X
ELD1	12044910		X	X	X	
ELD2	12044920		X	X	X	X
ELBED	12045000					[2]X
ELBR	12045200			X		
ELWP	12045500	X	X	X		X
ELDM	12046100		X	X		X
ELWS	12046300			X		

[1] Four-letter code names are used to simplify note-taking in the field and are compatible with computer software used in the U.S. Geological Survey sediment laboratory. Where possible, code names are the same as those used in telemetry of data by the DRGS (Direct-Receive Ground Station).

[2] Lakebed samples were analyzed for constituent concentrations.

taken on the left channel, although cross sections were surveyed there (described later in this report).

3. The ELWP gage site was used to provide streamflow discharge and suspended-sediment discharge downstream from Lake Mills. A staff gage, recording gage and cableway already existed at this long-term gaging-station site. Single vertical suspended-sediment samples were collected from a bridge box at ELBR, about four river miles upstream, to assist in computing suspended-sediment discharge at ELWP.
4. Temporary gaging site ELDM, located in the canyon downstream from Elwha Dam, was established to provide streamflow discharge and suspended-sediment discharge downstream from Lake Aldwell. Reference marks were established, but no recording equipment was installed at this site.
5. Temporary gaging site ELWS, located downstream from Lake Aldwell and site ELDM at the intake of a diversion canal that provides water for two Port Angeles mills, was established to provide suspended-sediment concentrations in the flow diverted from the river into the canal. No recording equipment was installed.

Standard streamflow measurement equipment and data-collection techniques (Rantz and others, 1982) were used during the drawdown experiment. Streamflow was measured using a standard Price-AA velocity meter. Data from streamflow discharge measurements made at five sites are given in tables 2a-2e, and the discharges are shown graphically in figures 5a-5e. Daily streamflow discharges for the five sites are given in table 3.

The continuous records of streamflow shown on figure 5b for site ELD1 and on figure 5c for site ELD2 were estimated from the continuous record of discharge at site ELWW. Comparison of discharge measurements made at ELD1 and ELD2 with concurrent streamflow at site ELWW indicates that about 58 to 65 percent of the streamflow at ELWW flows past the ELD1 and ELD2 sites. The continuous record of streamflow shown on figure 5e for site ELDM was estimated from the continuous record of discharge at site ELWP. Comparison of discharge measurements made at site ELDM with concurrent streamflow at site ELWP indicates that streamflow increases about 4 to 8 percent between sites ELWP and ELDM.

All suspended-sediment samples were obtained using standard suspended-sediment samplers and data-collection techniques (Edwards and Glysson, 1988). Suspended sediment was sampled with a DH-48 or D-74 suspended-sediment sampler, and the equal-width increment (EWI) sampling technique was used to collect all cross-section suspended-sediment samples. Sediment concentrations and discharges determined from the suspended-sediment samples are given in tables 4a-4g, and the sediment concentrations are shown in the graphs of figures 5a-5e. Whenever two consecutive samples were collected on the same day at a site, the average suspended-sediment concentration of the two samples is shown on the graphs. Suspended-sediment particle size distributions are given in tables 5a-5e.

The suspended-sediment discharges given in tables 4a-4f were computed using the formula given by Porterfield (1972)

$$Q_s = 0.0027 \times C_s \times Q_w \qquad (1)$$

where

Q_s = suspended-sediment discharge, in tons per day (t/d);
0.0027 = a coefficient to convert data to t/d;
C_s = suspended-sediment concentration, in milligrams per liter (mg/L); and
Q_w = water discharge, in ft^3/s.

The maximum concentrations of suspended sediment measured at delta sites ELD1 and ELD2, where erosion of the delta was adding large quantities of sediment to the river, were 443 and 6,110 mg/L, respectively. However, most of the suspended sediment measured at the delta sites must have been trapped in Lake Mills because only small increases in suspended-sediment concentrations were found downstream from Glines Canyon and Elwha Dams. Concentrations below Glines Canyon Dam increased from a background level of about 5 mg/L to a maximum of 20 mg/L, while concentrations below Elwha Dam increased from a background level of about 3 mg/L to a maximum of 12 mg/L. The leading edge of the suspended-sediment plume was detected downstream from Glines Canyon Dam about 2 days after erosion of the Lake Mills Delta deposits began and downstream from Elwha Dam about an additional 3 days later.

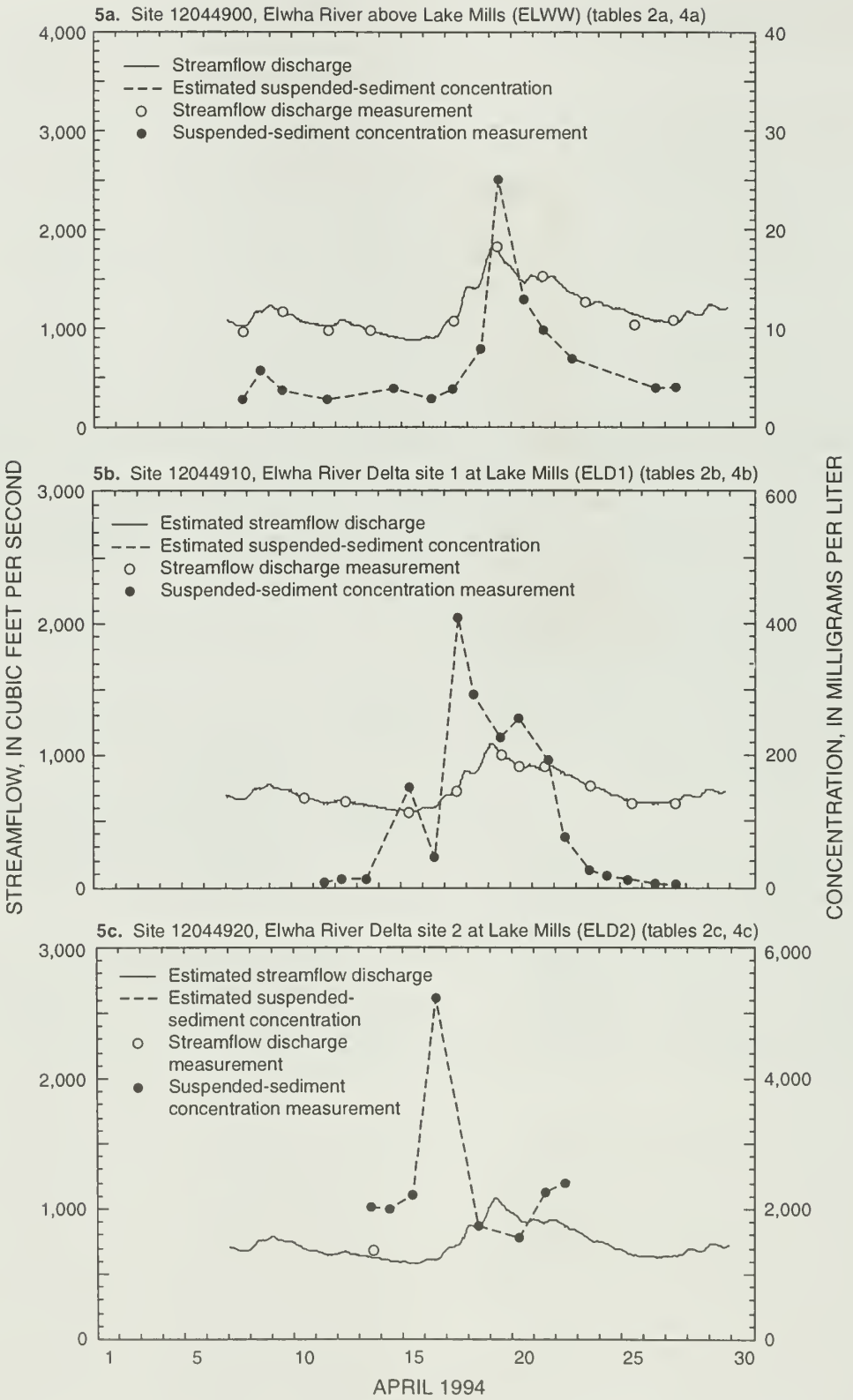


Figure 5a-c. Continuous record of streamflow and suspended-sediment concentration, instantaneous measurements of streamflow, and suspended-sediment samples at sites on the Elwha River, Washington. Whenever two consecutive samples were collected on the same day at a site, the average suspended-sediment concentration of the two samples is plotted.

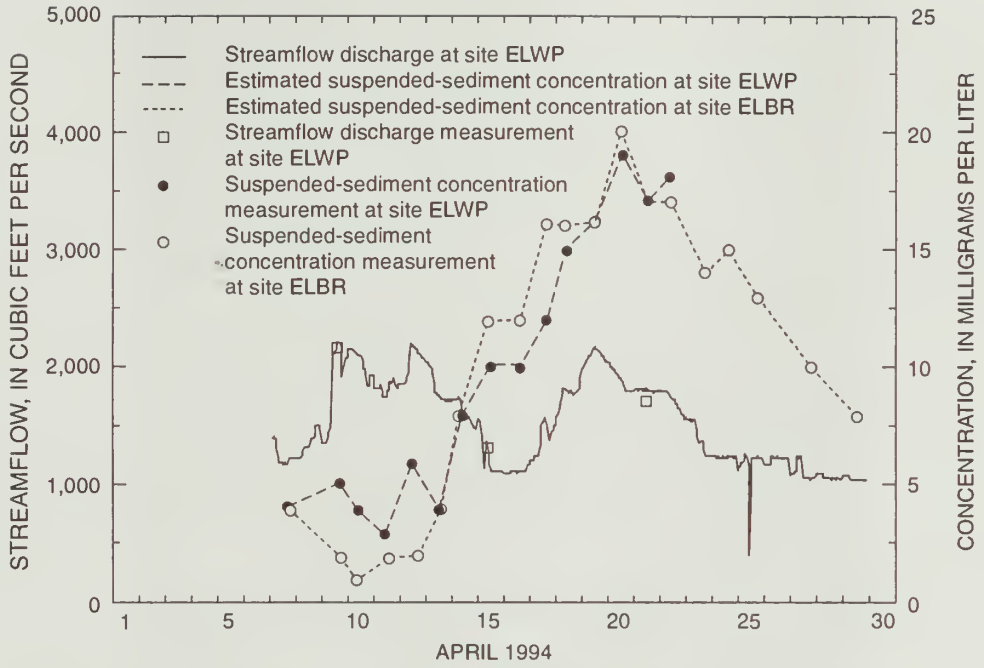


Figure 5d. Continuous record of streamflow and suspended-sediment concentration, instantaneous measurements of streamflow, and suspended-sediment samples at site 12045500, Elwha River at McDonald Bridge (ELWP); and continuous record of suspended-sediment concentration and suspended-sediment samples at site 12045200, Elwha River at Altaire Bridge (ELBR) (tables 2d, 4d, 4e). Whenever two consecutive samples were collected on the same day at a site, the average suspended-sediment concentration of the two samples is plotted.

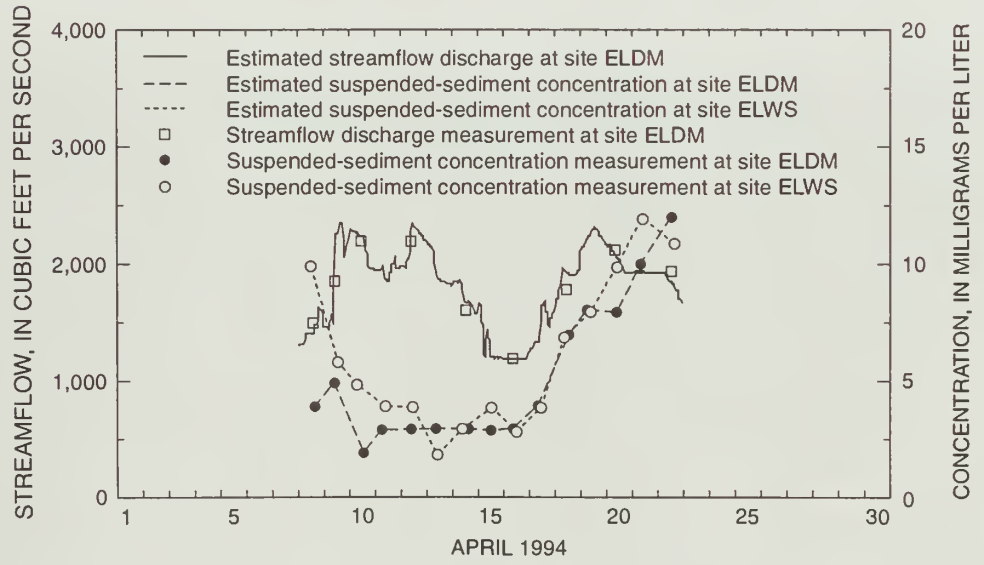


Figure 5e. Continuous record of streamflow and suspended-sediment concentration, instantaneous measurements of streamflow, and suspended-sediment samples at site 12046100, Elwha River below Elwha Dam (ELDM); and continuous record of suspended-sediment concentration and suspended-sediment samples at site 12046300, Elwha River diversion below Elwha Dam (ELWS) (tables 2e, 4f, 4g). Whenever two consecutive samples were collected on the same day at a site, the average suspended-sediment concentration of the two samples is plotted.

All bedload samples were collected using the multiple equal-width increment (MEWI) sampling technique (Edwards and Glysson, 1988). Most samples consisted of four subsamples, each representing an individual transect sample. Bedload discharges and sediment particle-size distributions determined from the bedload samples are given in tables 6a-6c.

The bedload discharges given in tables 6a-6c were computed using the formula given in Edwards and Glysson (1988, page 103, equation 3)

$$Q_b = \frac{K \times width \times mass}{time} \qquad (2)$$

where

Q_b = bedload discharge, in tons per day;
K = a coefficient that converts grams per second per foot of sampled width into tons per day per foot of width = 0.1429 for the 8-inch wide Elwha sampler;
width = total sampled width, in feet;
mass = total mass of the composited sample, in grams;
time = total time sampler was on streambed, in seconds.

The bedload sampler used (photo, fig. 6) was a 2/3-scale model of sampler nozzle no. 5 calibrated at the St. Anthony Falls Hydraulics Laboratory (SAFHL) flume (Hubbell and others, 1985; Hubbell and Stevens, 1986). The sampler nozzle is 4 inches high and 8 inches wide and has an entrance-to-exit-area expansion ratio of 1.4. The sampler was mounted on a long wading rod and used from the side of the boat. A tether line connected the sampler from a point on the rod immediately above the sampler nozzle to a forward position on the gunnel of the boat (photo, fig. 7). This minimized the likelihood of the sampler scooping the streambed and greatly facilitated taking the bedload samples in high velocities.

A catchment bag with a mesh of 0.5 millimeters was used on the bedload sampler, so sediment coarser than 0.5 millimeters in intermediate diameter was retained in the bag, while most finer sediment was washed back into the stream by passing through the mesh. Therefore, only sieves of 0.5 millimeters and coarser were used to determine the particle-size distributions for the bedload samples.

Graphs of suspended-sediment and bedload discharges at ELWW, ELD1, and ELD2 are shown in figures 8a-8c. Whenever two or more consecutive samples were collected on the same day at a site, the average sediment discharge of all the samples collected is shown on the graphs. The water discharges used in these graphs are the average of those for the suspended-sediment and bedload samples collected at about the same time on the same day at a particular site. Graphs of the percentage of total sediment discharge contributed by bedload are shown in figures 8d-8f.

At sites ELWW, ELD1, and ELD2, streamflow measurements, suspended-sediment and bedload samples were collected with either standard or long wading rods from the side of a boat (photos, figs. 9 and 10).

At ELBR, suspended-sediment samples were collected using a bridge box. At the ELWP site, all data were collected from a cable car. At ELDM, streamflow discharge measurements were made using standard boat-measuring equipment, and suspended-sediment samples were collected from the side of the boat using a sampler mounted on a wading rod. At ELWS, suspended-sediment samples were collected using a sampler mounted on a wading rod.

Water Quality

Streamflow samples collected at four Elwha River sites (ELWW, ELD2, ELWP, and ELDM) on three dates during the drawdown experiment were analyzed for about 90 chemical, biological, and radiological water-quality constituents (tables 7a-7d). Samples were collected at (1) ELWW to define baseline conditions in the basin upstream from any effects from erosion of the delta or from human activities; (2) ELD2 to determine the impact of delta erosion on water quality; (3) ELWP to determine the impact of delta erosion downstream from Lake Mills; and (4) ELDM to determine the persistence of that impact downstream from the two lakes at the water intake for two Port Angeles mills and a fish-rearing channel, and at the City of Port Angeles Ranney collector well.

At a site near Glines Canyon Dam, ELBED, the lakebed surface in Lake Mills was sampled on two dates (once before and once after the drawdown experiment) to identify any changes in the concentrations of about 36 chemical, biological, and radiological constituents as a result of the experiment (table 7e).

A small stainless steel Ponar sampler was used to collect these samples.

Figure 6. Sampler used to collect Elwha River bedload samples. Rod in middle foreground is marked in 10-centimeter increments.

Figure 7. Sampling bedload at site 12044900, Elwha River above Lake Mills (ELWW), from a boat using a tether line attached to the boat gunnel.

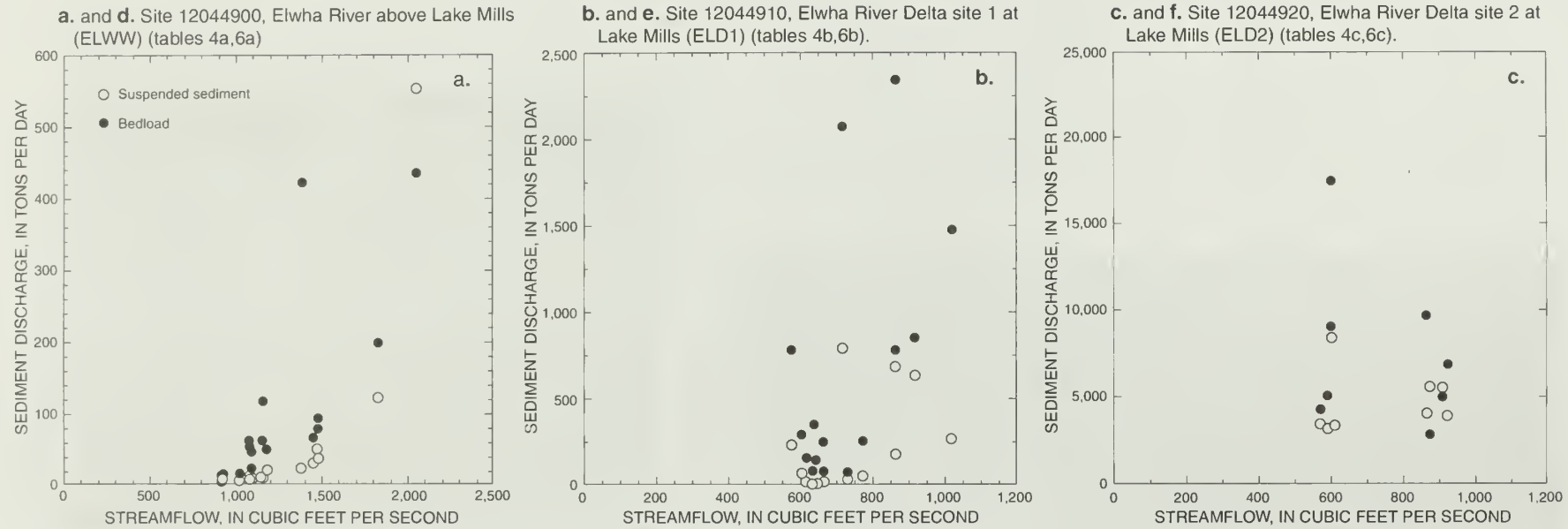


Figure 8a-c. Suspended-sediment and bedload discharges for samples collected at selected sites. Whenever two or more consecutive samples were collected on the same day, the average sediment discharges of the samples collected were used to calculate the values shown on the graph.

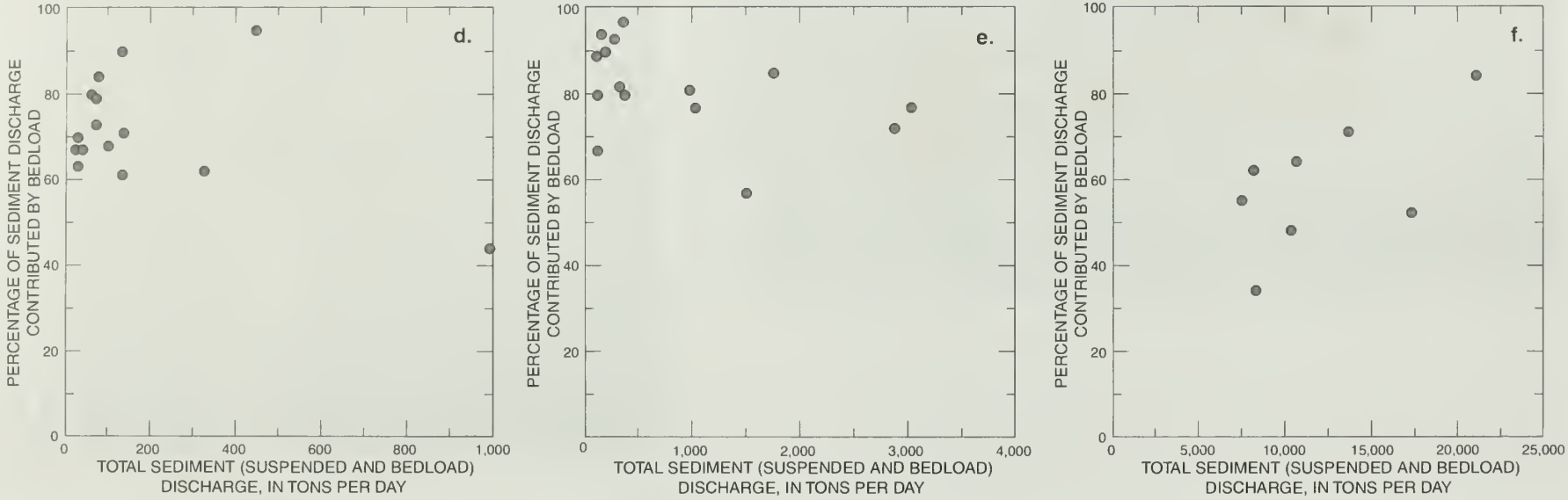


Figure 8d-f. Percentage of total sediment discharge that is contributed by bedload for samples collected at selected sites. Whenever two or more consecutive samples were collected on the same day, the average sediment discharges of the samples collected were used to calculate the values shown on the graph.

Figure 9. Suspended-sediment sampling using a long wading rod and a DH-48 suspended-sediment sampler from a boat at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1).

Figure 10. Suspended-sediment sampling using a standard wading rod and a DH-48 suspended-sediment sampler from a boat at site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2).

Protocols for sampling low-level dissolved constituents (Horowitz and others, 1994) were followed during sampling. At ELWW, ELD2, and ELDM, a wading-rod-mounted DH-81 water-quality sampler, with teflon cap, nozzle, and sample bottle, was used from the front of a boat, which was anchored to a boat tagline (photo, fig. 11). At ELWP, a D-77 sampler, with teflon cap, nozzle, and sample bottle, was suspended from a reel in a cable car.

Samples representative of the flow in the stream cross section were obtained by collecting depth-integrated subsamples at equally spaced verticals across the stream as described by Edwards and Glysson (1988). Samples were composited and split into subsamples for processing as described by Shelton (1994). Samples for the analysis of nutrients and major ions were filtered through a 0.45-micrometer filter as described by Shelton (1994). All other samples were unfiltered. All samples were shipped to the USGS National Water Quality Laboratory for analysis.

At ELWW, the concentrations of constituents measured were unaffected by the drawdown experiment, showing little change during the experiment. The river was clear and the streambed could be observed through the water column.

At ELD1, flow turbidity increased during the experiment, but the streambed could still be seen. At ELD2, the streambed could not be seen due to increased turbidity. At all other sites downstream, turbidity did not change significantly during the drawdown experiment.

The trace elements were the only water-quality constituents analyzed whose concentrations increased measureably during the drawdown experiment. All of the trace element concentrations at site ELWW were below detection limits except for iron, which had an average concentration of about 200 µg/L. Several trace elements had measureable concentrations at site ELD2. The average concentration of iron in three of the four samples at site ELD2 (one of the concentrations was omitted because its validity is questionable) was nearly 23,000 µg/L, which is over 100 times greater than the baseline concentration of iron at site ELWW. This enormous increase in the concentration of iron at site ELD2, which undoubtedly resulted from erosion of Lake Mills Delta deposits, is not surprising because the concentration of iron in seven soil samples collected from the delta averaged about 38,000 µg/kg (Gilbert and Link, 1995, Appendix C). The other trace elements that had measureable concentrations at site ELD2 were chromium, copper, lead, and manganese. The concentrations of chromium and copper averaged about 20 µg/L, the concentrations of lead averaged about 6 µg/L, and the concentrations of manganese averaged about 350 µg/L.

Figure 11. Wading-rod-mounted DH-81 water-quality and suspended-sediment sampler.

At the Elwha River sampling sites downstream from Lake Mills, the only trace elements whose concentrations increased during the drawdown experiment were iron and manganese. The concentration of iron increased from 110 µg/L to 960 µg/L at site ELWP and from 150 µg/L to 720 µg/L at site ELDM. The concentration of manganese increased from less than 10 µg/L to 80 µg/L at site ELWP and from 10 µg/L to 70 µg/L at site ELDM.

The concentrations of radionuclides, volatile organic compounds, organochlorine compounds (pesticides and PCB), and herbicides were at or below detection limits both before and during the drawdown experiment at all four of the water-quality sites. The concentrations of major ions, most of which were above detection limits, remained relatively unchanged during the experiment and were of appoximately the same magnitude at all four of the water-quality sites.

Quality Assurance

Duplicate samples were collected and analyzed, and field blank samples were prepared and analyzed to ensure that the Elwha River streamflow samples and the Lake Mills lakebed-sediment samples collected were not contaminated by the sample collection or processing procedures used. Duplicate samples were obtained and analyzed to check for consistency in both field and laboratory procedures. Field blank samples are laboratory-prepared solutions free of the constituents being analyzed that are subjected to all the same aspects of sample collection, field processing, preservation, transportation, and laboratory handling as the streamflow samples are subjected to. The purpose of the field blank samples is to evaluate the relative frequency and degree of sample contamination during the entire process from sample collection through laboratory analysis. The results of the duplicate and field blank sample analyses are included with the results of the field sample analyses in tables 7a-7e.

In general the analyses of the duplicate sample pairs agreed well with each other. The only significant difference observed was in the concentrations of iron in the duplicate samples obtained at site ELD2 on April 21, 1994 (2,800 and 17,000 µg/L). The reason for this large difference is unknown, but comparison with the concentrations in the April 15 and 17 samples (24,000 µg/L and 27,000 µg/L) casts some doubt on the validity of the 2,800 µg/L concentration.

Nearly all of the constituents analyzed for in the field blank samples were below detection limits. The few constituent concentrations that exceeded detection limits were all extremely low in comparison with concentrations found in the field samples, except for the concentrations of nitrogen and dissolved organic carbon. The concentrations of these constituents in the field blank samples, all of which were either at or only slightly above detection limits, were of approximately the same magnitude as their concentrations in the streamflow samples.

Sediment Deposits

Streambed, gravel bar, delta, and lakebed samples were collected at many sites to determine the distribution of sediment according to physical characteristics such as particle size and association of the deposited sediment with chemical, biological, and other constituents.

Elwha River Streambed

A pipe dredge (photo, fig. 12) was used to collect one set of samples from the streambed at ELWW prior to lake drawdown (table 8). The beds at ELD1, ELWP, and ELDM consisted of bedrock or were armored and too coarse to sample with available equipment.

The EWI sampling technique was used with five equally spaced sampling points across the stream to obtain streambed samples at ELWW. The dredge, a 1-foot length of 3-inch-diameter steel pipe with a cap on one end and a baler handle on the other, was lowered by rope to the streambed and dragged downstream as the boat was allowed to drift with the current. The sample was recovered by raising the dredge to the boat as the boat continued to drift with the current to prevent sand-sized and smaller sediment from being washed from the sample.

Elwha River Gravel Bars

Particle counts, each consisting of 200 sampling points, were collected from the surface of the upstream and downstream ends of the left bank gravel bar near ELWW. About 300 sampling points were included in particle-count measurements at the upstream end and midpoint of the left bank gravel bar near ELD1. Bulk samples of subsurface sediment were collected with each particle count. The particle-size distributions of the sediments in the surface and subsurface samples are given in tables 9a and 9b. The photographs in figures 13a and 13b show the surface armoring of the

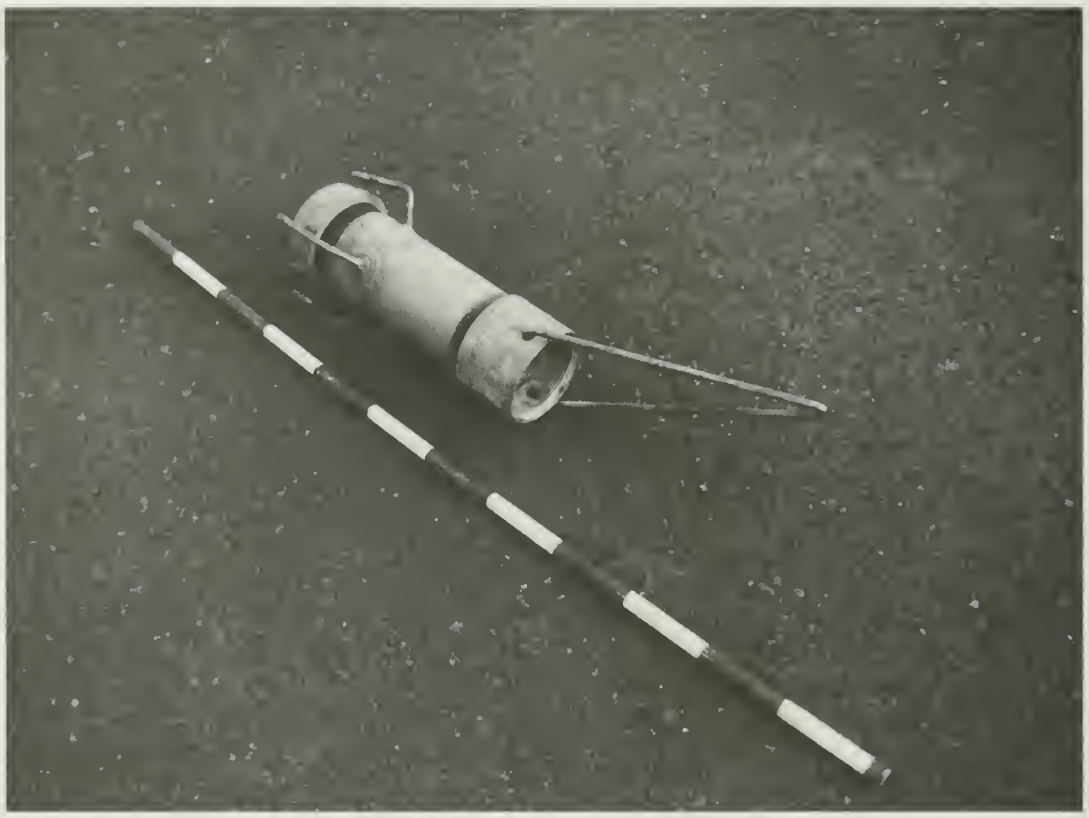


Figure 12. Three-inch (76 millimeters) pipe dredge used to collect bed-material samples. All bed material collected was finer than 45 millimeters. Rod is marked in 10-centimeter increments.

Figure 13a. Gravel bar surface near site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1). Rod is marked in 10-centimeter increments.

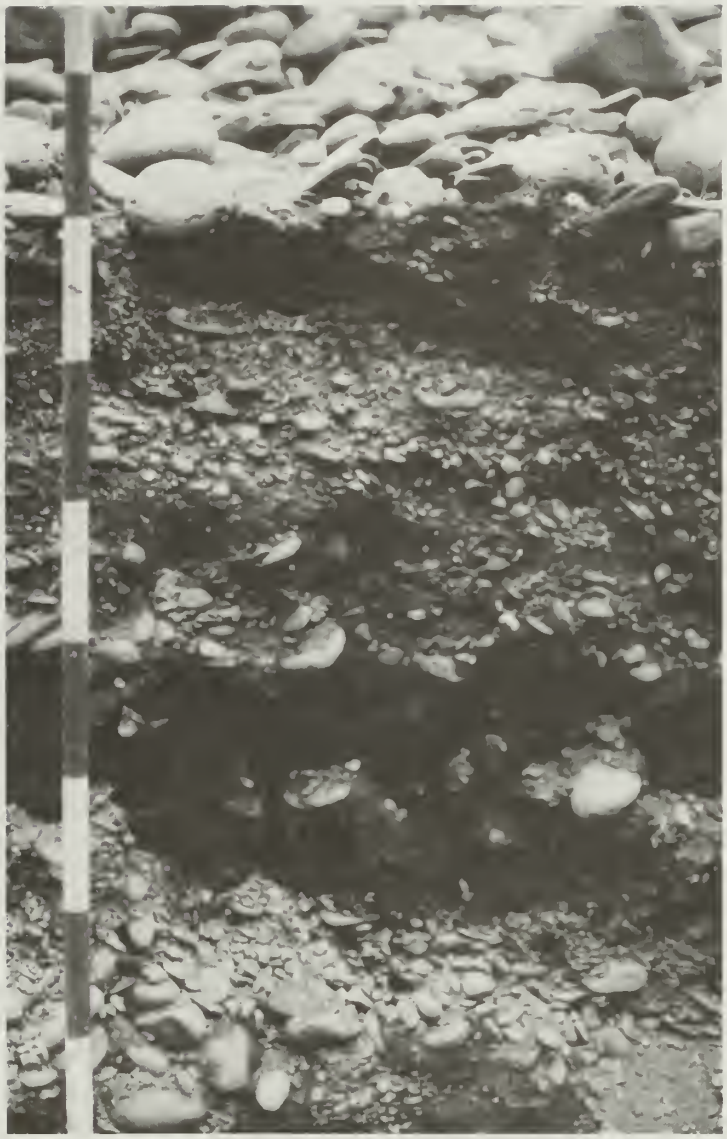


Figure 13b. Cut bank showing surface armoring and finer-grained subsurface sediment near site 12044910, Elwha River Delta site1 at Lake Mills (ELD1). Rod is marked in 10-centimeter increments.

streambed by fine to coarse gravel and the finer sediment found below the surface of the left bank gravel bar near ELD1.

Lake Mills Delta

The Lake Mills Delta deposits contain mostly sand-sized and gravel-sized sediments that consist primarily of platy-shaped and rod-shaped particles. These shape characteristics are strongly evident in the sand-sized sediments.

The largest rocks were concentrated in the upper part of the delta, in the Cat Creek fan, and in Rica Canyon (photo, fig. 3b, and map, fig. 14). The largest rocks were found in surface particle counts, which showed the maximum intermediate diameters of individual rocks to be less than 362 millimeters, with 99 percent being less than 256 millimeters. Pit samples showed similar results, with all rocks being less than 300 millimeters in size.

Bulk sediment samples were collected from the surface of the exposed delta deposit, near ELD2. The particle-size distributions and bulk densities of these samples are given in table 10.

Nine natural river bank exposures and 14 hand-dug test pits were sampled on the upstream delta and then partially hand-sieved in the field. Representative sack samples for laboratory analysis were collected from most exposures (Gilbert and Link, 1995). The bed of Lake Mills was divided into seven sedimentation areas (map, fig. 14) to estimate the volumes and particle-size distributions of the sediments accumulated on the lakebed. Areas 6 and 7 were further divided into three subareas, each according to the mode of deposition: topset, foreset, and bottomset beds. The photograph in figure 15 shows a cut bank illustrating deposits of topset beds overlying foreset deposits. The photograph in figure 16 shows the advancing delta during the drawdown experiment. The volume and particle-size distribution of the sediments in each sedimentation area are given in table 11.

Seven samples, including two duplicate samples, were collected from the Lake Mills Delta and packed in an ice-filled insulated chest for later analysis for pesticides, herbicides, and trace metals. No significant levels of the contaminants analyzed for were found. Analysis results are published in Appendix C of Gilbert and Link (1995).

Lake Mills Bed

Surficial samples of lakebed sediment, EBED01 through EBED08, were taken at eight sites in Lake Mills (map, fig. 14) using a standard BMH-60 bed-material sampler. Atterberg limits, plasticity indexes, and full particle-size distributions (0.001-1.00 millimeters) were determined for three samples. Only partial particle-size distributions (0.062-1.00 millimeters) were determined for the other five samples. These data are given in table 12.

CROSS-SECTION SURVEYS

Cross-section surveys of the exposed delta surface, streambed channels, and the bed of Lake Mills were conducted repeatedly to determine the amounts of erosion, transport, and deposition of sediment during the experiment. An electronic total station survey instrument, an electronic distance meter, a survey level, and survey rods were used to survey the delta and the stream channels. Fathometers were used to survey the lakebed.

Coordinate System

Horizontal and vertical control on the delta was established by a contract surveyor who used the local horizontal coordinate system established for Glines Canyon Dam as the basis for the delta surveys. Vertical control was initially obtained from a monument on the dam's left abutment but was later adjusted (see section below on vertical datum). Horizontal and vertical control was extended from the dam to the delta using three instrument setup locations: the first, over a monument (rebar with yellow plastic cap) on the dam's left abutment; the second, 3,871 feet upstream near the west (left bank) shoreline of the lake; and the third, on the delta near the edge of the lake, 6,695 feet upstream from the second location.

The contractor surveyed the coordinates of two control points on the delta above the full lake elevation and the location of each cross-section monument. The initial conditions survey of the above-water portion of the delta cross sections was also performed by the contract surveyor. The initial conditions survey of the below-water portion of the delta cross sections was conducted by personnel from Reclamation and the Lower Elwha Klallam Tribe.

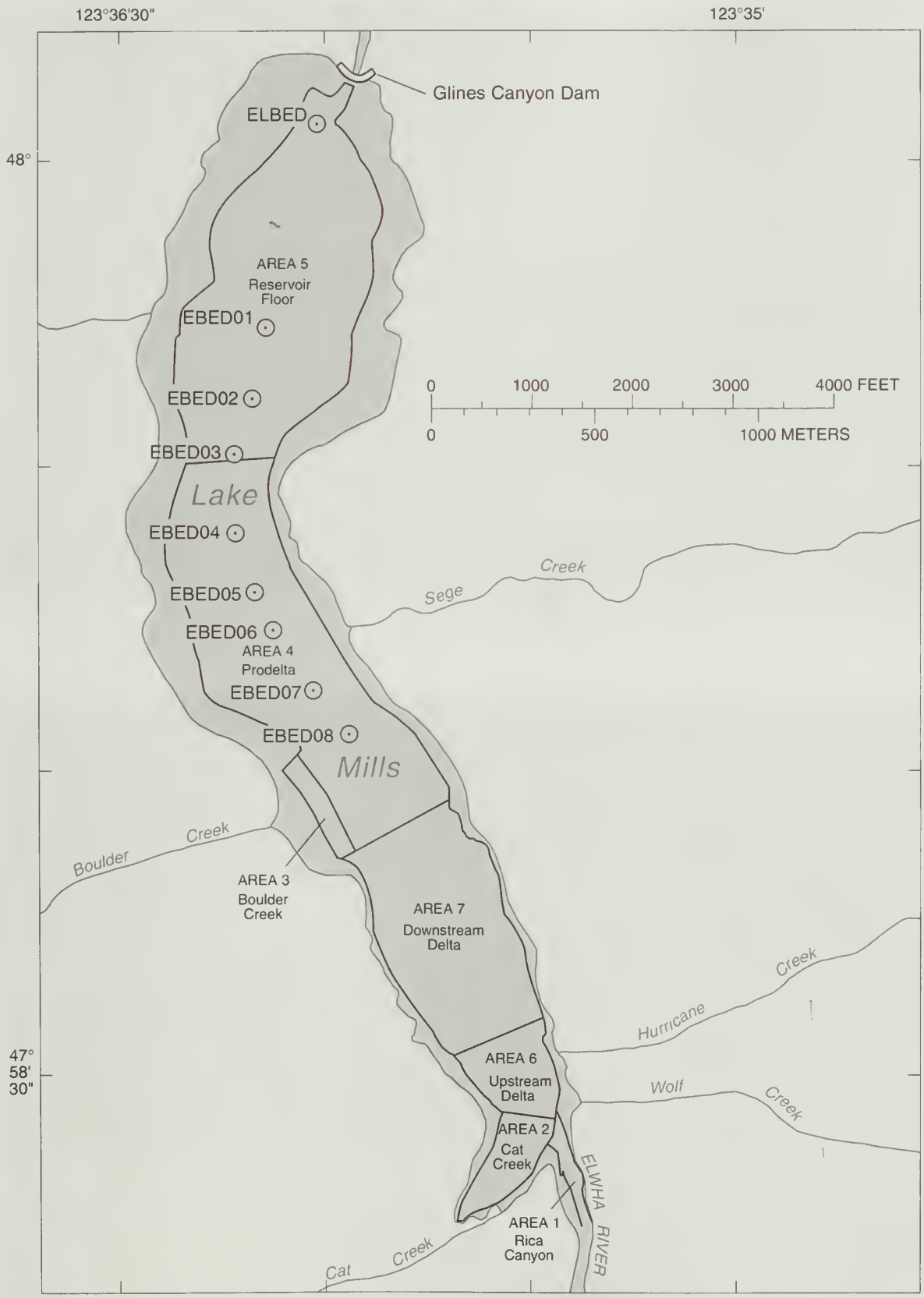


Figure 14. Lake Mills sedimentation areas (modified from Gilbert and Link,1995, figure 6), and locations of lakebed samples ELBED (table 7e) and EBED01-EBED08 (table 12).

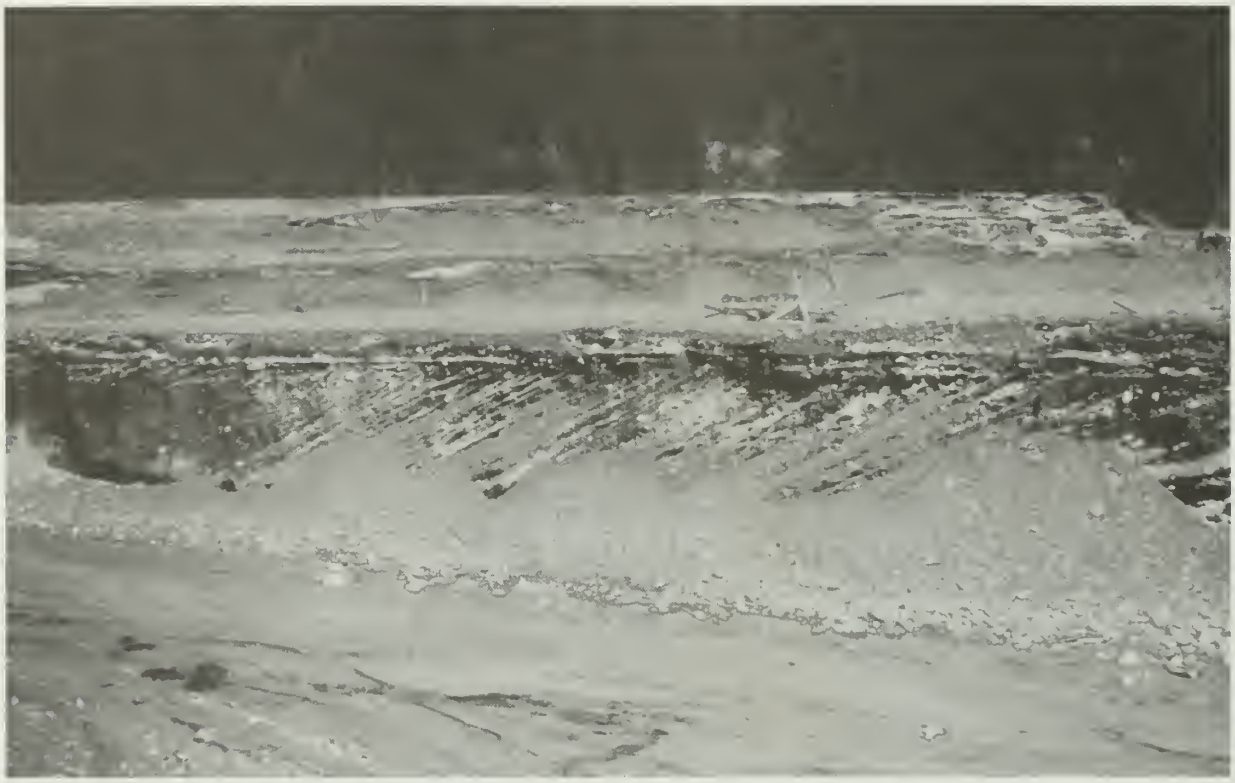


Figure 15. Topset beds overlying foreset beds near site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2).

Figure 16. New delta forming immediately downstream of toe of the exposed older delta.

Vertical Datum

Several different vertical datums were used in the land and boat (bathymetric) surveys of cross-section elevations. However, to avoid confusion all cross-section elevations in this report are given in just one vertical datum, the vertical datum used by Reclamation in surveys of Elwha River cross sections downstream from Glines Canyon Dam. The Reclamation datum was thought to be the same as the National Geodetic Vertical Datum (NGVD) of 1929, but the elevation of USGS bench mark L-36, located on the right abutment of Glines Canyon Dam, determined by Reclamation (604.36 feet) is 0.9 foot lower than the published elevation (605.26 feet, NGVD of 1929). Therefore 0.9 foot needs to be added to the elevations given in this report to convert them to NGVD of 1929 elevations.

The elevation determined by the contract surveyor for bench mark L-36 was 605.81 feet so the elevations of all points surveyed by the contractor were adjusted by -1.45 feet to convert them to the Reclamation datum.

Lake Mills water-surface elevations recorded by the dam's operators in a local Glines Canyon Dam datum were used to convert bathymetric survey depths to lake-bottom elevations. Drawings in the Elwha Report (U.S. Department of the Interior, 1994, Appendix F) indicate that the Glines Canyon Dam project datum is 19.67 feet lower than NGVD of 1929. However, comparison of lake elevations in project datum reported by Daishawa America with concurrent lake elevations measured during the land surveys indicate that the project datum is 20.9 feet lower than the Reclamation datum and therefore 20.0 feet (instead of 19.67 feet) lower than NGVD of 1929. Therefore, lake elevations were converted from project datum to Reclamation datum by subtracting 20.9 feet before converting bathymetric depths to lake-bottom elevations.

Cross-Section Locations

Fifteen cross sections (identified as numbers 3 through 17) were established from near the mouth of Rica Canyon to about a mile downstream in Lake Mills (aerial photo, fig. 17). Four of the cross sections were located across the lakebed, downstream from the initial delta front, six were located across the lower delta in the reservoir area, and five were located across the left and right channels on the delta's upstream end (above the full-lake elevation). Because of dense alder trees between the left and right channels, the upper delta cross sections included only the river channels and banks and not the delta's island portion.

Cross sections on the delta were spaced about 300 to 400 feet apart, and those for the three most downstream cross sections in the lake were spaced about 1,000 feet apart. Cross-section monuments (18-inch long by half-inch diameter pieces of steel rebar driven to within 2 inches of the ground surface) were installed along the reservoir shoreline above full lake elevation prior to the beginning of the drawdown experiment (table 13). Orange or red ribbon was tied to the top of each monument, and metal tags, stamped with the cross-section number, were nailed into nearby trees as reference points.

Cross-Section Survey Methods

All areas of the delta that were either dry or wadeable were surveyed by land methods (photo, fig. 18). Bathymetric surveys were made of lake cross sections too deep to wade (photo, fig. 19). Before the drawdown experiment began, cross sections were surveyed by boat from the delta's upstream end (just downstream from Rica Canyon) to about 1,500 feet downstream from the delta front. Additional sections were surveyed by land methods as the lake receded during drawdown. After 9 feet of drawdown, which occurred about 3 days after lake drawdown began, nearly all of the delta surface was exposed above the receding lake. During some resurveys, river channel cross-section data could not be collected because flow velocities were too great to safely wade the channel and the channel was too steep and shallow to survey by rigid boat. Although attempts were made to survey the channel using an inflatable boat and ultra-sonic depth sounder, the amount of suspended sediment in the water column attenuated the return signal and prevented discrimination of the streambed.

Land Surveys

An electronic total station referenced to three control points was used for the land surveys. One of the control points was used for the instrument setup location, from where the downstream two-thirds of the delta could be seen, and the other two were used as backsites. The position of the instrument was verified

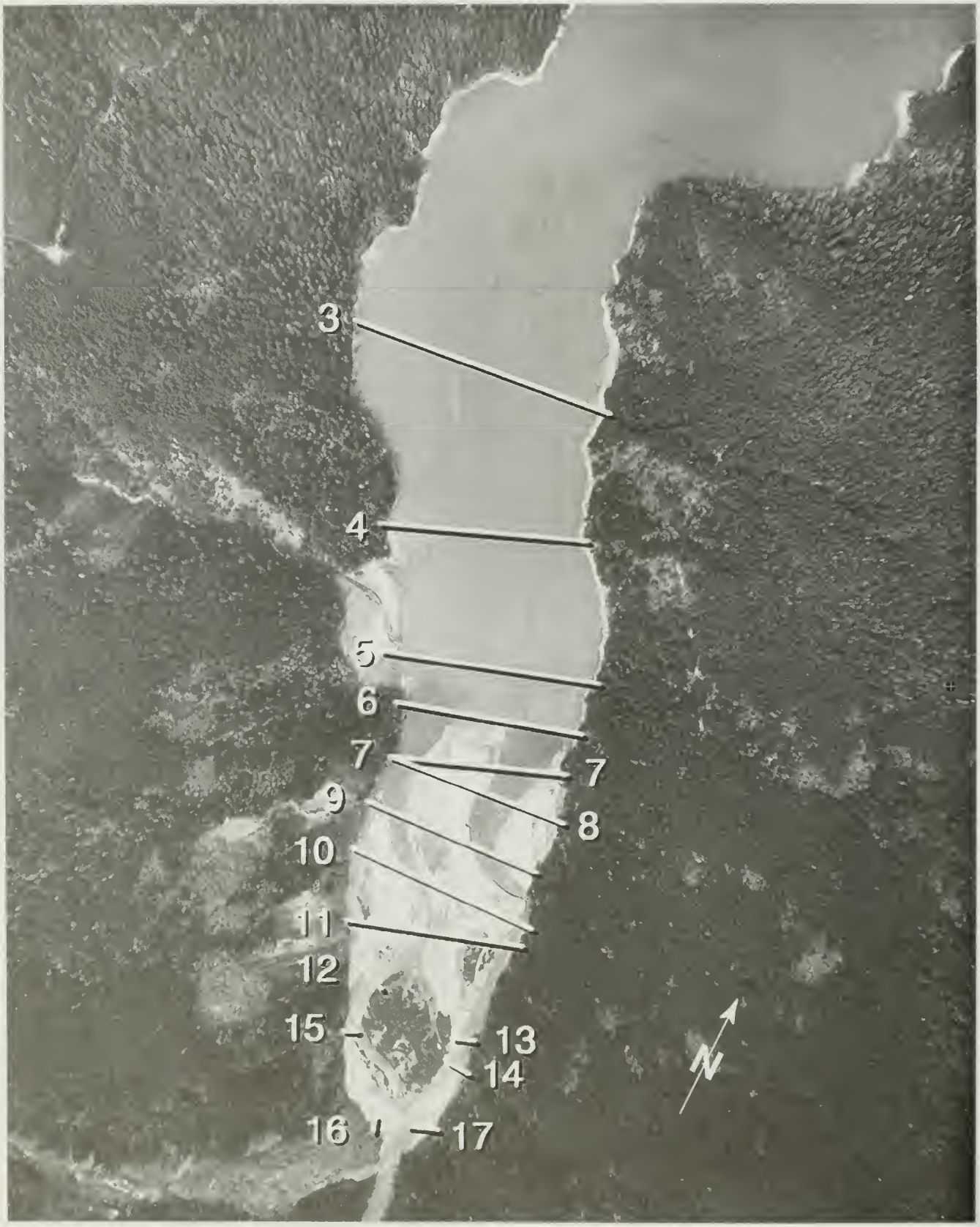


Figure 17. Locations of cross sections 3 through 17 surveyed on the Lake Mills Delta. Aerial photograph was taken at time of full reservoir drawdown on April 16, 1994. Photograph provided by the Bureau of Reclamation.

Figure 18. Land survey, with a total station and prism, of a Lake Mills Delta cross section.

Figure 19. Bathymetric survey crew from the Lower Elwha Klallam Tribe and boat used to survey, with an electronic distance meter and fathometer, Lake Mills Delta cross sections that were too deep to wade.

periodically throughout each survey to correct for thermal drift and to document survey accuracy. Because the early cross-section surveys were quite extensive, only the segments of cross sections that were known to have changed were resurveyed later.

The land surveys were conducted primarily by personnel of Olympic National Park Service and the Lower Elwha Klallam Tribe. Aerial photo survey panels were placed and surveyed so that measurements of distance could be obtained from aerial and other photographs.

Bathymetric Surveys

The initial conditions of the eight most downstream cross sections were surveyed by boat on April 8, 1994. Depths were sounded and recorded with a fathometer, and horizontal distance was measured by an electronic distance meter (EDM) set up on shore over each cross section's west (left bank) monument. The EDM readings were relayed by radio to the boat and recorded on the fathometer chart. Bathymetric cross-section surveys were repeated daily from April 10 through April 26, 1994.

By April 16, only four cross sections across the lakebed could be surveyed by boat, so nine additional short longitudinal survey lines were established extending downstream into the lake from the delta face at 45° angles to the direction of flow. These lines measured the deposition of sediment in the drawndown lake that eventually extended the delta downstream about 300 feet. Ultimately, the most upstream lakebed cross section and the nine additional lines across the new delta front were filled with sediment up to the lake water-surface elevation and could no longer be surveyed by boat until the lake began refilling.

The fathometer was calibrated at each cross section by lowering an aluminum bar under the boat to a known depth and adjusting the speed of sound in water until the depth recorder provided the correct depth. This procedure was repeated at 10-foot depth intervals down to the bottom of the lake.

Cross-section elevations were obtained by subtracting measured depths from the lake-surface elevation. Depths were recorded on the depth chart at a rate of about nine times per second. A horizontal scale had to be established for the depth recorder chart because the chart advanced at a constant rate whether the boat was stationary or moving.

The horizontal boat position was established by keeping the boat on line and using the EDM to continuously measure distance from the west (left bank) cross-section monument to a prism mounted on the boat. All cross sections were surveyed as the boat moved from the east (right bank) shore to the west (left bank) shore. This technique for obtaining horizontal position was considered satisfactory because the reservoir bottom (except for the sides and delta front) was relatively smooth and flat. The EDM operator would site and track the boat's prism to obtain distance. The radio operator on shore would help keep the boat pilot on line and call out distances at even intervals. For each distance, a "fix mark" (vertical line) was made on the recorder chart, and the distance was written on the chart next to the fix mark line. Analog depth data and horizontal stations were later converted to digital coordinates.

Cross-Section Data

Repeat surveys (daily or every few days) were conducted from April 10-26, 1994, for those cross sections (6-17) that were changing. The survey data collected for those cross sections are given in tables 14a-14p. Graphs of only the first and last surveys obtained for each of these cross sections are shown in figures 20a-20l. None of the data for cross sections 3, 4, and 5 was included in tables 14a-14p or shown in figures 20a-20l because there was no measureable change in these three cross sections during the experiment.

Cross sections were plotted to identify gaps in the survey data. Gaps typically occurred either because a segment of the cross section had not changed and was not resurveyed or because the river was unwadeable at certain locations and times due to high velocities. In cases where segments of cross sections were not resurveyed, survey data from prior days were used to fill in the gaps. In cases where a portion of the river channel was not resurveyed due to high velocities, data were interpolated from surveys on preceding and subsequent days.

The volume of Lake Mills Delta sediment that was eroded and transported during the drawdown experiment was estimated from the changes in cross-sectional area and the distances between cross sections to be about 300,000 cubic yards. Cross-section plots of the lower delta and lake were used to determine where degradation stopped and aggradation began. Eroded sediments were deposited farther downstream, extending the delta about 300 feet farther into the lake.

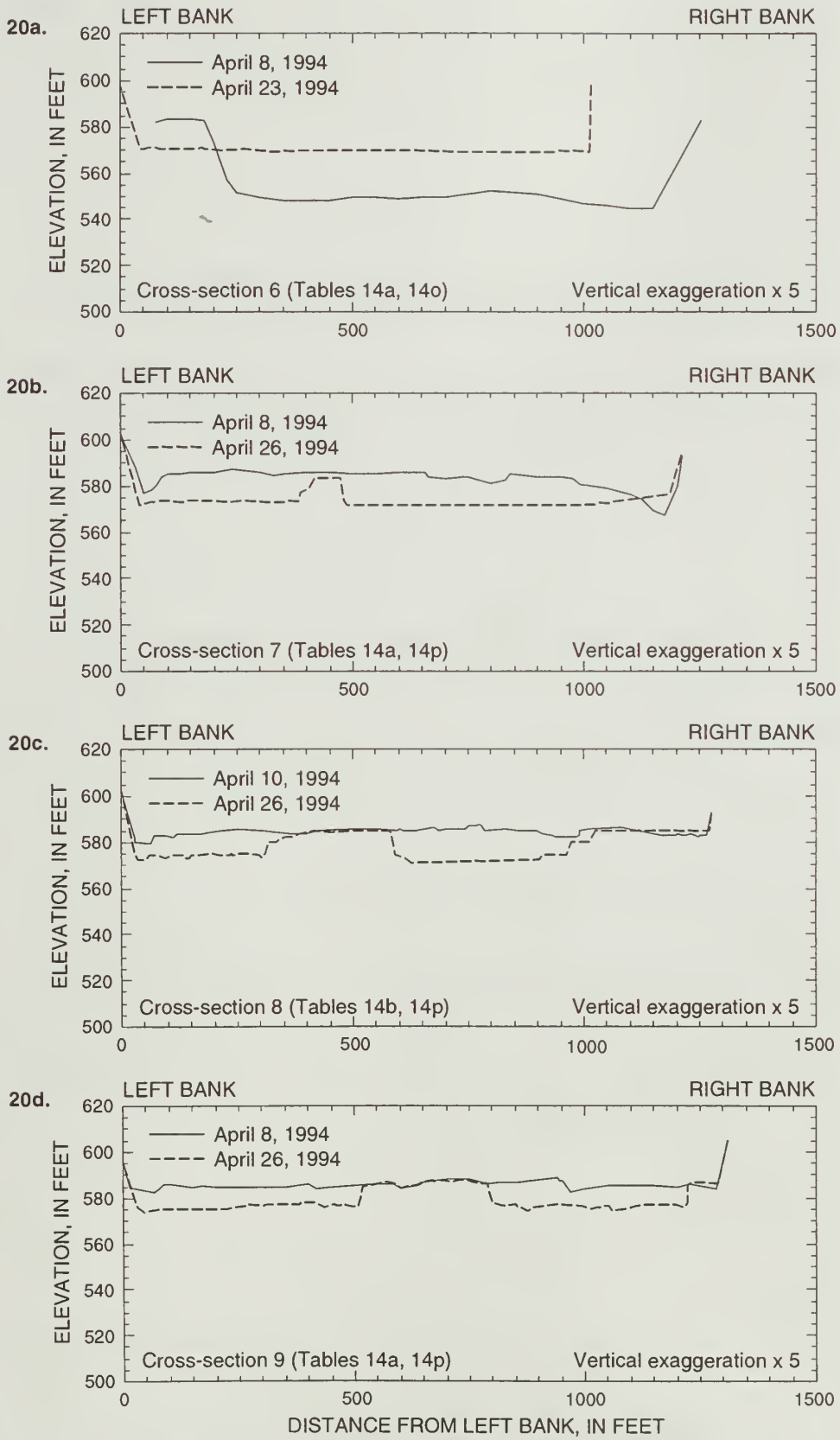


Figure 20a-d. Surface elevation of Lake Mills Delta, cross-sections 6-9.

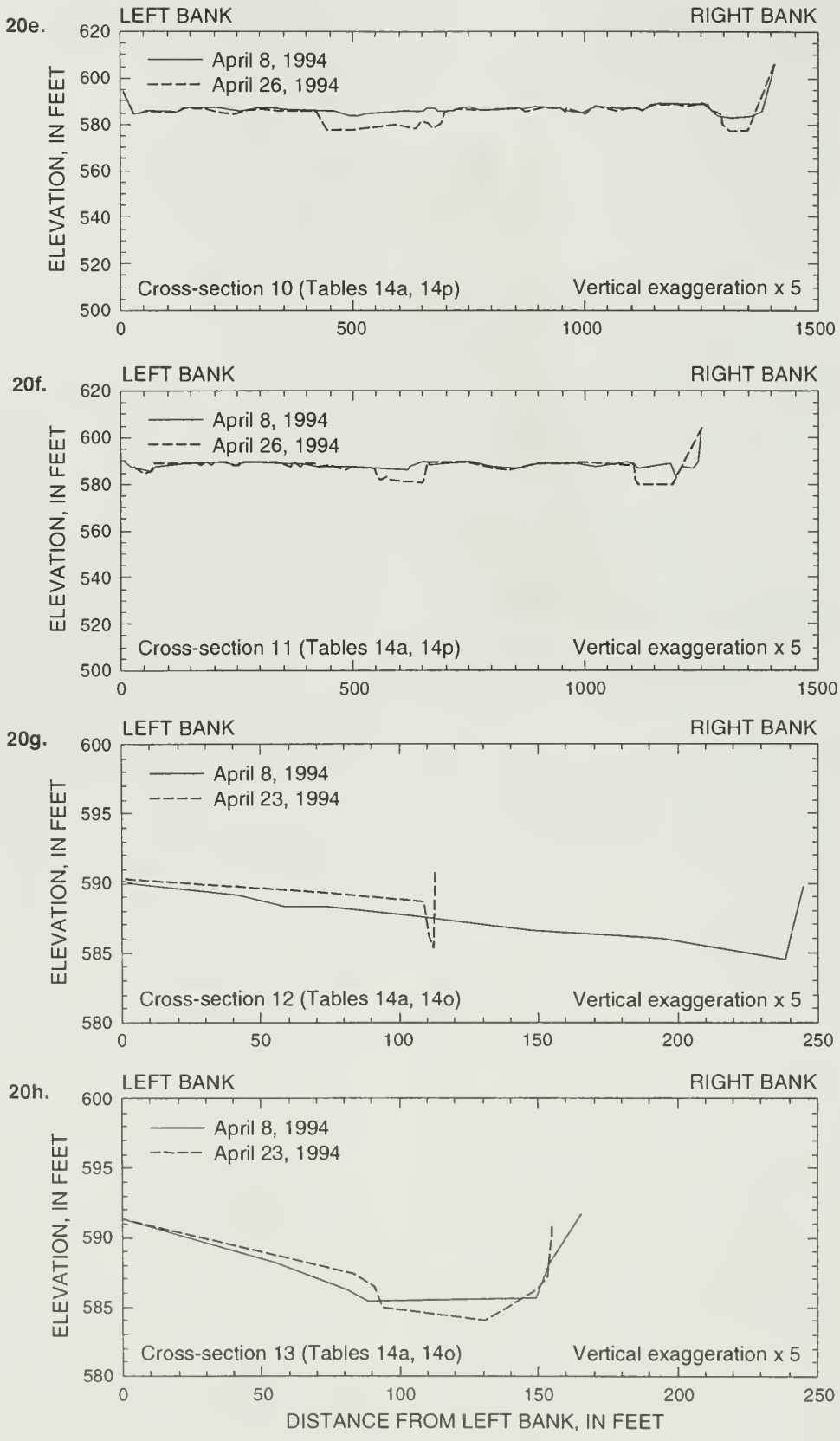
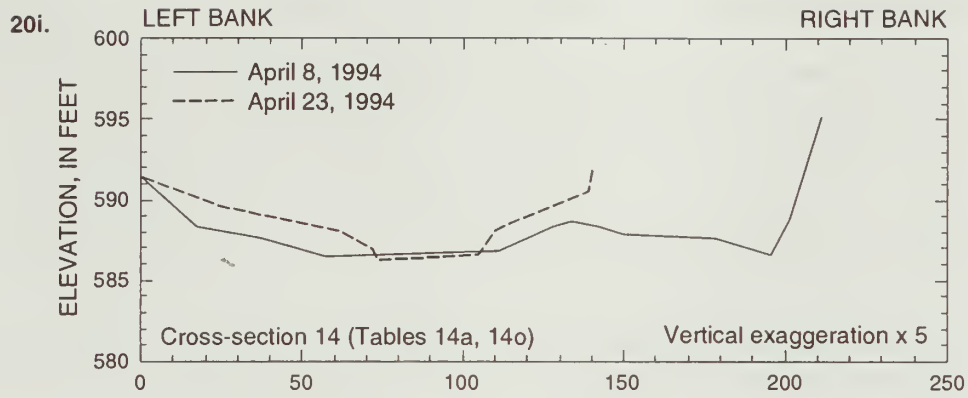
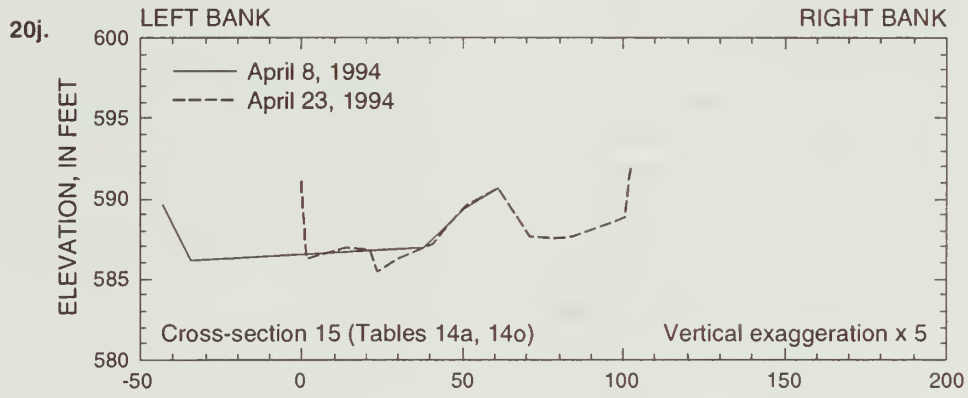
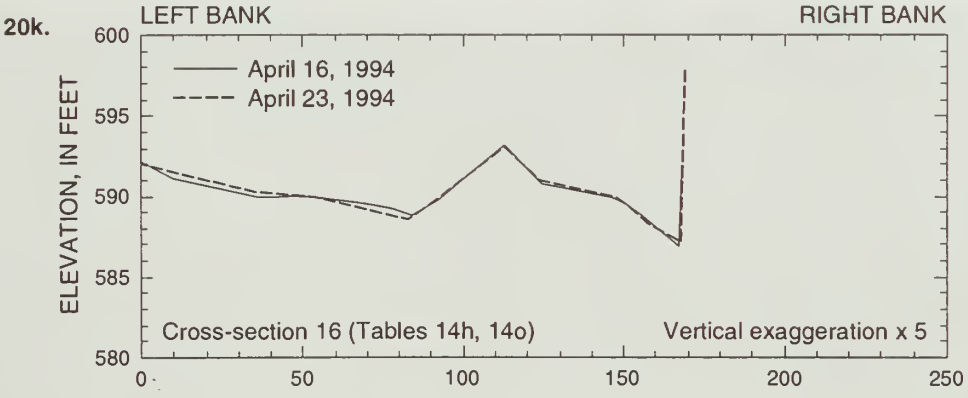


Figure 20e-h. Surface elevation of Lake Mills Delta, cross-sections 10-13.







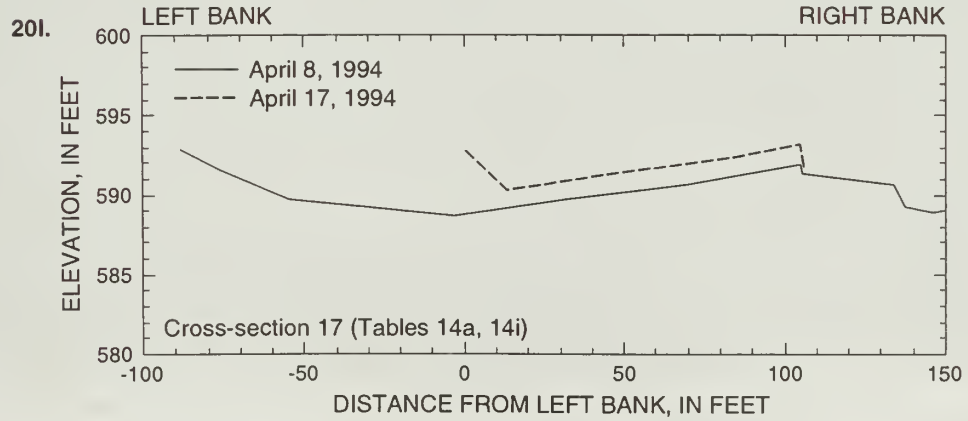


Figure 20i-l. Surface elevation of Lake Mills Delta, cross-sections 14-17.

Observed Channel Changes

Channel conditions changed very rapidly during the experiment. Flow in the middle channel was captured by the right channel after the sixth day (by the morning of April 15th). Standing waves were observed that formed rapidly and then washed out in a matter of seconds. Channel plan form, within the incised erosion channels, changed back and forth from meandering to braided.

Cross-section surveys of the delta showed that the channels eroded both vertically and horizontally during the first week when the reservoir was drawn down 18 feet. Lateral bank erosion rates at some cross sections were as much as 80 feet per day. During the second week, the lake elevation was held constant, and the cross-section surveys showed that vertical erosion essentially stopped while lateral erosion continued. By the end of the second week, the total channel erosion width at the initial delta front was equal to the lake width, and a new but lower delta had been deposited across the entire lakebed immediately downstream from the original delta front at cross section 6. However, no measurable change was detected in the three most downstream lake cross sections (3, 4, and 5) during the drawdown experiment.

During the course of the drawdown experiment, streambed erosion in the upper reaches of the left and right channels proceeded slowly and uniformly (photo, fig. 21). Nick points (points in the streambed where degradation begins) in both channels proceeded upstream but never reached the head of each riffle at the upstream end of the island separating the channels near the mouth of Rica Canyon. Bank erosion in the upper reaches of these two channels was limited to some degree by the abundance of logs and other woody debris from past floods deposited at the upstream end of the island and along the banks of the right channel. In the gravelly and cobbly upper part of the delta, erosion was primarily vertical during the entire experiment. As erosion continued, the bed became coarser, erosion slowed, and upstream progression of the nick points slowed.

Figure 21. Upstream reach of the right channel near site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1), looking upstream toward the head of the riffle.

PHOTOGRAPHS

Stereo vertical aerial photographs and time-lapse oblique photographs were taken during the drawdown experiment to visually monitor changes in channel location and other characteristics. Many other photographs, some of which are shown in this report, were also taken during the experiment.

Aerial Photographs

Two sets of stereo aerial photographs were obtained, each at a scale of 1 inch to approximately 400 feet. One set of aerial photographs (taken by the U.S. Army Corps of Engineers, Seattle District, on March 26, 1994) includes the Elwha River from Freshwater Bay at the river's mouth to the mouth of Rica Canyon. The other set of aerial photographs, taken by a consulting engineering firm, includes the Elwha River from Glines Canyon Dam to Mount Olympus. This set was taken on April 16, 1994, the first day that Lake Mills was at the full drawdown level. Several photo survey panels are visible in the photographs of the Lake Mills Delta. Although photo panels were surveyed, the photos have not been photogrametrically analyzed.

Oblique Time-Lapse Photographs

Three automated cameras were placed in weather-protected boxes at the top of a landslide area overlooking the delta on the lake's west side. From this vantage point, the three cameras provided overlapping coverage of the delta's upstream, middle, and downstream reaches. Each camera was set to take a picture every 4 hours or six pictures per day, four of which were during daylight and two at night. The cameras began operation on April 9 and continued until early May when the refilling of Lake Mills was completed.

The repeat photography provided a visual record of delta erosion and redeposition during the drawdown and refilling of the lake. A few of these photographs are shown in figures 22, 23, and 24 to illustrate the channel development and movement during the drawdown experiment. Quantitative measurements can be made from the photographs because surveyed photo panels were placed in the image fields. The photographs were digitized and archived in photo-CD format from which a time-lapsed video was produced. The video is in three parts, one for each camera position. The video is on file at the Water Resources Division Office of the National Park Service in Fort Collins, Colorado.

Figure 22. Time-lapse photographic sequence from camera looking at downstream reach of the delta on April 10, 14, 20, 24, and 28, 1994. Photographs provided by the National Park Service.

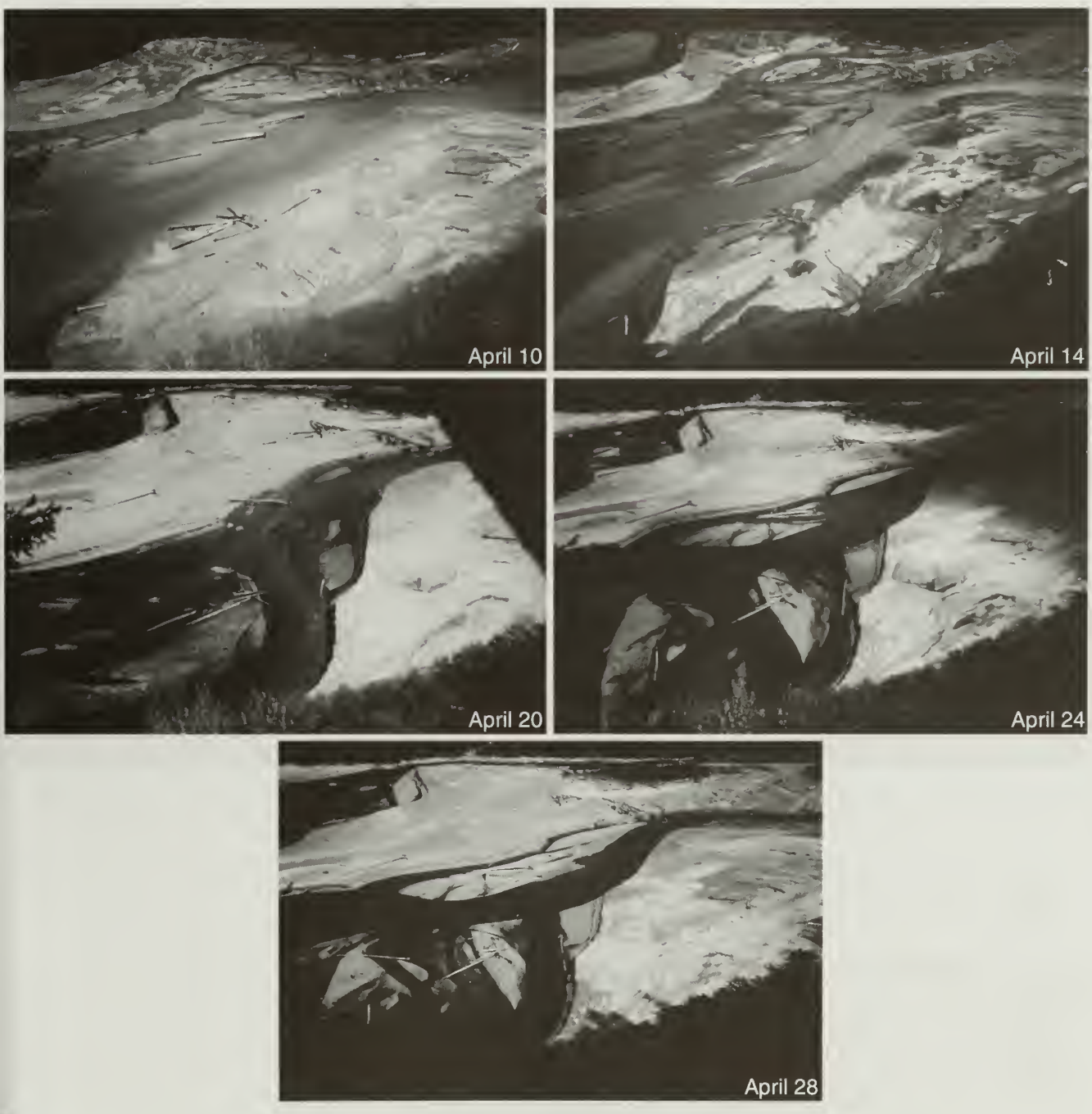


Figure 23. Time-lapse photographic sequence from camera looking at middle reach of the delta on April 10, 14, 20, 24, and 28, 1994. Photographs provided by the National Park Service.

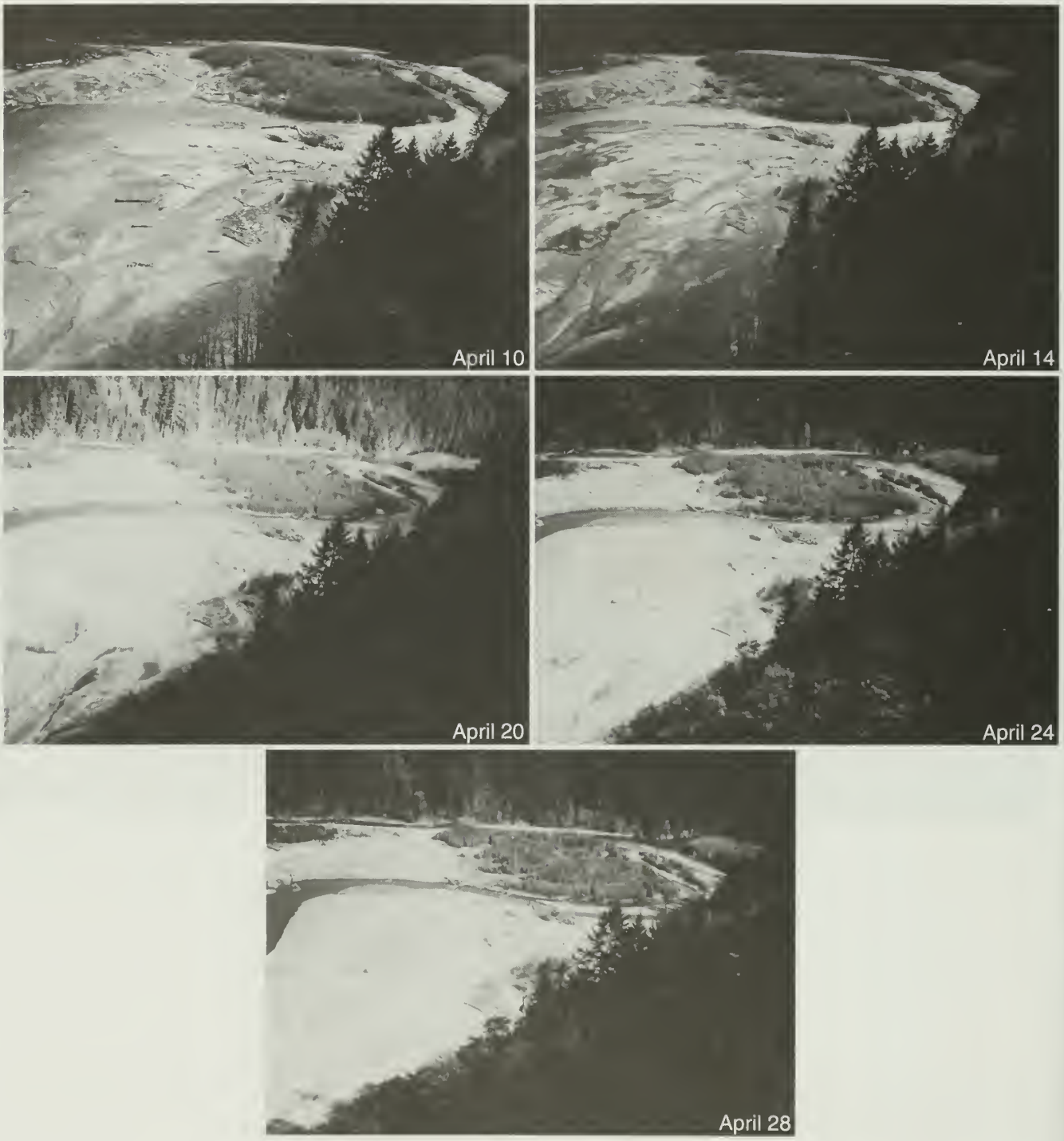


Figure 24. Time-lapse photographic sequence from camera looking at upstream reach of the delta on April 10, 14, 20, 24, and 28, 1994. Photographs provided by the National Park Service.

SUMMARY

The Lake Mills drawdown experiment from April 9 to April 23, 1994, was conducted to determine the erodibility and size gradation of the delta sediments and to determine the impact that a significant lowering of the Lake Mills water-surface elevation would have on sediment transport and water quality downstream from the lake. The Lake Mills Delta is estimated to contain 13.8 million cubic yards of sediment, and the amount of that sediment that was transported downstream during the experiment is estimated to be about 300,000 cubic yards. Data were collected upstream of the eroding delta both before the experiment, to define baseline conditions, and throughout the experiment.

The experiment was conducted jointly by the U.S. National Park Service, the Bureau of Reclamation, the U.S. Geological Survey, and the Lower Elwha Klallam Tribe. The Daishawa America Port Angeles Paper Mill provided special reservoir control to make the drawdown experiment possible.

The experiment was conducted during relatively low daily flows in the Elwha River upstream of Lake Mills (at gaging station ELWW) that ranged from 390 to 1,760 ft^3/s. The range of daily flows in the Elwha River downstream of Lake Mills (at gaging station ELWP) during the same period was from 1,110 to 2,090 ft^3/s, flows that are equalled or exceeded 56 and 20 percent of the time, respectively.

The lake was drawn down 18 feet over 1 week from April 9 to 16, 1994, and then held at a constant elevation for 1 week until refilling began on April 23. The lake refilled to approximate pre-drawdown elevation on May 7, 1994.

The types of data and samples collected were (1) gage-height and streamflow data, (2) suspended-sediment and bedload samples, (3) water-quality samples, (4) streambed-sediment, bar-deposit, delta-deposit, and lakebed-sediment samples, (5) cross-section surveys of the Lake Mills bed and delta, and (6) aerial and oblique photographs of the Lake Mills Delta.

During the drawdown experiment, channel conditions changed very rapidly as the delta eroded both vertically and laterally. Flow in the middle channel was captured by the right channel by the morning of April 15. Eroded banks were nearly vertical, with no signs of seepage-based erosion. In the lower reaches of the left and right channels, standing waves were observed that formed rapidly and then washed out in a matter of seconds.

Streambed erosion in the lower two thirds of the delta was observed at a rate nearly equal to the lake drawdown rate. The eroded sediment was redeposited in the receding lake, forming new and lower delta deposits. As erosion and deposition continued, these channels were forced to move laterally to reach the lake. This lateral channel migration induced episodes of large and rapid bank erosion near the mouth. Once the lake reached the 18-foot drawdown level, vertical erosion essentially ceased, and bank erosion due to lateral migration substantially increased. The amount of bank erosion rapidly decreased with distance upstream.

Channel plan form within the downstream half of the incised erosion channels changed over time from meandering to braided. Lateral bank erosion rates at some cross sections were as much as 80 feet per day. By the end of the second week, the total channel erosion width at the initial delta front was equal to the lake width, as the river attained a base level defined by the lake's lowered water-surface elevation. By that date, a new but lower delta had formed downstream of the original delta front, extending the delta about 300 feet farther into the lake.

In the upper reaches of the left and right channels streambed erosion proceeded slowly and uniformly. Nick points in both channels proceeded upstream but never reached the head of each riffle at the upstream end of the island separating the channels near the mouth of Rica Canyon. Bank erosion in the upper reaches of these two channels may have been limited by the abundance of logs and other woody debris from past floods deposited at the upstream end of the island and along the banks of the right channel. In the gravelly and cobbly upper part of the delta, erosion was primarily vertical during the entire experiment. As erosion continued, the bed became coarser, erosion slowed, and upstream progression of the nick points slowed.

Erosion of the delta sediments resulted in maximum suspended-sediment concentrations of 443 and 6,110 mg/L, respectively, at the two measuring sites on the delta. However, most of the suspended sediment measured at the delta sites must have been trapped in Lake Mills because only small increases in suspended-sediment concentrations were found downstream from Glines Canyon and Elwha Dams. The leading edge of the suspended-sediment plume was detected downstream from Glines Canyon Dam about 2 days after erosion of the Lake Mills Delta deposits began and downstream from Elwha Dam about an additional 3 days later.

The average concentrations of unfiltered iron and manganese measured at a site on the delta (23,000 µg/L and 350 µg/L, respectively) were considerably greater than their ambient concentrations measured at a site upstream from Lake Mills

(200 µg/L and <10 µg/L, respectively). However, their maximum concentrations measured at sites downstream from Glines Canyon and Elwha Dams were only 960 µg/L and 80 µg/L, respectively.

The ambient water quality at site ELWW is exceptionally good because the Elwha River is relatively pristine upstream from there. The concentrations of water-quality constituents at site ELWW were unaffected by the drawdown experiment, showing little change during the experiment. The river was clear, and the streambed could be observed through the water column.

The drawdown experiment showed that the Lake Mills Delta contains mostly sand-sized and gravel-sized sediments that consist primarily of platy-shaped and rod-shaped particles. This characteristic is strongly evident in the sand-sized sediments. The largest rocks sampled were concentrated in the upper part of the delta, in the Cat Creek fan, and in Rica Canyon where 99 percent of the rocks measured in surface particle counts had maximum intermediate diameters of less than 362 millimeters. Pit samples showed similar results, with all rocks being less than 300 millimeters in size. The Lake Mills Delta sediments were rapidly eroded and redistributed both laterally and downstream in the lake during the drawdown experiment.

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GLOSSARY

Bedload--material moving on or near the streambed by rolling, sliding, or skipping.

Bedload sampler--a device for sampling bedload.

Bed material--the sediment mixture of which the stream bed is composed.

Bulk density--the mass of dry sediment per unit volume, in grams per cubic centimeter (g/cm^3).

Bottomset bed--relatively fine-grained sediment of a lakebed or delta.

delta deposit--a deposit of sediment formed where moving water (as from a stream entering a lake) is slowed by a body of standing water. As a delta grows from the accumulation of sediment over time, a bottomset bed is progressively covered by a foreset bed, which in turn is covered by a topset bed.

density--the mass of a substance per unit volume, in grams per cubic centimeter.

ecology--the study of relations between organisms and their environment.

ecosystem--a community of plants, animals and bacteria and its interrelated physical and chemical environment, regarded as a unit.

equal-width increment (EWI) method--a procedure for obtaining the discharge-weighted suspended-sediment concentration at a stream transect by (1) performing depth integration at a series of equally spaced sampling verticals across the transect, and by (2) using the same vertical transit rate at all sampling verticals.

fishery--a water body containing fish.

fluvial sediment--particles derived from rocks, biological materials, or chemical precipitants that are transported by, suspended in, or deposited by water.

foreset bed--inclined layers of sandy material deposited on or along an advancing and relatively steep frontal slope of a delta.

isokinetic sampling--to sample a stream in such a way that the ambient velocity of the water-sediment mixture does not accelerate or decelerate as it enters the sampler intake.

particle count--a procedure for obtaining a representative sample of sediment particles on the surface of a sediment deposit for the determination of sediment characteristics such as particle-size distribution, particle density, shape, and so on.

suspended sediment--sediment that is carried in suspension by the turbulent components of streamflow or by Brownian movement.

suspended-sediment sampler--a device that collects a representative sample of the
mixture of water and suspended sediment in a stream.

streamflow discharge--the quantity of water passing a stream transect in a unit of time, in cubic feet per second (ft^3/s).

terrane--a term applied to a rock or group of rocks and to the area in which they crop out; the term is used in a general sense and does not imply a specific rock unit.

topset bed--a layer of sediments deposited on the top surface of an advancing delta.

TABLES 2 THROUGH 14

All suspended-sediment concentrations, sand and silt/clay percentages, sample masses used to determine bedload discharges, and sediment particle-size distributions were analyzed by the U.S. Geological Survey Cascade Volcano Observatory sediment laboratory.

All water-quality data and bed-sediment quality data were analyzed by the U.S. Geological Survey National Water Quality Laboratory.

Table 2a.--*Streamflow measurements made at site 12044900, Elwha River above Lake Mills (ELWW)*
[ft/s, feet per second; ft^2, square feet; ft^3/s, cubic feet per second]

Meas-urement number	Date	Gage height (feet)	Time	Width (feet)	Mean depth (feet)	Mean velocity (ft/s)	Area (ft^2)	Discharge (ft^3/s)
1	940325	13.60	12:15	164	2.60	2.17	426	924
2	940407	13.80	18:35	136	3.80	1.93	517	1,000
3	940409	13.94	15:25	134	3.93	2.26	527	1,190
4	940411	13.78	17:20	134	3.77	2.00	505	1,010
5	940413	13.75	15:05	134	3.75	1.99	503	1,000
6	940417	13.87	10:45	134	3.87	2.08	519	1,080
7	940419	14.64	09:40	133	4.44	3.10	590	1,830
8	940421	14.30	12:05	133	4.22	2.73	561	1,530
9	940423	14.10	09:45	134	4.00	2.37	536	1,270
10	940425	13.95	16:10	124	3.83	2.17	475	1,030
11	940427	13.87	09:40	135	3.85	2.08	520	1,080

Table 2b.--*Streamflow measurements made at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)*
[ft/s, feet per second; ft^2, square feet; ft^3/s, cubic feet per second; --, no data]

Meas-urement number	Date	Gage[1] height (feet)	Time	Width (feet)	Mean depth (feet)	Mean velocity (ft/s)	Area (ft^2)	Discharge (ft^3/s)
1	940410	--	16:20	97.0	2.03	3.45	197	679
2	940412	--	13:00	86.0	1.73	4.34	149	647
3	940415	--	10:30	57.0	1.69	5.86	96.3	564
4	940417	--	13:50	54.0	2.00	6.81	108	736
5	940419	--	16:15	64.0	2.36	6.69	151	1,010
6	940420	--	11:50	67.0	2.09	6.64	140	930
7	940421	--	16:05	71.0	2.08	6.25	148	925
8	940423	--	15:50	70.0	2.01	5.53	141	780
9	940425	--	12:30	68.0	1.96	4.79	133	637
10	940427	--	12:00	68.0	1.99	4.73	135	638

[1] No staff gage at this site.

Table 2c.--*Streamflow measurements made at site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2)*
[ft/s, feet per second; ft^2, square feet; ft^3/s, cubic feet per second; --, no data]

Meas-urement number	Date	Gage[1] height (feet)	Time	Width (feet)	Mean depth (feet)	Mean velocity (ft/s)	Area (ft^2)	Discharge (ft^3/s)
1	940413	--	17:00	87.0	1.09	7.10	95.2	676

[1] No staff gage at this site.

Table 2d.--*Streamflow measurements made at site 12045500, Elwha River at McDonald Bridge (ELWP)*
[ft/s, feet per second; ft^2, square feet; ft^3/s, cubic feet per second]

Measurement number	Date	Gage height (feet)	Time	Width (feet)	Mean depth (feet)	Mean velocity (ft/s)	Area (ft^2)	Discharge (ft^3/s)
416	940309	11.72	13:30	91.0	7.16	2.18	652	1,830
417	940409	12.07	15:50	93.0	7.47	3.12	695	2,170
418	940415	11.21	09:50	91.0	6.63	2.17	603	1,310
419	940421	11.72	11:20	93.0	7.15	2.71	665	1,800
420	940512	12.02	16:20	91.0	7.53	3.09	685	2,120

Table 2e.--*Streamflow measurements made at site 12046100, Elwha River below Elwha Dam (ELDM)*
[ft/s, feet per second; ft^2, square feet; ft^3/s, cubic feet per second; --, no data]

Measurement number	Date	Gage[1] height (feet)	Time	Width (feet)	Mean depth (feet)	Mean velocity (ft/s)	Area (ft^2)	Discharge (ft^3/s)
1	940408	--	17:15	150	3.41	2.95	512	1,510
2	940409	--	11:45	152	3.69	3.33	561	1,870
3	940410	--	12:55	152	3.97	3.63	604	2,190
4	940412	--	09:30	153	3.99	3.61	610	2,200
5	940414	--	13:55	148	3.53	3.12	523	1,630
6	940416	--	09:55	146	3.10	2.68	452	1,210
7	940418	--	12:10	150	3.51	3.40	527	1,790
8	940420	--	08:30	152	3.93	3.56	598	2,130
9	940422	--	11:50	151	3.80	3.40	574	1,950

[1] No staff gage at this site.

Table 3.--*Daily-mean discharge at data-collection sites during the Lake Mills drawdown experiment*
[--, no data]

Date	Daily-mean discharge, in cubic feet per second				
	ELWW	ELD1[1]	ELD2[1]	ELWP	ELDM
940401	1,330	--	--	1,570	--
940402	1,320	816	816	1,590	--
940403	1,280	796	796	1,520	--
940404	1,180	744	744	1,420	--
940405	1,110	706	706	1,350	--
940406	1,120	711	711	1,340	--
940407	1,050	677	677	1,250	--
940408	1,150	729	729	1,350	--
940409	1,190	748	748	1,820	1,900
940410	1,090	690	690	2,020	2,170
940411	1,040	645	645	1,820	1,950
940412	1,070	646	646	2,030	2,160
940413	1,010	620	620	1,820	1,970
940414	933	590	590	1,610	1,740
940415	890	577	577	1,230	1,340
940416	930	607	607	1,110	1,190
940417	1,150	726	726	1,370	1,450
940418	1,480	894	894	1,760	1,860
940419	1,760	1,030	1,030	2,090	2,220
940420	1,540	925	925	1,900	2,040
940421	1,510	913	913	1,800	1,930
940422	1,430	872	872	1,710	1,850
940423	1,300	786	786	1,410	--
940424	1,240	722	722	1,230	--
940425	1,170	658	658	1,160	--
940426	1,100	637	637	1,210	--
940427	1,090	649	649	1,100	--
940428	1,160	691	691	1,060	--
940429	1,230	723	723	1,040	--
940430	1,190	703	703	1,050	--

[1] Discharges were estimated based on flows at site ELWW (see "Streamflow and Sediment Discharge" section of report).

Table 4a. *--Suspended-sediment data from samples collected at site 12044900, Elwha River above Lake Mills (ELWW)*
[°C, degrees Celsius; ft^3/s, cubic feet per second; mg/L, milligrams per liter; --, no data]

Date	Time	Temperature (°C)	Water discharge (ft^3/s)	Concentration (mg/L)	Sediment discharge (tons per day)	Sand (percent)	Silt/clay (percent)
940325	13:40	5.0	885	3	7.2	15	85
940407	19:30	6.5	1,040	3	8.4	16	84
940407	19:40	6.5	1,040	3	8.4	15	85
940408	14:50	--	1,180	6	19	24	76
940409	15:00	5.5	1,150	5	16	24	76
940409	15:05	5.5	1,150	4	12	19	81
940411	16:25	7.0	1,020	3	8.3	8	92
940411	16:30	7.0	1,020	3	8.3	10	90
940414	16:20	5.5	928	5	13	46	54
940414	16:30	5.5	918	3	7.4	18	82
940416	08:25	--	915	3	7.4	28	72
940416	08:45	--	918	3	7.4	15	85
940417	08:25	--	1,090	4	12	13	87
940417	08:30	--	1,090	4	12	14	86
940418	14:35	--	1,450	9	35	22	78
940418	14:55	--	1,450	7	27	19	81
940419	10:35	6.0	1,830	26	128	31	69
940419	10:40	6.0	1,830	24	119	27	73
940420	15:25	--	1,470	9	36	19	81
940420	15:30	--	1,470	17	68	54	46
940421	10:30	6.0	1,490	10	40	34	66
940421	10:55	6.0	1,480	9	36	23	77
940422	16:50	--	1,380	6	22	10	90
940422	16:55	--	1,380	7	26	22	78
940426	11:05	--	1,090	4	12	12	88
940427	10:30	6.5	1,080	4	12	16	84
940511	13:05	8.0	2,050	100	554	84	16
940531	14:20	9.0	1,080	5	15	22	78
940621	13:27	8.5	1,160	3	9.4	10	90
940621	13:48	8.5	1,160	4	13	9	91

Table 4b.--*Suspended-sediment data from samples collected at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)*

[°C, degrees Celsius; ft^3/s, cubic feet per second; mg/L, milligrams per liter; --, no data]

Date	Time	Temperature (°C)	Water discharge [1] (ft^3/s)	Concentration (mg/L)	Sediment discharge (tons per day)	Sand (percent)	Silt/clay (percent)
940411	13:27	5.5	639	6	10	53	47
940411	13:35	5.5	639	6	10	53	47
940412	09:15	5.5	665	10	18	61	39
940412	09:30	5.5	660	11	20	69	31
940413	12:24	--	618	13	22	75	25
940413	12:38	--	618	10	17	69	31
940415	11:19	6.5	577	130	203	90	10
940415	11:35	6.5	577	174	271	92	8
940416	15:06	--	602	279	453	85	15
940416	15:12	--	602	45	73	84	16
940417	15:19	--	717	374	724	94	6
940417	15:25	--	717	443	858	94	6
940418	08:50	--	862	227	528	92	8
940418	09:03	--	865	362	845	95	5
940419	14:41	6.0	1,020	98	270	77	23
940419	14:42	7.0	1,020	229	631	87	13
940420	10:35	6.5	917	276	683	86	14
940420	10:42	6.5	915	240	593	87	13
940421	17:40	6.5	912	193	475	91	9
940421	17:41	6.5	913	159	392	91	9
940422	13:20	6.0	863	113	263	86	14
940422	13:21	6.0	863	44	103	81	19
940423	15:10	6.0	773	24	50	75	25
940423	15:15	6.0	776	30	63	79	21
940424	09:48	6.0	730	19	37	74	26
940424	10:00	6.0	730	13	26	63	37
940425	09:10	5.0	663	17	30	69	31
940425	09:11	5.0	662	8	14	48	52
940426	14:17	6.5	635	40	69	91	9
940426	14:22	6.5	635	6	10	37	63
940427	13:15	7.5	643	17	30	81	19
940427	13:20	7.5	642	6	10	54	46

[1] Discharges were estimated based on flows at site ELWW (see "Streamflow and Sediment Discharge" section of report).

Table 4c.--*Suspended-sediment data from samples collected at site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2)*
[°C, degrees Celsius; ft^3/s, cubic feet per second; mg/L, milligrams per liter; --, no data]

Date	Time	Temperature (°C)	Water discharge [1] (ft^3/s)	Concentration (mg/L)	Sediment discharge (tons per day)	Sand (percent)	Silt/clay (percent)
940413	15:40	--	614	1,760	2,920	98	2
940413	15:50	--	615	2,260	3,750	98	2
940414	11:40	5.0	588	1,900	3,020	93	7
940414	11:45	5.0	589	2,080	3,310	96	4
940415	14:15	6.5	569	2,180	3,350	95	5
940415	14:20	6.5	569	2,220	3,410	94	6
940416	13:05	--	600	4,310	6,980	95	5
940416	13:10	--	601	6,110	9,910	98	2
940418	11:45	6.0	865	1,810	4,230	97	3
940418	12:00	6.0	865	1,630	3,810	91	9
940420	09:25	--	924	1,810	4,520	88	12
940420	09:30	--	924	1,300	3,240	89	11
940421	14:00	--	904	2,250	5,490	98	2
940421	14:20	--	906	656	1,600	95	5
940422	10:50	--	872	2,200	5,180	98	2
940422	11:00	--	865	2,530	5,910	97	3

[1] Discharges were estimated based on flows at site ELWW (see "Streamflow and Sediment Discharge" section of report).

Table 4d.--*Suspended-sediment data from samples collected at site 12045200, Elwha River at Altaire Bridge (ELBR)*
[°C, degrees Celsius; ft^3/s, cubic feet per second; mg/L, milligrams per liter; --, no data]

Date	Time	Temperature (°C)	Water discharge (ft^3/s)	Concentration (mg/L)	Sediment discharge (tons per day)	Sand (percent)	Silt/clay (percent)
940407	16:30	7.5	1,170	4	13	11	89
940409	18:01	--	2,200	2	12	11	89
940410	08:08	6.0	2,110	1	5.7	17	83
940411	12:04	--	1,740	2	9.4	7	93
940412	14:58	7.5	2,140	2	12	7	93
940413	13:43	6.5	1,740	4	19	4	96
940414	08:30	6.5	1,710	8	37	8	92
940415	07:50	6.0	1,370	12	44	14	86
940416	13:46	8.0	1,110	12	36	24	76
940417	14:13	8.0	1,570	16	68	9	91
940418	08:22	7.0	1,810	16	78	2	98
940419	13:05	8.0	2,140	16	92	2	98
940420	14:04	8.0	1,870	20	101	1	99
940421	14:04	8.5	1,790	17	82	1	99
940422	08:35	7.0	1,780	17	82	0	100
940423	17:32	8.0	1,260	14	48	0	100
940424	13:48	8.0	1,240	15	50	0	100
940425	18:55	7.5	1,230	13	43	1	99
940427	17:30	--	1,050	11	31	2	98
940427	17:42	--	1,050	10	28	0	100
940429	12:11	--	1,040	8	23	0	100
940502	14:22	--	1,170	5	16	4	96
940504	15:21	--	1,160	4	13	22	78
940507	08:20	--	1,260	2	6.8	10	90

Table 4e.--*Suspended-sediment data from samples collected at site 12045500, Elwha River at McDonald Bridge (ELWP)*

[°C, degrees Celsius; ft^3/s, cubic feet per second; mg/L, milligrams per liter; --, no data]

Date	Time	Temperature (°C)	Water discharge (ft^3/s)	Concentration (mg/L)	Sediment discharge (tons per day)	Sand (percent)	Silt/clay (percent)
940407	19:00	--	1,230	3	10	9	91
940407	20:00	--	1,220	5	17	42	58
940409	17:05	6.5	2,200	6	36	12	88
940409	17:30	6.5	2,200	4	24	7	93
940410	08:55	6.5	2,110	5	29	15	85
940410	09:20	6.5	2,110	3	17	13	87
940411	11:05	7.0	1,750	4	19	18	82
940411	11:20	7.0	1,750	2	9.5	3	97
940412	13:50	7.5	2,160	7	41	21	79
940412	14:20	7.5	2,160	5	29	14	86
940413	12:35	6.5	1,750	5	24	8	92
940413	13:05	6.5	1,750	4	19	6	94
940414	09:35	6.5	1,650	8	36	8	92
940414	10:10	6.5	1,590	7	30	7	93
940415	11:00	7.0	1,160	9	28	4	96
090415	11:30	7.0	1,130	10	31	5	95
940416	14:55	7.5	1,110	11	33	24	76
940416	15:40	7.5	1,110	9	27	2	98
940417	15:15	8.0	1,530	13	54	3	97
940417	15:40	8.0	1,500	12	49	3	97
940418	09:05	7.0	1,810	14	68	4	96
940418	09:20	7.0	1,810	16	78	13	87
940419	11:35	8.0	2,150	16	93	2	98
940419	12:02	8.0	2,160	16	93	4	96
940420	12:40	8.5	1,900	19	98	2	98
940420	13:02	8.5	1,890	19	97	4	96
940421	13:00	8.0	1,810	17	83	1	99
940421	13:20	8.0	1,810	17	83	2	98
940422	09:30	7.0	1,760	18	86	2	98
490422	10:05	7.0	1,750	18	85	6	94
940512	09:05	9.0	2,320	10	63	14	86
940512	09:20	9.0	2,300	7	44	18	82
940601	12:45	9.5	1,250	3	10	43	57

Table 4f.--*Suspended-sediment data from samples collected at site 12046100, Elwha River below Elwha Dam (ELDM)*

[°C, degrees Celsius; ft^3/s, cubic feet per second; mg/L, milligrams per liter; --, no data]

Date	Time	Temperature (°C)	Water discharge [1] (ft^3/s)	Concentration (mg/L)	Sediment discharge (tons per day)	Sand (percent)	Silt/clay (percent)
940408	18:25	--	1,490	4	16	5	95
940409	13:00	7.0	2,260	6	37	9	91
940409	13:13	7.0	2,260	4	24	11	89
940410	14:12	7.0	2,240	2	12	29	71
940410	14:26	7.0	2,240	3	18	16	84
940411	08:47	7.0	1,980	3	16	17	83
940411	09:02	7.0	1,980	3	16	2	98
940412	10:35	7.5	2,210	3	18	5	95
940412	10:50	7.5	2,250	3	18	16	84
940413	08:43	7.5	1,940	3	16	14	86
940413	09:08	7.5	1,990	3	16	23	77
940414	15:19	7.5	1,640	3	13	14	86
940414	15:42	7.5	1,670	3	14	11	89
940415	14:23	7.5	1,210	3	9.8	15	85
940415	14:48	7.5	1,200	3	9.7	8	92
940416	10:51	7.5	1,190	3	9.6	10	90
940416	11:16	7.5	1,190	3	9.6	3	97
940417	11:30	7.5	1,560	4	17	10	90
940417	11:35	7.5	1,570	4	17	14	86
940418	14:00	7.5	1,920	7	36	12	88
940419	08:18	8.0	2,230	7	42	3	97
940419	08:48	8.0	2,240	9	54	7	93
940420	09:39	8.0	2,090	9	51	2	98
940420	10:03	8.0	2,080	8	45	2	98
940421	07:58	8.0	1,940	10	52	2	98
940422	12:54	8.5	1,860	12	60	5	95
940422	13:15	8.5	1,860	12	60	4	96

[1] Discharges were estimated based on flows at site ELWP (see "Streamflow and Sediment Discharge" section of report).

Table 4g.--*Suspended-sediment data from samples collected at site 12046300, Elwha River diversion below Elwha Dam (ELWS)*

[°C, degrees Celsius; mg/L, milligrams per liter; water discharge and sediment discharge were not determined]

Date	Time	Temperature (°C)	Concentration (mg/L)	Sand (percent)	Silt/clay (percent)
940408	15:05	7.0	13	10	90
940408	15:15	7.0	7	13	87
940409	15:10	7.0	6	24	76
940409	15:20	7.0	5	7	93
940410	10:08	7.0	6	13	87
940410	10:20	7.0	3	13	87
940411	10:18	7.0	3	7	93
940411	10:27	7.0	4	13	87
940412	12:25	7.5	4	46	54
940412	12:35	7.5	3	7	93
940413	10:40	7.5	2	0	100
940413	10:50	7.5	1	6	94
940414	11:13	8.0	4	29	71
940414	11:25	8.0	2	3	97
940415	12:33	8.0	4	15	85
940415	12:42	8.0	4	29	71
940416	12:41	8.5	3	13	87
940416	12:53	8.5	3	2	98
940417	13:21	7.5	4	7	93
940417	13:31	7.5	5	8	92
940418	10:15	8.0	6	10	90
940418	10:26	8.0	7	8	92
940419	10:15	8.0	8	8	92
940419	10:23	8.0	9	15	85
940420	11:25	8.0	10	5	95
940420	11:36	8.0	9	5	95
940421	09:31	8.0	11	4	96
940421	09:41	8.0	12	10	90
940422	14:41	8.5	12	11	89
940422	14:49	8.5	10	3	97

Table 5a.--*Suspended-sediment particle-size distribution from samples collected at site 12044900, Elwha River above Lake Mills (ELWW)*

[ft^3/s, cubic feet per second; mg/L, milligrams per liter; t/d, tons per day; --, not analyzed]

Date	Time	Water discharge (ft^3/s)	Concentration (mg/L)	Sediment discharge (t/d)	Percent finer than size shown, in millimeters						
					0.062	0.125	0.250	0.500	1.00	2.00	4.00
940407	19:30	1,040	3	8.4	84	91	93	100	--	--	--
940408	14:50	1,180	6	19	76	86	98	100	--	--	--
940411	16:30	1,020	3	8.3	90	100	--	--	--	--	--
940414	16:20	928	5	13	54	70	88	95	100	--	--
940418	14:35	1,450	9	35	78	86	97	100	--	--	--
940422	16:50	1,380	6	22	90	96	97	100	--	--	--
940511	13:05	2,050	100	554	16	17	19	27	59	97	100
940531	14:20	1,080	5	15	78	89	96	100	--	--	--

Table 5b.--*Suspended-sediment particle-size distribution from samples collected at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)*

[ft^3/s, cubic feet per second; mg/L, milligrams per liter; t/d, tons per day; --, not analyzed]

Date	Time	Water discharge [1] (ft^3/s)	Concentration (mg/L)	Sediment discharge (t/d)	Percent finer than size shown, in millimeters						
					0.062	0.125	0.250	0.500	1.00	2.00	4.00
940411	13:27	639	6	10	47	54	78	100	--	--	--
940412	09:30	660	11	20	31	40	74	100	--	--	--
940413	12:38	618	10	17	31	39	47	70	100	--	--
940415	11:35	577	174	271	8	11	17	33	59	79	100
940416	15:06	602	279	453	15	26	40	55	71	88	100
940417	15:25	717	443	858	6	8	14	31	65	94	100
940418	09:03	865	362	845	5	9	17	34	60	96	100
940419	14:41	1,020	98	270	23	29	39	64	96	100	--
940420	10:42	915	240	593	13	18	26	50	90	100	--
940421	17:41	913	159	392	9	12	21	46	85	100	--
940422	13:21	863	44	103	19	23	30	52	86	100	--
940423	15:10	773	24	50	25	32	39	58	82	100	--
940424	10:00	730	1	2.0	37	41	46	66	100	--	--
940425	09:11	662	8	14	52	57	68	90	100	--	--
940426	14:22	635	6	10	63	68	72	83	100	--	--
940427	13:20	642	6	10	46	47	56	82	100	--	--

[1] Discharges were estimated based on flows at site ELWW (see "Streamflow and Sediment Discharge" section of report).

Table 5c.--*Suspended-sediment particle-size distribution from samples collected at site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2)*
[ft^3/s, cubic feet per second; mg/L, milligrams per liter; t/d, tons per day; --, not analyzed]

Date	Time	Water discharge [1] (ft^3/s)	Concentration (mg/L)	Sediment discharge (t/d)	Percent finer than size shown, in millimeters						
					0.062	0.125	0.250	0.500	1.00	2.00	4.00
940413	15:50	615	2,260	3,750	2	3	15	58	92	99	100
940414	11:40	588	1,900	3,020	7	12	35	76	96	100	--
940415	14:20	569	2,220	3,410	6	13	43	84	99	100	--
940416	13:10	601	6,110	9,910	2	4	15	54	85	96	100
940418	12:00	865	1,630	3,810	9	13	35	76	93	97	100
940420	09:30	924	1,300	3,240	11	21	55	94	100	--	--
940421	14:20	906	656	1,600	5	7	18	61	92	100	--
940422	11:00	865	2,530	5,910	3	6	18	48	85	99	--

[1] Discharges were estimated based on flows at site ELWW (see "Streamflow and Sediment Discharge" section of report).

Table 5d.--*Suspended-sediment particle-size distribution from samples collected at site 12045500, Elwha River at McDonald Bridge (ELWP)*
[ft^3/s, cubic feet per second; mg/L, milligrams per liter; t/d, tons per day; --, not analyzed]

Date	Time	Water discharge (ft^3/s)	Concentration (mg/L)	Sediment discharge (t/d)	Percent finer than size shown, in millimeters						
					0.062	0.125	0.250	0.500	1.00	2.00	4.00
940407	19:00	1,230	3	10	91	95	100	--	--	--	--
940418	09:20	1,810	16	78	87	89	93	97	100	--	--
940419	12:02	2,160	16	93	95	97	99	100	--	--	--
940420	13:02	1,890	19	97	96	97	98	99	100	--	--

Table 5e.--*Suspended-sediment particle-size distribution from samples collected at site 12046100, Elwha River below Elwha Dam (ELDM)*
[ft^3/s, cubic feet per second; mg/L, milligrams per liter; t/d, tons per day; --, not analyzed]

Date	Time	Water discharge (ft^3/s)	Concentration (mg/L)	Sediment discharge (t/d)	Percent finer than size shown, in millimeters						
					0.062	0.125	0.250	0.500	1.00	2.00	4.00
940418	14:00	1,920	7	36	88	91	91	96	100	--	--
940421	07:58	1,940	10	52	98	100	--	--	--	--	--

Table 5a. Bedload discharge and particle-size distribution from samples collected at site 12044900, Elwha River above Lake Mills (ELWW)

[Bag mesh size 0.5 millimeters; ft3/s, cubic feet per second; t/d, tons per day; --, no data or not analyzed]

Measurement number	Date	Time	Water discharge (ft3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters													
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0
ELWW01A	940408	12:20	1,190	44	3	15	27	38	54	64	74	82	89	95	99	100	--	--	--
ELWW01B	940408	13:00	1,180	51	2	9	17	26	42	55	70	81	90	95	98	100	--	--	--
ELWW01C	940408	13:20	1,190	64	2	14	25	37	54	65	75	84	90	94	98	99	100	--	--
ELWW01D	940408	13:40	1,190	45	2	11	22	32	49	62	74	83	91	96	99	100	--	--	--
Mean	940408		1,190	51	2	12	22	33	50	62	73	82	90	95	99	100	--	--	--
ELWW02A	940409	11:45	1,200	84	2	10	19	28	43	55	67	76	85	94	99	100	--	--	--
ELWW02B	940409	12:10	1,200	60	1	8	16	26	45	57	68	78	85	93	99	100	--	--	--
ELWW02C	940409	12:30	1,200	37	1	11	21	31	47	60	73	85	93	98	99	100	--	--	--
ELWW02D	940409	13:00	1,190	75	1	5	11	21	43	61	76	85	92	96	98	100	--	--	--
Mean	940409		1,200	64	1	9	17	26	45	58	71	81	89	95	99	100	--	--	--
ELWW03A	940411	14:45	1,040	19	1	5	13	24	48	66	82	92	99	99	100	--	--	--	--
ELWW03B	940411	15:10	1,040	13	1	10	19	28	41	51	60	70	80	89	94	100	--	--	--
ELWW03C	940411	15:35	1,040	20	1	5	12	24	50	69	82	90	96	99	100	--	--	--	--
ELWW03D	940411	16:00	1,040	25	4	20	37	53	72	81	89	93	98	100	--	--	--	--	--
Mean	940411		1,040	19	2	10	20	32	53	66	78	86	93	97	99	100	--	--	--
ELWW04A	940412	14:50	1,070	39	1	9	20	33	52	64	76	85	93	98	100	--	--	--	--
ELWW04B	940412	15:17	1,070	46	3	14	29	46	64	74	81	87	92	95	97	98	100	--	--
ELWW04C	940412	15:29	1,080	41	2	12	25	39	55	64	73	80	86	90	95	98	100	--	--
ELWW04D	940412	15:53	1,080	39	1	6	12	21	41	59	74	85	93	97	100	--	--	--	--
Mean	940412		1,080	41	2	10	22	35	53	65	76	84	91	95	98	99	100	--	--
ELWW05A	940414	15:10	937	13	1	6	13	21	42	59	75	84	92	94	98	100	--	--	--
ELWW05B	940414	15:26	937	16	1	10	22	36	56	68	80	87	93	98	100	--	--	--	--
ELWW05C	940414	15:43	929	19	1	8	18	30	52	69	85	94	98	98	100	--	--	--	--
ELWW05D	940414	15:58	929	20	1	7	15	22	37	49	62	73	82	90	96	100	--	--	--
Mean	940414		933	17	1	8	17	27	47	61	75	84	91	95	99	100	--	--	--

Table 6a.--Bedload discharge and particle-size distribution from samples collected at site 12044900, Elwha River above Lake Mills (ELWW)--Continued

Measurement number	Date	Time	Water discharge (ft3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters														
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0
ELWW06A	940416	9:25	911	19	1	12	20	28	41	54	69	79	89	93	96	100	--	--	--
ELWW06B	940416	9:40	911	16	2	14	30	45	60	67	73	79	84	90	93	100	--	--	--
ELWW06C	940416	10:10	918	15	2	11	20	28	41	51	62	73	82	91	99	100	--	--	--
ELWW06D	940416	10:40	918	10	3	17	34	49	65	74	82	87	92	95	95	100	--	--	--
Mean	940416		914	15	2	14	26	38	52	61	71	79	87	92	96	100	--	--	--
ELWW07A	940417	08:45	1,090	20	3	16	30	41	54	63	73	82	92	98	100	--	--	--	--
ELWW07B	940417	08:55	1,090	24	3	15	26	36	48	59	72	82	91	98	100	--	--	--	--
ELWW07C	940417	09:10	1,090	26	3	15	28	44	66	76	83	88	93	98	100	--	--	--	--
ELWW07D	940417	09:25	1,090	28	3	15	25	36	51	61	70	78	86	91	97	100	--	--	--
Mean	940417		1,090	25	3	15	27	39	55	65	75	82	90	96	99	100	--	--	--
ELWW08A	940418	15:30	1,450	72	2	13	24	34	48	58	70	79	89	94	98	98	100	--	--
ELWW08B	940418	15:44	1,450	68	5	19	31	40	52	61	72	80	88	92	96	98	100	--	--
ELWW08C	940418	15:56	1,460	69	7	28	44	57	69	76	81	86	90	95	97	98	100	--	--
ELWW08D	940418	16:10	1,460	61	2	10	19	29	46	58	72	83	91	96	98	100	--	--	--
Mean	940418		1,460	67	4	17	30	40	54	63	74	82	90	95	97	98	100	--	--
ELWW09A	940419	11:25	1,810	134	3	11	18	26	41	54	66	75	84	91	97	99	100	--	--
ELWW09B	940419	11:41	1,820	183	5	15	25	35	51	62	71	79	86	93	97	100	--	--	--
ELWW09C	940419	11:54	1,810	254	2	8	16	26	43	55	67	75	83	91	97	99	100	--	--
ELWW09D	940419	12:03	1,810	228	3	10	19	30	49	62	72	80	87	93	98	98	100	--	--
Mean	940419		1,810	200	3	11	19	29	46	58	69	77	85	92	97	99	100	--	--
ELWW10A	940420	14:50	1,490	63	3	16	29	43	61	72	82	89	93	96	98	100	--	--	--
ELWW10B	940420	15:03	1,490	78	5	19	35	50	69	79	86	92	96	98	99	100	--	--	--
ELWW10C	940420	15:12	1,490	84	2	10	20	33	50	60	68	75	82	87	94	94	96	100	--
ELWW10D	940420	15:23	1,480	94	2	10	19	28	42	50	57	64	70	74	76	81	83	83	100
Mean	940420		1,490	80	3	14	26	39	55	65	73	80	85	89	92	94	95	96	100

Table 62.--Bedload discharge and particle size distribution from samples collected at site 12044900, Elwha River above Lake Mills (ELWW)--Continued

Measurement number	Date	Time	Water discharge (ft3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters													
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0
ELWW11A	940421	09:25	1,500	178	3	14	27	42	59	69	76	81	84	87	91	94	95	100	--
ELWW11B	940421	10:00	1,500	51	1	6	14	27	51	67	79	85	89	94	96	100	--	--	--
ELWW11C	940421	10:00	1,500	56	1	10	21	34	50	62	76	83	90	95	97	100	--	--	--
ELWW11D	940421	10:15	1,500	97	2	9	18	31	54	71	85	92	96	98	100	--	--	--	--
Mean	940421		1,500	96	2	10	20	33	53	67	79	85	90	93	96	98	99	100	--
ELWW12A	940422	16:10	1,390	540	1	3	8	18	39	55	70	78	84	89	93	96	99	100	--
ELWW12B	940422	16:20	1,390	303	2	7	14	22	35	45	55	64	72	81	92	99	100	--	--
Mean	940422		1,390	422	1	5	11	20	37	50	63	71	78	85	93	97	100	100	--
ELWW13A	940425	17:15	1,150	56	6	17	29	40	53	61	68	74	78	82	87	93	100	--	--
ELWW13B	940425	17:35	1,150	68	6	26	45	60	76	83	89	93	97	99	100	--	--	--	--
Mean	940425		1,150	62	6	22	37	50	64	72	74	83	87	90	93	96	100	--	--
ELWW14A	940426	09:56	1,110	36	13	33	46	54	65	72	80	88	95	99	100	100	--	--	--
ELWW14B	940426	10:20	1,110	32	7	22	34	45	60	71	81	89	95	99	100	--	--	--	--
ELWW14C	940426	10:45	1,100	52	6	26	45	61	78	86	92	96	98	99	100	--	--	--	--
ELWW14D	940426	11:06	1,100	71	6	21	35	49	66	76	86	92	96	99	99	100	--	--	--
Mean	940426		1,100	48	8	26	40	52	67	76	85	91	96	99	100	100	--	--	--
ELWW15A	940427	10:55	1,090	52	4	15	26	37	51	61	71	80	89	94	96	98	100	--	--
ELWW15B	940427	11:10	1,080	76	8	25	43	57	71	78	84	90	95	98	99	100	--	--	--
ELWW15C	940427	11:30	1,080	62	6	20	33	45	61	71	81	88	94	99	100	--	--	--	--
ELWW15D	940427	11:45	1,070	60	6	21	35	47	64	74	83	90	96	98	99	100	--	--	--
Mean	940427		1,080	63	6	20	34	47	62	71	80	87	94	97	98	100	100	--	--
ELWW16A	940511	14:10	2,030	234	9	22	35	47	61	70	77	83	89	93	97	99	99	100	--
ELWW16B	940511	14:40	2,030	506	9	20	30	40	52	60	70	78	86	92	94	95	96	99	100
ELWW16C	940511	15:00	2,020	467	7	16	25	33	45	53	64	72	80	84	87	92	97	98	100
ELWW16D	940511	15:20	2,030	535	15	28	39	48	62	71	81	88	94	97	99	100	--	--	--
Mean	940511		2,020	436	10	22	32	42	55	64	73	80	87	92	94	98	98	99	100

Table 6a.--Bedload discharge and particle-size distribution from samples collected at site 12044900, Elwha River above Lake Mills (ELWW)--Continued

Measurement number	Date	Time	Water discharge (ft3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters													
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0
ELWW17A	940531	15:15	1,100	62	5	11	19	28	39	46	55	67	81	92	97	100	--	--	--
ELWW17B	940531	15:30	1,090	21	15	31	42	51	62	68	74	78	83	89	97	100	--	--	--
ELWW17C	940531	15:45	1,090	43	3	10	18	28	41	49	60	71	85	94	98	100	--	--	--
ELWW17D	940531	16:05	1,090	94	4	9	13	20	36	47	63	74	85	93	97	99	99	100	--
Mean	940531		1,090	55	7	15	23	32	45	53	62	72	84	92	97	100	100	100	--
ELWW18A	940621	14:30	1,160	121	2	5	10	17	29	39	50	59	70	77	83	89	91	100	--
ELWW18B	940621	14:45	1,170	77	3	9	18	30	49	63	77	88	94	97	100	100	--	--	--
ELWW18C	940621	15:00	1,170	96	10	22	36	50	67	75	82	89	95	98	99	100	--	--	--
ELWW18D	940621	15:15	1,160	181	2	8	17	26	39	50	69	81	91	96	99	100	--	--	--
Mean	940621		1,160	119	4	11	20	31	46	57	70	79	87	92	95	97	98	100	--
ELWW18E	940621	15:29	1,160	4.6	6	21	41	60	78	86	93	97	99	100	--	--	--	--	--
ELWW18F	940621	15:32	1,160	1.6	4	18	37	55	72	80	88	94	99	100	--	--	--	--	--
ELWW18G	940621	15:38	1,160	1.5	4	23	54	76	88	93	96	98	100	--	--	--	--	--	--
ELWW18H	940621	15:42	1,160	4.2	5	24	51	72	85	91	95	97	100	--	--	--	--	--	--
ELWW18I	940621	15:47	1,160	3.2	4	25	58	80	92	96	98	99	100	--	--	--	--	--	--
ELWW18J	940621	15:51	1,160	3.5	4	27	61	84	95	98	99	100	100	--	--	--	--	--	--
Mean	940621		1,160	3.1	5	23	50	71	85	91	95	97	100	100	--	--	--	--	--
ELWW19A	940726	--	--	29	0	1	3	7	16	25	38	52	67	83	96	100	--	--	--
ELWW19B	940726	--	--	60	0	2	4	8	17	25	34	44	56	68	78	94	100	--	--
ELWW19C	940726	--	--	14	0	2	5	10	27	42	60	73	83	87	90	100	--	--	--
ELWW19D	940726	--	--	2.2	5	17	30	46	73	87	94	98	100	--	--	--	--	--	--
Mean	940726	[1]15:30	628	26	1	6	10	18	33	45	57	67	77	84	91	98	100	--	--

[1] Estimated time at which measurement was made.

Table 6b --Bedload discharge and particle-size distribution from samples collected at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)

[Bag mesh size 0.5 millimeters; ft^3/s, cubic feet per second; t/d, tons per day; --, no data or not analyzed]

Measurement number	Date	Time	Water discharge [1] (ft^3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters														
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0	90.5
ELD101A	940409	--	--	38	9	23	41	56	73	90	95	99	100	--	--	--	--	--	--	--
ELD101B	940409	--	--	42	2	9	20	34	59	90	96	99	100	--	--	--	--	--	--	--
ELD101C	940409	--	--	49	4	10	20	30	48	79	89	96	99	100	--	--	--	--	--	--
ELD101D	940409	--	--	35	2	7	18	33	58	87	95	99	100	--	--	--	--	--	--	--
ELD101E	940409	--	--	41	1	2	8	25	65	97	99	100	--	--	--	--	--	--	--	--
Mean	940409	[2]10:30	748	41	4	10	21	35	60	89	95	98	100	100	--	--	--	--	--	--
ELD102A	940411	10:55	640	321	1	7	13	19	28	41	52	65	76	88	95	100	--	--	--	--
ELD102B	940411	11:15	643	--	2	9	17	24	37	53	61	68	75	83	87	100	--	--	--	--
ELD102C	940411	11:45	643	380	1	5	10	15	23	35	47	59	69	79	87	100	--	--	--	--
ELD102D	940411	12:05	639	329	1	5	10	15	23	33	42	55	66	83	91	99	100	--	--	--
Mean	940411		641	343	1	6	12	18	27	41	50	62	72	83	90	100	100	--	--	--
ELD103A	940412	10:00	660	260	1	6	13	21	32	39	47	54	62	70	77	82	87	95	100	--
ELD103B	940412	10:21	658	163	1	7	13	21	31	39	46	54	60	66	76	84	90	98	100	--
ELD103C	940412	10:38	656	256	1	6	13	21	34	41	50	57	63	69	75	79	88	93	100	--
ELD103D	940412	10:58	652	319	1	8	17	26	41	49	58	66	72	78	85	87	95	99	100	--
Mean	940412		656	250	1	7	14	22	35	42	51	58	64	71	78	83	90	96	100	--
ELD104A	940413	09:56	622	59	1	5	10	16	23	32	36	39	43	49	54	61	67	100	--	--
ELD104B	940413	10:18	622	193	1	2	5	8	13	21	26	30	35	40	46	53	58	84	100	--
ELD104D	940413	10:42	626	299	1	3	7	13	22	38	46	55	63	71	78	88	96	100	--	--
ELD104C	940413	11:03	619	99	0	3	6	10	18	30	35	42	47	53	59	66	74	79	100	--
Mean	940413		622	162	1	3	7	12	19	30	36	42	47	53	59	67	74	91	100	--
ELD105A	940415	12:15	577	660	1	3	6	8	10	13	15	17	20	24	31	38	51	62	75	100
ELD105B	940415	12:30	573	762	2	7	11	15	21	26	30	33	37	41	45	52	56	66	80	100
ELD105C	940415	12:47	577	768	1	3	5	6	9	11	13	16	20	25	31	42	57	74	93	100
ELD105D	940415	12:58	577	960	1	3	5	8	12	16	21	27	36	44	57	70	79	88	97	100
Mean	940415		576	788	1	4	7	9	13	16	20	23	28	33	41	51	61	73	86	100

Table 6b.--Bedload discharge and particle-size distribution from samples collected at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)--Continued

Measurement number	Date	Time	Water discharge [1] (ft^3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters															
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0	90.5
ELD106A	940416	15:25	599	265	1	2	5	8	12	19	23	26	31	35	41	58	79	100	--	--
ELD106B	940416	15:35	601	407	0	1	2	4	7	14	20	27	35	41	49	60	66	68	100	--
ELD106C	940416	15:50	606	166	1	3	7	11	18	30	36	44	49	59	73	84	89	100	--	--
ELD106D	940416	16:04	605	322	0	2	4	6	11	18	25	32	37	44	50	67	75	93	100	--
Mean	940416		603	290	0	2	4	7	12	20	26	32	38	45	53	67	77	90	100	--
ELD107A	940417	14:35	714	2,110	1	5	9	14	24	33	41	49	56	62	70	75	77	82	93	100
ELD107B	940417	14:50	717	2,060	2	7	12	18	28	36	45	57	67	77	83	89	91	94	100	--
Mean	940417		716	2,080	1	6	10	16	26	35	43	53	61	69	76	82	84	88	97	100
ELD108A	940418	09:30	860	2,950	1	3	5	8	13	23	32	41	49	57	62	82	88	95	100	--
ELD108B	940418	09:45	860	1,500	1	4	7	11	16	23	31	40	49	58	67	80	86	92	100	--
ELD108C	940418	10:00	860	2,130	1	4	7	12	20	32	44	55	64	73	79	86	90	96	100	--
ELD108D	940418	10:15	860	2,780	1	2	4	6	10	21	33	50	65	79	89	95	99	100	--	--
Mean	940418		860	2,340	1	3	6	9	15	25	35	47	57	67	74	86	91	96	100	--
ELD109A	940419	14:55	1,030	648	0	1	6	11	18	23	28	33	39	46	56	68	81	83	89	100
ELD109B	940419	15:10	1,020	1,010	1	5	10	16	26	34	44	52	59	66	71	75	88	92	100	--
ELD109C	940419	15:25	1,020	2,460	1	2	5	8	14	19	27	36	46	54	62	69	79	84	91	100
ELD109D	940419	15:40	1,020	1,790	1	4	9	17	30	41	53	62	67	71	75	79	82	85	89	100
Mean	940419		1,020	1,480	1	3	8	13	22	29	38	46	53	59	66	70	82	86	92	100
ELD110A	940420	09:30	924	710	2	5	9	12	16	18	20	22	24	28	33	40	58	66	82	100
ELD110B	940420	09:45	924	995	1	2	3	4	6	6	7	7	10	15	27	44	60	70	85	100
Mean	940420		924	852	1	4	6	8	11	12	13	15	17	22	30	42	59	68	83	100
ELD111A	940420	12:25	907	1,500	5	15	25	36	53	64	76	77	77	78	78	79	80	85	96	100
ELD111B	940420	12:50	904	1,790	13	22	31	39	50	57	66	66	67	67	67	68	68	73	76	100
Mean	940420		906	1,640	9	18	28	38	51	61	71	71	72	72	73	73	74	79	86	100

Table 38.--Bedload discharge and particle-size distribution from samples collected at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)--Continued

Measurement number	Date	Time	Water discharge [1] (ft^3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters															
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0	90.5
ELD112A	940422	12:28	865	1,240	1	3	5	7	11	15	19	27	36	47	58	68	80	89	96	100
ELD112B	940422	12:40	862	655	1	3	6	9	15	20	26	33	41	49	56	66	76	84	92	100
ELD112C	940422	12:51	863	655	1	4	7	11	18	24	31	38	45	52	60	66	71	77	79	100
ELD112D	940422	13:05	868	598	1	4	7	10	18	23	31	38	45	53	60	66	71	77	79	100
Mean	940422		864	787	1	3	6	9	16	21	27	34	42	50	58	67	75	82	87	100
ELD113A	940423	14:11	775	207	1	4	8	13	21	26	32	38	46	56	66	77	88	94	100	--
ELD113B	940423	14:23	773	73	1	2	4	6	10	12	16	21	30	41	53	64	80	91	100	--
ELD113C	940423	14:35	771	394	1	8	15	21	30	35	41	45	50	53	57	59	67	100	--	--
ELD113D	940423	14:47	770	348	1	3	6	9	13	17	24	31	40	49	59	69	78	87	87	100
Mean	940423		772	255	1	4	8	12	18	22	28	34	42	50	59	67	78	93	97	100
ELD114A	940424	10:52	723	54	1	7	15	23	36	47	57	65	73	78	81	85	86	91	100	--
ELD114B	940424	11:11	720	69	0	3	7	13	23	32	43	52	60	67	73	80	87	90	90	100
ELD114C	940424	11:31	717	96	0	3	6	8	13	17	21	26	31	36	44	54	64	69	77	100
ELD114D	940424	11:49	721	84	1	5	11	18	30	39	50	58	66	74	78	83	87	90	100	--
Mean	940424		720	76	1	5	10	16	26	34	42	50	57	64	69	75	81	85	92	100
ELD115A	940425	09:50	655	63	3	6	11	17	29	40	52	61	69	76	82	87	88	100	--	--
ELD115B	940425	10:08	654	56	1	4	8	13	19	24	30	34	38	42	47	52	60	73	91	100
ELD115C	940425	10:36	653	187	1	6	12	18	27	34	40	45	48	51	54	58	65	72	100	--
ELD115D	940425	10:54	651	41	1	6	13	22	36	48	59	69	77	82	87	92	96	100	--	--
Mean	940425		653	87	1	6	11	17	28	37	45	52	58	63	68	72	77	86	98	100

Table 6b.--Bedload discharge and particle-size distribution from samples collected at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)--Continued

Measurement number	Date	Time	Water discharge [1] (ft^3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters															
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0	90.5
ELD116A	940426	14:37	635	29	0	5	12	21	33	42	49	55	61	67	71	77	87	100	--	--
ELD116B	940426	14:52	633	147	0	2	4	6	12	18	24	30	36	42	48	55	63	69	79	100
ELD116C	940426	15:12	631	86	0	2	5	10	18	25	32	38	44	48	53	57	63	71	71	100
ELD116D	940426	15:28	631	87	0	3	6	11	19	26	34	39	44	46	50	53	53	66	73	100
Mean	940426		632	87	0	3	7	12	21	28	35	41	46	51	55	61	61	76	81	100
ELD117A	940427	13:30	639	144	0	3	7	13	24	32	40	47	54	60	66	72	80	86	100	--
ELD117B	940427	13:43	643	147	0	2	5	8	15	21	28	35	42	47	54	61	68	75	84	100
ELD117C	940427	13:55	643	197	1	3	6	10	16	21	27	32	38	43	48	54	60	69	82	100
ELD117D	940427	14:07	643	86	1	3	6	10	16	20	24	29	33	37	41	46	50	53	60	100
Mean	940427		642	144	0	3	6	10	18	23	30	36	42	47	52	58	64	71	81	100

[1] Discharges were estimated based on flows at site ELWW (see "Streamflow and Sediment Discharge" section of report).

[2] Estimated time at which measurement was made.

Table 6c.--Bedload discharge and particle-size distribution from samples collected at site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2)

[Bag mesh size 0.5 millimeters; ft^3/s, cubic feet per second; t/d, tons per day; --, no data or not analyzed]

Measurement number	Date	Time	Water discharge [1] (ft^3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters															
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0	90.5
ELD201A	940413	17:40	618	17,300	6	11	14	17	22	25	28	30	33	35	36	37	39	69	100	--
ELD201B	940413	18:05	614	18,500	12	20	28	36	46	53	61	67	74	79	84	90	94	100	--	--
Mean	940413		616	17,900	9	15	21	27	34	39	44	49	53	57	60	63	67	84	100	--
ELD202A	940414	--	--	4,590	17	33	42	48	55	59	63	67	73	78	85	88	95	97	100	--
ELD202B	940414	--	--	6,390	20	35	43	49	55	59	62	66	69	74	79	84	95	98	100	--
ELD202C	940414	--	--	6,420	12	25	34	41	50	56	62	67	73	78	81	88	92	96	98	100
ELD202D	940414	--	--	2,880	25	40	50	57	67	70	73	75	79	82	88	92	99	100	--	--
Mean	940414	[2]13:00	589	5,070	19	33	42	49	57	61	65	69	73	78	83	88	95	98	99	100
ELD203A	940415	--	--	3,830	16	35	47	56	65	70	75	79	84	87	91	95	100	100	--	--
ELD203B	940415	--	--	3,700	16	33	44	53	62	68	74	78	83	87	91	94	96	98	100	--
ELD203C	940415	--	--	5,090	16	31	41	50	59	65	71	76	81	85	89	92	96	98	98	100
Mean	940415	[2]16:00	573	4,210	16	33	44	53	62	68	73	78	83	87	90	93	97	99	99	100
ELD204A	940416	13:50	601	10,300	6	8	9	9	10	11	11	15	19	22	26	29	31	76	100	--
ELD204B	940416	14:25	598	7,660	22	31	37	41	47	51	56	59	62	66	68	71	72	87	100	--
Mean	940416		600	9,000	14	19	23	25	29	31	33	37	40	44	47	50	51	81	100	--
ELD205A	940418	11:55	865	11,300	23	44	57	65	72	76	79	83	87	90	92	97	98	99	99	100
ELD205B	940418	12:20	860	8,220	12	25	34	40	47	51	56	60	64	67	71	77	94	98	99	100
Mean	940418		862	9,760	17	35	45	52	59	63	68	71	75	79	81	87	96	99	99	100
ELD206A	940420	10:40	914	8,370	6	14	21	27	34	39	43	50	56	63	70	80	91	93	97	100
ELD206B	940420	10:55	909	8,120	13	29	41	52	65	74	82	83	83	83	84	84	84	86	89	100
ELD206C	940420	11:10	904	5,350	13	27	39	48	58	63	68	72	78	83	92	98	98	98	100	--
ELD206D	940420	11:20	904	5,660	10	22	31	39	47	51	54	60	67	75	86	92	92	100	--	--
Mean	940420		909	6,880	11	23	33	42	51	57	62	66	71	76	83	89	91	94	97	100

Table 6c.--Bedload discharge and particle-size distribution from samples collected at site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2)--Continued

Measurement number	Date	Time	Water discharge [1] (ft^3/s)	Bedload discharge (t/d)	Percent finer than size shown, in millimeters															
					0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.2	64.0	90.5
ELD207A	940421	--	--	4,630	5	16	26	38	44	51	58	64	71	80	85	91	91	98	100	--
ELD207B	940421	--	--	4,950	7	18	26	33	42	49	56	62	68	73	78	79	85	92	97	100
ELD207C	940421	--	--	4,680	6	17	26	35	46	54	62	68	75	83	90	94	94	98	100	--
ELD207D	940421	--	--	5;680	6	18	29	39	49	56	61	66	71	76	80	87	93	97	100	--
Mean	940421	[2]15:00	909	4,980	6	17	27	36	45	52	59	65	71	78	83	88	88	96	99	100
ELD208A	940422	09:35	878	2,600	11	23	31	37	43	47	51	58	67	73	79	87	97	100	--	--
ELD208B	940422	09:55	875	4,110	9	18	26	31	39	44	49	55	63	73	79	81	90	93	96	100
ELD208C	940422	10:20	875	2,180	12	24	32	38	45	49	54	61	68	76	81	93	98	100	--	--
ELD208D	940422	10:45	875	2,570	12	23	30	35	41	45	48	54	60	64	69	79	91	97	100	--
Mean	940422		876	2,860	11	22	30	35	42	46	53	57	65	71	77	85	94	97	99	100

[1] Discharges were estimated based on flows at site ELWW (see "Streamflow and Sediment Discharge" section of report).

[2] Estimated time at which measurement was made.

Table 7a.--*Water-quality constituent concentrations in streamflow samples collected at site 12044900, Elwha River above Lake Mills (ELWW)*

[µS/cm, microsiemens per centimeter; NTU, nephelometric turbidity units; mg/L, milligrams per liter; K, non-ideal colony count; ml, milliliter; <, less than; acre-ft, acre foot; NO_2+NO_3, nitrite plus nitrate; µg/L, micrograms per liter; pCi/L, picocuries per liter; --, not measured or not analyzed]

Constituent measured	Date and time streamflow samples collected 940407 14:00	940415 11:00	940421 17:30	Unit of measurement
Field Measurements:				
Specific conductance	96	96	83	µS/cm
pH	7.4	7.6	7.7	
Water temperature	6.0	5.5	7.0	degrees Celsius
Turbidity	0.4	0.3	0.5	NTU
Oxygen, dissolved	12.4	12.3	12.3	mg/L
Oxygen, percent satuation	101	99	--	
Bicarbonate	43	44	37	mg/L as HCO_3
Carbonate	0	0	0	mg/L as CO_3
Alkalinity	36	36	30	mg/L as $CaCO_3$
Bacterial Counts:				
Total coliform	K8	--	24	colonies/100 ml
Fecal coliform	<1	--	<1	colonies/100 ml
Major ions, dissolved solids, and hardness:				
Calcium	14	15	12	mg/L as Ca
Magnesium	1.1	1.1	0.8	mg/L as Mg
Sodium	1.9	2.0	1.6	mg/L as Na
Potassium	0.1	<0.1	0.1	mg/L as K
Sulfate	8.9	9.2	7.5	mg/L as SO_4
Chloride	0.7	0.7	0.6	mg/L as Cl
Fluoride	<0.1	<0.1	<0.1	mg/L as F
Dissolved solids (calculated)	48	--	41	mg/L
Dissolved solids (calculated)	0.07	--	0.06	tons/acre-ft
Hardness (calculated)	39	42	33	mg/L as $CaCO_3$
Non-carbonate hardness (calculated)	4	6	3	mg/L as $CaCO_3$
Nutrients and organic carbon:				
Nitrogen (NO_2+NO_3)	0.01	0.01	0.008	mg/L as N
Phosphorous (ortho)	<0.01	<0.01	<0.01	mg/L as P
Dissolved organic carbon	0.7	0.6	0.5	mg/L as C

Table 7a.--*Water-quality constituent concentrations in streamflow samples collected at site 12044900, Elwha River above Lake Mills (ELWW)--Continued*

Constituent measured	Date and time streamflow samples collected 940407 14:00	940415 11:00	940421 17:30	Unit of measurement
Trace Elements (unfiltered water):				
Arsenic	<1	<1	<1	µg/L as As
Barium	<100	<100	<100	µg/L as Ba
Cadmium	<1	<1	<1	µg/L as Cd
Chromium	<1	<1	<1	µg/L as Cr
Copper	<1	<1	<1	µg/L as Cu
Iron	140	90	330	µg/L as Fe
Lead	<1	<1	<1	µg/L as Pb
Manganese	<10	<10	<10	µg/L as Mn
Mercury	0.2	<0.1	<0.1	µg/L as Hg
Silver	<1	<1	<1	µg/L as Ag
Selenium	<1	<1	<1	µg/L as Se
Zinc	<10	<10	<10	µg/L as Zn
Radionuclides:				
Alpha radioactivity	<0.6	<0.6	<0.6	pCi/L as Th-230
Gross alpha	<0.6	<0.6	<0.6	µg/L as U-nat
Gross beta	<0.6	<0.6	<0.6	pCi/L as Cs-137
Gross beta	<0.6	<0.6	<0.6	pCi/L as Sr-90/Y-90
Radium (radon method)	0.02	0.02	<0.02	pCi/L as Ra-226
Volatile Organic Compounds (unfiltered water):				
1,3-Dichlorobenzene	--	--	<0.2	µg/L
1,4-Dichlorobenzene	--	--	<0.2	µg/L
1,1-Dichloroethane	--	--	<0.2	µg/L
1,2-Dichloroethane	--	--	<0.2	µg/L
cis-1,2-Dichloroethene	--	--	<0.2	µg/L
trans-1,2-Dichloroethene	--	--	<0.2	µg/L
1,1-Dichloroethylene	--	--	<0.2	µg/L
1,2-Dichloropropane	--	--	<0.2	µg/L
1,2-Transdichloroethene	--	--	<0.2	µg/L
1,1,1-Trichloroethane	--	--	<0.2	µg/L
Benzene	--	--	<0.2	µg/L
Bromoform	--	--	<0.2	µg/L
Carbon tetrachloride	--	--	<0.2	µg/L
Chlorobenzene	--	--	<0.2	µg/L
Chlorodibromomethane	--	--	<0.2	µg/L
Chloroform	--	--	<0.2	µg/L
Dichlorobromomethane	--	--	<0.2	µg/L
Dichlorodifluoromethane	--	--	<0.2	µg/L
Ethylbenzene	--	--	<0.2	µg/L

Table 7a.--*Water-quality constituent concentrations in streamflow samples collected at site 12044900, Elwha River above Lake Mills (ELWW)--Continued*

Constituent measured	Date and time streamflow samples collected 940407 14:00	940415 11:00	940421 17:30	Unit of measurement
Flurocarbon-113	--	--	<0.2	µg/L
Dichloromethane	--	--	<0.2	µg/L
Methyl *tert*-butyl ether (MTBE)	--	--	<0.2	µg/L
o-Chlorobenzene	--	--	<0.2	µg/L
o-Dichlorobenzene	--	--	<0.2	µg/L
Styrene	--	--	<0.2	µg/L
Tetrachloroethylene	--	--	<0.2	µg/L
Toluene	--	--	<0.2	µg/L
Trichloroethylene	--	--	<0.2	µg/L
Trichlorofluoromethane	--	--	<0.2	µg/L
Vinyl chloride	--	--	<0.2	µg/L
Xylene	--	--	<0.2	µg/L
Organochlorine Compounds (pesticides, PCBs, and PCNs) (unfiltered water):				
Aldrin	--	--	<0.01	µg/L
Chlordane	--	--	<0.1	µg/L
p,p'-DDD	--	--	<0.01	µg/L
p,p'-DDE	--	--	<0.01	µg/L
p,p'-DDT	--	--	<0.01	µg/L
Dieldrin	--	--	<0.01	µg/L
Endosulfan I	--	--	<0.01	µg/L
Endrin	--	--	<0.01	µg/L
Heptachlor	--	--	<0.01	µg/L
Heptachlor epoxide	--	--	<0.01	µg/L
Lindane	--	--	<0.01	µg/L
Methoxychlor	--	--	<0.01	µg/L
Perthane	--	--	<0.1	µg/L
Toxaphene	--	--	<1	µg/L
PCB, gross	--	--	<0.1	µg/L
PCN, gross	--	--	<0.1	µg/L
Herbicides:				
2,4,D	--	--	<0.01	µg/L
2,4-DP	--	--	<0.01	µg/L
2,4,5-T	--	--	<0.01	µg/L
Mirex	--	--	<0.01	µg/L
Silvex	--	--	<0.01	µg/L

Table 7b.--*Water-quality constituent concentrations in streamflow samples collected at site 12044920, Elwha River Delta Site 2 at Lake Mills (ELD2)*

[µS/cm, microsiemens per centimeter; NTU, nephelometric turbidity units; mg/L, milligrams per liter; K, non-ideal colony count; ml, milliliter; <, less than; acre-ft, acre foot; NO_2+NO_3, nitrite plus nitrate; µg/L, micrograms per liter; pCi/L, picocuries per liter; --, not measured or not analyzed]

	Date and time streamflow samples collected				
Constituent measured	940415 14:00	940417 15:45	940421 11:00	940421 [1]11:01	Unit of measurement
Field Measurements:					
Specific conductance	--	91	85	84	µS/cm
pH	7.3	7.5	7.8	7.7	
Water temperature	6.5	8.0	--	7.0	degrees Celsius
Turbidity	--	3.2	2.0	2.0	NTU
Oxygen, dissolved	11.6	10.8	12.1	11.5	mg/L
Oxygen, percent saturation	--	--	--	--	
Bicarbonate	46	--	39	38	mg/L as HCO_3
Carbonate	0	--	0	0	mg/L as CO_3
Alkalinity	38	--	32	32	mg/L as $CaCO_3$
Bacterial Counts:					
Total coliform	--	K9	K16	K13	colonies/100 ml
Fecal coliform	--	--	K3	K5	colonies/100 ml
Major ions, dissolved solids, and hardness:					
Calcium	--	14	13	12	mg/L as Ca
Magnesium	--	1.1	0.9	0.9	mg/L as Mg
Sodium	--	1.9	1.6	1.6	mg/L as Na
Potassium	--	0.1	0.1	0.1	mg/L as K
Sulfate	--	8.5	7.4	7.4	mg/L as SO_4
Chloride	--	0.9	0.5	0.5	mg/L as Cl
Fluoride	--	<0.1	<0.1	<0.1	mg/L as F
Dissolved solids (calculated)	--	--	43	41	mg/L
Dissolved solids (calculated)	--	--	0.06	0.06	tons/acre-ft
Hardness (calculated)	--	39	36	34	mg/L as $CaCO_3$
Non-carbonate hardness (calculated)	--	--	4	2	mg/L as $CaCO_3$
Nutrients and organic carbon:					
Nitrogen (NO_2+NO_3)	--	0.011	0.019	0.016	mg/L as N
Phosphorous (ortho)	--	<0.01	<0.01	<0.01	mg/L as P
Dissolved organic carbon	--	0.8	0.5	0.6	mg/L as C

Table 7b.--*Water-quality constituent concentrations in streamflow samples collected at site 12044920, Elwha River Delta Site 2 at Lake Mills (ELD2)--Continued*

Constituent measured	Date and time streamflow samples collected: 940415 14:00	940417 15:45	940421 11:00	940421 [1]11:01	Unit of measurement
Trace Elements (unfiltered water):					
Arsenic	3	3	3	1	µg/L as As
Barium	<100	<100	<100	<100	µg/L as Ba
Cadmium	<1	<1	<1	<1	µg/L as Cd
Chromium	18	21	18	12	µg/L as Cr
Copper	19	25	22	13	µg/L as Cu
Iron	24,000	27,000	2,800	17,000	µg/L as Fe
Lead	7	8	7	4	µg/L as Pb
Manganese	370	420	370	230	µg/L as Mn
Mercury	<0.1	<0.1	<0.1	<0.1	µg/L as Hg
Silver	<1	<1	<1	<1	µg/L as Ag
Selenium	<1	<1	<1	<1	µg/L as Se
Zinc	50	70	70	40	µg/L as Zn
Radionuclides:					
Alpha radioactivity	<0.6	--	<0.6	<0.6	pCi/L as Th-230
Gross alpha	<0.6	--	<0.6	<0.6	µg/L as U-nat
Gross beta	<0.6	--	<0.6	<0.6	pCi/L as Cs-137
Gross beta	<0.6	--	<0.6	<0.6	pCi/L as Sr-90/Y-90
Radium (radon method)	0.05	--	0.07	<0.02	pCi/L as Ra-226
Volatile Organic Compounds (unfiltered water):					
1,3-Dichlorobenzene	--	<0.2	<0.2	<0.2	µg/L
1,4-Dichlorobenzene	--	<0.2	<0.2	<0.2	µg/L
1,1-Dichloroethane	--	<0.2	<0.2	<0.2	µg/L
1,2-Dichloroethane	--	<0.2	<0.2	<0.2	µg/L
cis-1,2-Dichloroethene	--	<0.2	<0.2	<0.2	µg/L
trans-1,2-Dichloroethene	--	<0.2	<0.2	<0.2	µg/L
1,1-Dichloroethylene	--	<0.2	<0.2	<0.2	µg/L
1,2-Dichloropropane	--	<0.2	<0.2	<0.2	µg/L
1,2-Transdichloroethene	--	<0.2	<0.2	<0.2	µg/L
1,1,1-Trichloroethane	--	<0.2	<0.2	<0.2	µg/L
Benzene	--	<0.2	<0.2	<0.2	µg/L
Bromoform	--	<0.2	<0.2	<0.2	µg/L
Carbon tetrachloride	--	<0.2	<0.2	<0.2	µg/L
Chlorobenzene	--	<0.2	<0.2	<0.2	µg/L
Chlorodibromomethane	--	<0.2	<0.2	<0.2	µg/L
Chloroform	--	<0.2	<0.2	<0.2	µg/L
Dichlorobromomethane	--	<0.2	<0.2	<0.2	µg/L
Dichlorodifluoromethane	--	<0.2	<0.2	<0.2	µg/L
Ethylbenzene	--	<0.2	<0.2	<0.2	µg/L

Table 7b.--*Water-quality constituent concentrations in streamflow samples collected at site 12044920, Elwha River Delta Site 2 at Lake Mills (ELD2)--Continued*

Constituent measured	Date and time streamflow samples collected: 940415 14:00	940417 15:45	940421 11:00	940421 [1]11:01	Unit of measurement
Flurocarbon-113	--	<0.2	<0.2	<0.2	µg/L
Dichloromethane	--	<0.2	<0.2	<0.2	µg/L
Methyl *tert*-butyl ether (MTBE)	--	<0.2	<0.2	<0.2	µg/L
o-Chlorobenzene	--	<0.2	<0.2	<0.2	µg/L
o-Dichlorobenzene	--	<0.2	<0.2	<0.2	µg/L
Styrene	--	<0.2	<0.2	<0.2	µg/L
Tetrachloroethylene	--	<0.2	<0.2	<0.2	µg/L
Toluene	--	<0.2	<0.2	<0.2	µg/L
Trichloroethylene	--	<0.2	<0.2	<0.2	µg/L
Trichlorofluoromethane	--	<0.2	<0.2	<0.2	µg/L
Vinyl chloride	--	<0.2	<0.2	<0.2	µg/L
Xylene	--	<0.2	<0.2	<0.2	µg/L
Organochlorine Compounds (pesticides, PCBs, and PCNs) (unfiltered water):					
Aldrin	--	<0.01	<0.01	<0.01	µg/L
Chlordane	--	<0.1	<0.1	<0.1	µg/L
p,p'-DDD	--	<0.01	<0.01	<0.01	µg/L
p,p'-DDE	--	<0.01	<0.01	<0.01	µg/L
p,p'-DDT	--	<0.01	<0.01	<0.01	µg/L
Dieldrin	--	<0.01	<0.01	<0.01	µg/L
Endosulfan I	--	<0.01	<0.01	<0.01	µg/L
Endrin	--	<0.01	<0.01	<0.01	µg/L
Heptachlor	--	<0.01	<0.01	<0.01	µg/L
Heptachlor epoxide	--	<0.01	<0.01	<0.01	µg/L
Lindane	--	<0.01	<0.01	<0.01	µg/L
Methoxychlor	--	<0.01	<0.01	<0.01	µg/L
Perthane	--	<0.1	<0.1	<0.1	µg/L
Toxaphene	--	<1	<1	<1	µg/L
PCB, gross	--	<0.1	<0.1	<0.1	µg/L
PCN, gross	--	<0.1	<0.1	<0.1	µg/L
Herbicides:					
2,4,D	--	<0.01	<0.01	<0.01	µg/L
2,4-DP	--	<0.01	<0.01	<0.01	µg/L
2,4,5-T	--	<0.01	<0.01	<0.01	µg/L
Mirex	--	<0.01	<0.01	<0.01	µg/L
Silvex	--	<0.01	<0.01	<0.01	µg/L

[1] Duplicate of sample collected at 11:00 on 940421 (see "Quality Assurance" section of report).

Table 7c.--*Water-quality constituent concentrations in streamflow samples collected at site 12045500, Elwha River at McDonald Bridge (ELWP)*

[µS/cm, microsiemens per centimeter; NTU, nephelometric turbidity units; mg/L, milligrams per liter; K, non-ideal colony count; ml, milliliter; <, less than; acre-ft, acre foot; NO_2+NO_3, nitrite plus nitrate; µg/L, micrograms per liter; pCi/L, picocuries per liter; --, not measured or not analyzed]

Constituent measured	Date and time streamflow samples collected: 940407 11:15	940416 09:40	940416 [1]09:41	940422 14:00	Unit of measurement	Field blank sample, date and time prepared: 940416 [2]09:42
Field Measurements:						
Specific conductance	97	101	100	95	µS/cm	--
pH	7.6	7.2	7.5	7.6		--
Water temperature	6.0	6.5	7.5	9.0	degrees Celsius	--
Turbidity	0.6	1.0	0.6	1.4	NTU	--
Oxygen, dissolved	12.5	12.4	12.4	11.7	mg/L	--
Oxygen, percent saturation	102	101	104	101		--
Bicarbonate	46	47	48	44	mg/L as HCO_3	--
Carbonate	0	0	0	0	mg/L as CO_3	--
Alkalinity	38	39	39	36	mg/L as $CaCO_3$	--
Bacterial Counts:						
Total coliform	K15	K14	K20	28	colonies/100 ml	--
Fecal coliform	K1	K1	<1	K1	colonies/100 ml	--
Major ions, dissolved solids, and hardness:						
Calcium	14	15	15	14	mg/L as Ca	<0.02
Magnesium	1.3	1.4	1.4	1.2	mg/L as Mg	<0.01
Sodium	2.0	2.1	2.2	1.8	mg/L as Na	<0.2
Potassium	0.2	0.1	0.1	0.1	mg/L as K	<0.1
Sulfate	8.6	8.9	9.0	8.1	mg/L as SO_4	<0.1
Chloride	0.9	0.9	0.8	0.8	mg/L as Cl	<0.1
Fluoride	<0.1	<0.1	<0.1	<0.1	mg/L as F	<0.1
Dissolved solids (calculated)	50	52	52	48	mg/L	--
Dissolved solids (calculated)	0.07	0.07	0.07	0.06	tons/acre-ft	--
Hardness (calculated)	40	43	43	40	mg/L as $CaCO_3$	--
Non-carbonate hardness (calculated)	3	5	4	4	mg/L as $CaCO_3$	--
Nutrients and organic carbon:						
Nitrogen (NO_2+NO_3)	0.006	<0.005	<0.005	0.005	mg/L as N	0.008
Phosphorous (ortho)	<0.01	<0.01	<0.01	<0.01	mg/L as P	<0.01
Dissolved organic carbon	0.7	0.7	0.6	0.7	mg/L as C	0.2

Table 7c.--*Water-quality constituent concentrations in streamflow samples collected at site 12045500, Elwha River at McDonald Bridge (ELWP)--Continued*

Constituent measured	Date and time streamflow samples collected: 940407 11:15	940416 09:40	940416 [1]09:41	940422 14:00	Unit of measurement	Field blank sample, date and time prepared: 940416 [2]09:42
Trace Elements (unfiltered water):						
Arsenic	<1	<1	<1	<1	µg/L as As	<1
Barium	<100	<100	<100	<100	µg/L as Ba	<100
Cadmium	<1	<1	<1	<1	µg/L as Cd	<1
Chromium	<1	<1	<1	<1	µg/L as Cr	<1
Copper	<1	1	<1	2	µg/L as Cu	<1
Iron	110	690	510	960	µg/L as Fe	20
Lead	<1	<1	<1	<1	µg/L as Pb	<1
Manganese	<10	40	40	80	µg/L as Mn	<10
Mercury	<0.1	<0.1	<0.1	<0.1	µg/L as Hg	<0.1
Silver	<1	<1	<1	<1	µg/L as Ag	<1
Selenium	<1	<1	<1	<1	µg/L as Se	<1
Zinc	<10	<10	<10	<10	µg/L as Zn	<10
Radionuclides:						
Alpha radioactivity	<0.6	<0.6	<0.6	<0.6	pCi/L as Th-230	--
Gross alpha	<0.6	<0.6	<0.6	<0.6	µg/L as U-nat	--
Gross beta	<0.6	<0.6	<0.6	<0.6	pCi/L as Cs-137	--
Gross Beta	<0.6	<0.6	<0.6	<0.6	pCi/L as Sr-90/Y-90	--
Radium (radon method)	<0.02	<0.02	<0.02	<0.02	pCi/L as Ra-226	--
Volatile Organic Compounds (unfiltered water):						
1,3-Dichlorobenzene	--	--	--	<0.2	µg/L	--
1,4-Dichlorobenzene	--	--	--	<0.2	µg/L	--
1,1-Dichloroethane	--	--	--	<0.2	µg/L	--
1,2-Dichloroethane	--	--	--	<0.2	µg/L	--
cis-1,2-Dichloroethene	--	--	--	<0.2	µg/L	--
trans-1,2-Dichloroethene	--	--	--	<0.2	µg/L	--
1,1-Dichloroethylene	--	--	--	<0.2	µg/L	--
1,2-Dichloropropane	--	--	--	<0.2	µg/L	--
1,2-Transdichloroethene	--	--	--	<0.2	µg/L	--
1,1,1-Trichloroethane	--	--	--	<0.2	µg/L	--
Benzene	--	--	--	<0.2	µg/L	--
Bromoform	--	--	--	<0.2	µg/L	--
Carbon tetrachloride	--	--	--	<0.2	µg/L	--
Chlorobenzene	--	--	--	<0.2	µg/L	--
Chlorodibromomethane	--	--	--	<0.2	µg/L	--
Chloroform	--	--	--	<0.2	µg/L	--
Dichlorobromomethane	--	--	--	<0.2	µg/L	--
Dichlorodifluoromethane	--	--	--	<0.2	µg/L	--
Ethylbenzene	--	--	--	<0.2	µg/L	--
Flurocarbon-113	--	--	--	<0.2	µg/L	--
Dichloromethane	--	--	--	<0.2	µg/L	--

Table 7c.--*Water-quality constituent concentrations in streamflow samples collected at site 12045500, Elwha River at McDonald Bridge (ELWP)--Continued*

Constituent measured	Date and time streamflow samples collected: 940407 11:15	940416 09:40	940416 [1]09:41	940422 14:00	Unit of measurement	Field blank sample, date and time prepared: 940416 [2]09:42
Methyl *tert*-butyl ether (MTBE)	--	--	--	<0.2	µg/L	--
o-Chlorobenzene	--	--	--	<0.2	µg/L	--
o-Dichlorobenzene	--	--	--	<0.2	µg/L	--
Styrene	--	--	--	<0.2	µg/L	--
Tetrachloroethylene	--	--	--	<0.2	µg/L	--
Toluene	--	--	--	<0.2	µg/L	--
Trichloroethylene	--	--	--	<0.2	µg/L	--
Trichlorofluoromethane	--	--	--	<0.2	µg/L	--
Vinyl chloride	--	--	--	<0.2	µg/L	--
Xylene	--	--	--	<0.2	µg/L	--
Organochlorine Compounds (pesticides, PCBs, and PCNs) (unfiltered water):						
Aldrin	--	--	--	<0.01	µg/L	--
Chlordane	--	--	--	<0.1	µg/L	--
p,p'-DDD	--	--	--	<0.01	µg/L	--
p,p'-DDE	--	--	--	<0.01	µg/L	--
p,p'-DDT	--	--	--	<0.01	µg/L	--
Dieldrin	--	--	--	<0.01	µg/L	--
Endosulfan I	--	--	--	<0.01	µg/L	--
Endrin	--	--	--	<0.01	µg/L	--
Heptachlor	--	--	--	<0.01	µg/L	--
Heptachlor epoxide	--	--	--	<0.01	µg/L	--
Lindane	--	--	--	<0.01	µg/L	--
Methoxychlor	--	--	--	<0.01	µg/L	--
Perthane	--	--	--	<0.1	µg/L	--
Toxaphene	--	--	--	<1	µg/L	--
PCB, gross	--	--	--	<0.1	µg/L	--
PCN, gross	--	--	--	<0.1	µg/L	--
Herbicides:						
2,4,D	--	--	--	<0.01	µg/L	--
2,4-DP	--	--	--	<0.01	µg/L	--
2,4,5-T	--	--	--	<0.01	µg/L	--
Mirex	--	--	--	<0.01	µg/L	--
Silvex	--	--	--	<0.01	µg/L	--

[1] Duplicate of sample collected at 09:40 on 940416 (see "Quality Assurance" section of report).

[2] A field blank sample is a laboratory prepared solution free of the constituents being analyzed that is processed in the same manner as the streamflow samples that are collected (see "Quality Assurance" section of report).

Table 7d.--*Water-quality constituent concentrations in streamflow samples collected at site 12046100, Elwha River below Elwha Dam (ELDM)*

[µS/cm, microsiemens per centimeter; NTU, nephelometric turbidity units; mg/L, milligrams per liter; K, non-ideal colony count; ml, milliliter; <, less than; acre-ft, acre foot; NO_2+NO_3, nitrite plus nitrate; µg/L, micrograms per liter; pCi/L, picocuries per liter; --, not measured or not analyzed]

Constituent measured	Date and time streamflow samples collected				Unit of measurement	Field blank sample, date and time prepared
	940408 13:30	940417 10:45	940422 10:45	940422 [1]10:46		940422 [2]07:57
Field Measurements:						
Specific conductance	102	102	103	--	µS/cm	--
pH	7.6	7.4	7.3	--		--
Water temperature	7.0	7.5	8.5	--	degrees Celsius	--
Turbidity	0.9	0.6	1.2	--	NTU	0.1
Oxygen, dissolved	12.2	11.9	11.6	--	mg/L	--
Oxygen, percent saturation	102	99	100	--		--
Bicarbonate	49	48	49	--	mg/L as HCO_3	--
Carbonate	0	0	0	--	mg/L as CO_3	--
Alkalinity	40	40	41	--	mg/L as $CaCO_3$	--
Bacterial Counts:						
Total coliform	26	21	40	--	colonies/100 ml	--
Fecal coliform	<1	<1	K2	--	colonies/100 ml	--
Major ions, dissolved solids, and hardness:						
Calcium	15	15	15	--	mg/L as Ca	0.16
Magnesium	1.6	1.5	1.4	--	mg/L as Mg	<0.01
Sodium	2.3	2.3	2.1	--	mg/L as Na	<0.2
Potassium	0.2	0.2	0.1	--	mg/L as K	<0.1
Sulfate	8.7	8.9	8.4	--	mg/L as SO_4	<0.1
Chloride	1.0	0.9	1.0	--	mg/L as Cl	<0.1
Fluoride	<0.1	<0.1	<0.1	--	mg/L as F	<0.1
Dissolved solids (calculated)	53	52	52	--	mg/L	--
Dissolved solids (calculated)	0.07	0.07	0.07	--	tons/acre-ft	--
Hardness (calculated)	44	44	43	--	mg/L as $CaCO_3$	--
Non-carbonate hardness (calculated)	4	4	3	--	mg/L as $CaCO_3$	--
Nutrients and organic carbon:						
Nitrogen (NO_2+NO_3)	0.019	0.009	0.01	--	mg/L as N	<0.005
Phosphorous (ortho)	<0.01	<0.01	<0.01	--	mg/L as P	<0.01
Dissolved organic carbon	0.8	0.8	0.8	--	mg/L as C	0.5

Table 7d.--*Water-quality constituent concentrations in streamflow samples collected at site 12046100, Elwha River below Elwha Dam (ELDM)--Continued*

Constituent measured	Date and time streamflow samples collected: 940408 13:30	940417 10:45	940422 10:45	940422 [1]10:46	Unit of measurement	Field blank sample, date and time prepared: 940422 [2]07:57
Trace Elements (unfiltered water):						
Arsenic	<1	<1	<1	--	µg/L as As	<1
Barium	<100	<100	<100	--	µg/L as Ba	<100
Cadmium	<1	<1	<1	--	µg/L as Cd	<1
Chromium	<1	<1	6	--	µg/L as Cr	<1
Copper	<1	<1	1	--	µg/L as Cu	<1
Iron	150	220	720	--	µg/L as Fe	<10
Lead	<1	<1	<1	--	µg/L as Pb	<1
Manganese	10	20	70	--	µg/L as Mn	<10
Mercury	0.2	<0.1	<0.1	--	µg/L as Hg	<0.1
Silver	<1	<1	<1	--	µg/L as Ag	<1
Selenium	<1	<1	<1	--	µg/L as Se	<1
Zinc	<10	<10	<10	--	µg/L as Zn	<10
Radionuclides:						
Alpha radioactivity	<0.6	<0.6	<0.6	--	pCi/L as Th-230	--
Gross alpha	<0.6	<0.6	<0.6	--	µg/L as U-nat	--
Gross beta	<0.6	<0.6	<0.6	--	pCi/L as Cs-137	--
Gross beta	<0.6	<0.6	<0.6	--	pCi/L as Sr-90/Y-90	--
Radium (radon method)	<0.02	0.04	0.03	--	pCi/L as Ra-226	--
Volatile Organic Compounds (unfiltered water):						
1,3-Dichlorobenzene	--	--	<0.2	<0.2	µg/L	<0.2
1,4-Dichlorobenzene	--	--	<0.2	<0.2	µg/L	<0.2
1,1-Dichloroethane	--	--	<0.2	<0.2	µg/L	<0.2
1,2-Dichloroethane	--	--	<0.2	<0.2	µg/L	<0.2
cis-1,2-Dichloroethene	--	--	<0.2	<0.2	µg/L	<0.2
trans-1,2-Dichloroethene	--	--	<0.2	<0.2	µg/L	<0.2
1,1-Dichloroethylene	--	--	<0.2	<0.2	µg/L	<0.2
1,2-Dichloropropane	--	--	<0.2	<0.2	µg/L	<0.2
1,2-Transdichloroethene	--	--	<0.2	<0.2	µg/L	<0.2
1,1,1-Trichloroethane	--	--	<0.2	<0.2	µg/L	<0.2
Benzene	--	--	<0.2	<0.2	µg/L	<0.2
Bromoform	--	--	<0.2	<0.2	µg/L	<0.2
Carbon tetrachloride	--	--	<0.2	<0.2	µg/L	<0.2
Chlorobenzene	--	--	<0.2	<0.2	µg/L	<0.2
Chlorodibromomethane	--	--	<0.2	<0.2	µg/L	<0.2
Chloroform	--	--	<0.2	<0.2	µg/L	<0.2
Dichlorobromomethane	--	--	<0.2	<0.2	µg/L	<0.2
Dichlorodifluoromethane	--	--	<0.2	<0.2	µg/L	<0.2
Ethylbenzene	--	--	<0.2	<0.2	µg/L	<0.2
Flurocarbon-113	--	--	<0.2	<0.2	µg/L	<0.2
Dichloromethane	--	--	<0.2	<0.2	µg/L	<0.2

Table 7d.--*Water-quality constituent concentrations in streamflow samples collected at site 12046100, Elwha River below Elwha Dam (ELDM)--Continued*

Constituent measured	Date and time streamflow samples collected				Unit of measurement	Field blank sample, date and time prepared
	940408 13:30	940417 10:45	940422 10:45	940422 [1]10:46		940422 [2]07:57
Methyl *tert*-butyl ether (MTBE)	--	--	<0.2	<0.2	µg/L	<0.2
o-Chlorobenzene	--	--	<0.2	<0.2	µg/L	<0.2
o-Dichlorobenzene	--	--	<0.2	<0.2	µg/L	<0.2
Styrene	--	--	<0.2	<0.2	µg/L	<0.2
Tetrachloroethylene	--	--	<0.2	<0.2	µg/L	<0.2
Toluene	--	--	<0.2	<0.2	µg/L	<0.2
Trichloroethylene	--	--	<0.2	<0.2	µg/L	<0.2
Trichlorofluoromethane	--	--	<0.2	<0.2	µg/L	<0.2
Vinyl chloride	--	--	<0.2	<0.2	µg/L	<0.2
Xylene	--	--	<0.2	<0.2	µg/L	<0.2
Organochlorine Compounds (pesticides, PCBs, and PCNs) (unfiltered water):						
Aldrin	--	--	<0.01	<0.01	µg/L	<0.01
Chlordane	--	--	<0.1	<0.1	µg/L	<0.1
p,p'-DDD	--	--	<0.01	<0.01	µg/L	<0.01
p,p'-DDE	--	--	<0.01	<0.01	µg/L	<0.01
p,p'-DDT	--	--	<0.01	<0.01	µg/L	<0.01
Dieldrin	--	--	<0.01	<0.01	µg/L	<0.01
Endosulfan I	--	--	<0.01	<0.01	µg/L	<0.01
Endrin	--	--	<0.01	<0.01	µg/L	<0.01
Heptachlor	--	--	<0.01	<0.01	µg/L	<0.01
Heptachlor epoxide	--	--	<0.01	<0.01	µg/L	<0.01
Lindane	--	--	<0.01	<0.01	µg/L	<0.01
Methoxychlor	--	--	<0.01	<0.01	µg/L	<0.01
Perthane	--	--	<0.1	<0.1	µg/L	<0.1
Toxaphene	--	--	<1	<1	µg/L	<1
PCB, gross	--	--	<0.1	<0.1	µg/L	<0.1
PCN, gross	--	--	<0.1	<0.1	µg/L	<0.1
Herbicides:						
2,4,D	--	--	<0.01	<0.01	µg/L	<0.01
2,4-DP	--	--	<0.01	<0.01	µg/L	<0.01
2,4,5-T	--	--	<0.01	<0.01	µg/L	<0.01
Mirex	--	--	<0.01	<0.01	µg/L	<0.01
Silvex	--	--	<0.01	<0.01	µg/L	<0.01

[1] Duplicate sample collected at 10:45 on 940422 (see "Quality Assurance" section of report).

[2] A field blank sample is a laboratory prepared solution free of the constituents being analyzed that is processed in the same manner as the streamflow samples that are collected (see "Quality Assurance" section of report).

Table 7e.--*Concentrations of constituents in bed-sediment samples collected at site 12045000, Lake Mills bed near Glines Canyon Dam (ELBED)*

[<, less than; g/kg, grams per kilogram; µg/g, micrograms per gram; pCi/g, picocuries per gram; µg/kg, micrograms per kilogram; --, not measured or not analyzed]

Constituent measured	Date and time bed-sediment samples collected: 940408 10:30	940423 09:15	940423 [1]09:16	Unit of measurement
Carbon:				
Carbon, inorganic, total	--	<0.1	<0.1	g/kg as C
Carbon, inorganic + organic	--	8.7	9.4	g/kg as C
Trace Elements:				
Arsenic	7	13	13	µg/g as As
Cadmium	<1	<1	<1	µg/g as Cd
Chromium	40	30	20	µg/g as Cr
Cobalt	30	20	20	µg/g as Co
Copper	50	50	50	µg/g as Cu
Iron	41,000	34,000	31,000	µg/g as Fe
Lead	20	20	20	µg/g as Pb
Manganese	830	820	800	µg/g as Mn
Mercury	0.1	0.1	0.1	µg/g as Hg
Selenium	<1	<1	<1	µg/g as Se
Zinc	90	80	80	µg/g as Zn
Radionuclides:				
Radium-228 (total dry weight)	1.2	1.2	1.1	pCi/g
Organochlorine Compounds (pesticides, PCBs, and PCNs):				
Aldrin	<0.1	<0.1	<0.01	µg/kg
Chlordane	<1.0	<1.0	<1.0	µg/kg
p,p'-DDD	<0.1	<0.1	<0.1	µg/kg
p,p'-DDE	<0.1	<0.1	<0.1	µg/kg
p,p'-DDT	<0.1	<0.1	<0.1	µg/kg
Dieldrin	<0.1	<0.2	<0.2	µg/kg
Endosulfan I	<0.1	<0.1	<0.1	µg/kg
Endrin	<0.1	<0.1	<0.1	µg/kg
Heptachlor	<0.1	<0.1	<0.1	µg/kg
Heptachlor epoxide	<0.1	<0.1	<0.1	µg/kg
Lindane	<0.1	<0.1	<0.1	µg/kg
Methoxychlor	<0.1	<0.2	<0.2	µg/kg
Perthane	<1.0	<1.0	<1.0	µg/kg
Toxaphene	<10	<10	<10	µg/kg

Table 7e.--*Concentrations of constituents in bed-sediment samples collected at site 12045000, Lake Mills bed near Glines Canyon Dam (ELBED)--Continued*

Constituent measured	Date and time bed-sediment samples collected			Unit of measurement
	940408 10:30	940423 09:15	940423 [1]09:16	
PCB, gross	<1	1	1	µg/kg
PCN, gross	<1	<1	<1	µg/kg
Herbicides:				
2,4,D	<0.1	<0.1	<0.1	µg/kg
2,4-DP	<0.1	<0.1	<0.1	µg/kg
2,4,5-T	<0.1	<0.1	<0.1	µg/kg
Mirex	<0.1	<0.1	<0.1	µg/kg
Silvex	<0.1	<0.1	<0.1	µg/kg

[1] Duplicate of sample collected at 09:15 on 940423 (see "Quality Assurance" section of report).

Table 8.--*Particle-size distribution of wetted channel bed sediment from samples collected at site 12044900, Elwha River above Lake Mills (ELWW)*
[ft^3/s, cubic feet per second; --, not analyzed]

Date	Time	Discharge (ft^3/s)	Percent finer than size shown, in millimeters								
			0.062	0.088	0.125	0.177	0.250	0.354	0.500	0.708	1.00
940409	17:00	1,150	0	0	1	2	4	5	6	6	8
940409	17:04	1,150	0	0	0	1	2	4	6	14	21
940409	17:10	1,150	0	0	0	1	2	4	7	14	21
940409	17:15	1,150	0	0	0	1	1	2	5	10	16
940409	17:18	1,150	0	1	3	10	21	36	56	79	90
Means of sample percentages			0	0	1	3	6	10	16	25	31

Date	Percent finer than size shown, in millimeters										
	1.42	2.00	2.83	4.00	5.66	8.00	11.3	16.0	22.6	32.0	45.3
940409	11	17	24	34	45	57	73	87	92	100	--
940409	26	34	42	53	65	78	89	96	99	100	--
940409	29	43	54	65	75	82	88	94	97	100	--
940409	21	26	29	31	34	37	41	46	53	64	100
940409	95	98	99	100	--	--	--	--	--	--	--
Means	36	38	49	57	64	71	78	85	88	93	100

Table 9a.--*Particle-size distribution of gravel bar deposits from surface particle counts and subsurface bulk samples of sediment collected at site 12044900, Elwha River above Lake Mills (ELWW)*
[--, not analyzed]

Date	Description of sampling site	Percent finer than size shown, in millimeters							
		0.062	0.088	0.125	0.177	0.250	0.354	0.500	0.707
940621	upstream bar	--	--	--	--	--	--	--	--
940621	downstream bar	--	--	--	--	--	--	--	--
940621	bulk sample	1	1	1	2	4	6	9	11

Date	Description of sampling site	Percent finer than size shown, in millimeters								
		1.00	1.42	2.00	2.83	4.00	5.66	8.00	11.3	16.0
940621	upstream bar	--	--	15	15	16	16	16	17	17
940621	downstream bar	--	--	3	3	3	3	5	14	28
940621	bulk sample	12	12	13	14	16	20	29	41	57

Date	Description of sampling site	Percent finer than size shown, in millimeters								
		22.6	32.0	45.3	64.0	90.5	128	181	256	362
940621	upstream bar	19	26	35	53	63	80	96	99	100
940621	downstream bar	45	64	75	87	93	98	100	--	--
940621	bulk sample	71	86	95	100	--	--	--	--	--

Table 9b.--*Particle-size distribution of gravel bar deposits from surface particle counts and subsurface bulk samples of sediment collected at site 12044910, Elwha River Delta site 1 at Lake Mills (ELD1)*
[--, not analyzed]

Date	Description of sampling site	Percent finer than size shown, in millimeters							
		0.062	0.088	0.125	0.177	0.250	0.354	0.500	0.707
940424	upstream bar	--	--	--	--	--	--	--	--
940424	mid bar	--	--	--	--	--	--	--	--
940424	bulk sample	0	1	1	2	3	4	6	8

Date	Description of sampling site	Percent finer than size shown, in millimeters								
		1.00	1.42	2.00	2.83	4.00	5.66	8.00	11.3	16.0
940424	upstream bar	--	--	7	7	7	7	7	9	12
940424	mid bar	--	--	--	--	--	--	--	--	3
940424	bulk sample	10	11	12	14	16	17	19	22	25

Date	Description of sampling site	Percent finer than size shown, in millimeters								
		22.6	32.0	45.3	64.0	90.5	128	181	256	362
940424	upstream bar	17	23	29	49	73	89	99	99	100
940424	mid bar	8	19	33	54	73	95	100	--	--
940424	bulk sample	30	35	43	48	71	100	--	--	--

Table 10.--*Particle-size distribution and bulk density of the delta sediment deposit from surface bulk samples collected at site 12044920, Elwha River Delta site 2 at Lake Mills (ELD2)*
[g/cm^3, grams per cubic centimeter; --, not analyzed]

Measurement number	Date	Bulk density (g/cm^3)	Percent finer than size shown, in millimeters					
			0.062	0.088	0.125	0.177	0.250	0.354
DLTABD01	940409	1.937	0	1	1	1	2	4
DLTABD02	940409	1.708	0	1	1	2	3	7
DLTABD03	940409	1.733	0	0	0	1	1	6
DLTABD04	940409	1.670	1	1	1	2	2	5

Measurement number	Percent finer than size shown, in millimeters							
	0.500	0.707	1.00	1.41	2.00	2.83	4.00	5.66
DLTABD01	11	20	31	42	57	66	75	81
DLTABD02	18	35	52	67	82	89	94	96
DLTABD03	20	39	54	65	74	78	82	84
DLTABD04	14	27	41	53	67	75	82	86

Measurement number	Percent finer than size shown, in millimeters						
	8.00	11.3	16.0	22.6	32.0	45.2	64.0
DLTABD01	87	92	96	98	100	--	--
DLTABD02	97	98	100	--	--	--	--
DLTABD03	85	87	88	90	94	96	100
DLTABD04	91	94	97	100	--	--	--

Table 11.--*Summaries of estimated volumes and particle-size distributions of sediment deposits in Lake Mills (adapted from Gilbert and Link, 1995, tables 1-3). Locations of sedimentation areas are shown on figure 14*
[Class sizes in millimeters; <, less than; yds^3, cubic yards]

Lake Mills sedimentation area	Percent in Class: clay, silt <0.075	sand 0.075-0.425	sand 0.425-5.00	gravel 5.00-19.0	gravel 19.0-75.0	cobbles 75.0-125	cobbles 125-300
Area 1. Rica Canyon sediments - Total volume: 550,000 yds^3	5	10	20	20	35	5	5
Area 2. Cat Creek fan sediments - Total volume: 622,700 yds^3	5	10	20	20	35	5	5
Area 3. Boulder Creek fan sediments - Total volume: 382,000 yds^3	5	10	20	20	35	5	5
Area 4. Prodelta sediments - Total volume: 3,400,000 yds^3	89	11	0	0	0	0	0
Area 5. Reservoir floor sediments - Total volume: 1,900,000 yds^3	98	2	0	0	0	0	0
Area 6T. Topset sediments - Total volume: 324,600 yds^3	6	10	20	20	35	6	3
Area 6F. Foreset sediments - Total volume: 292,100 yds^3	13	35	46	6	0	0	0
Area 6B. Bottomset sediments - Total volume: 465,300 yds^3	23	29	38	9	1	0	0
Area 7T. Topset sediments - Total volume: 1,825,800 yds^3	5	15	48	22	9	1	0
Area 7F. Foreset sediments - Total volume: 1,943,600 yds^3	14	30	50	6	0	0	0
Area 7B. Bottomset sediments - Total volume: 2,120,200 yds^3	53	32	12	3	0	0	0

Table 12.--*Atterberg limits, plasticity indexes, and particle-size distribution of surficial samples of lakebed sediment collected from the bed of Lake Mills in the fall of 1994. Locations at which samples were obtained are shown on figure 14*
[--, not analyzed]

Sample number	Atterberg limits		
	Liquid Limit	Plastic Limit	Plasticity Index
EBED01	36.5	29.3	7.13
EBED02	32.5	25.8	6.70
EBED03	--	--	--
EBED04	--	--	--
EBED05	40.2	26.6	13.6
EBED06	--	--	--
EBED07	--	--	--
EBED08	--	--	--

Sample number	Percent finer than size shown, in millimeters							
	0.001	0.002	0.004	0.008	0.016	0.031	0.062	0.088
EBED01	5	9	20	36	55	76	92	98
EBED02	5	8	16	29	44	64	86	96
EBED03	--	--	--	--	--	--	54	72
EBED04	--	--	--	--	--	--	98	99
EBED05	8	16	32	58	81	95	99	100
EBED06	--	--	--	--	--	--	100	--
EBED07	--	--	--	--	--	--	100	--
EBED08	--	--	--	--	--	--	100	--

Sample number	Percent finer than size shown, in millimeters						
	0.125	0.177	0.250	0.354	0.500	0.707	1.00
EBED01	99	100	--	--	--	--	--
EBED02	99	100	--	--	--	--	--
EBED03	86	96	99	100	--	--	--
EBED04	99	100	--	--	--	--	--
EBED05	--	--	--	--	--	--	--
EBED06	--	--	--	--	--	--	--
EBED07	--	--	--	--	--	--	--
EBED08	--	--	--	--	--	--	--

Table 13.--*Coordinates and elevations of monuments marking the end point locations of cross sections surveyed during the Lake Mills drawdown experiment. Coordinates are distances east and north from arbitrary reference point*

Designation	Easting (feet)	Northing (feet)	Elevation[1] (feet)	Location
3L	7,492	4,543	592	Left bank end of cross section 3
3R	9,562	4,500	609	Right bank end of cross section 3
4L	8,625	3,158.5	592.2	Left bank end of cross section 4
4R	9,924.4	3,686.1	601.3	Right bank end of cross section 4
5L	8,934	2,391	594	Left bank end of cross section 5
5R	10,533	2,797	599	Right bank end of cross section 5
6L	9,467.7	2,018.2	599.6	Left bank end of cross section 6
6R	10,629.1	2,518.2	597.7	Right bank end of cross section 6
7L	9,577.3	1,727.1	601.4	Left bank end of cross section 7
7R	10,675.8	2,239.8	593.1	Right bank end of cross section 7
8L	9,577.3	1,697.1	601.4	Left bank end of cross section 8
8R	10,814.9	1,995.9	592.1	Right bank end of cross section 8
9L	9,627.9	1,333.1	595.2	Left bank end of cross section 9
9R	10,918.7	1,545.2	604.5	Right bank end of cross section 9
10L	9,701.6	970.3	595.6	Left bank end of cross section 10
10R	11,085.7	1,219.9	606.4	Right bank end of cross section 10
11L	9,958.3	554.2	590.7	Left bank end of cross section 11
11R	11,104.5	1,049.9	604.4	Right bank end of cross section 11
12L	10,183.7	327.0	590.3	Left bank end of cross section 12
12M	10,426.1	290.4	589.7	Midpoint of cross section 12
13L	11,025.5	321.3	591.3	Left bank end of cross section 13
13R	11,189.9	342.6	591.7	Right bank end of cross section 13
14L	11,097.4	132.1	591.5	Left bank end of cross section 14
14R	11,300.2	73.9	595.2	Right bank end of cross section 14
15L	10,344.6	-99.1	591.4	Left bank end of cross section 15
15R	10,448.8	-71.5	590.7	Right bank end of cross section 15
16L	10,664.6	-499.3	592	Left bank end of cross section 16
16R	10,686.2	-435.7	590	Right bank end of cross section 16
17L	11,076.8	-417.6	592.9	Left bank end of cross section 17
17R	11,267.8	-386.7	591.8	Right bank end of cross section 17

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14a.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 8, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
50.0	582.3	75.0	582.8	100.0	583.8	150.0	584.3
180.0	583.3	200.0	573.3	228.0	557.3	250.0	552.3
300.0	550.3	350.0	548.3	400.0	548.3	450.0	548.8
500.0	549.8	550.0	549.8	600.0	549.3	650.0	549.8
700.0	550.3	750.0	551.3	800.0	552.8	850.0	551.8
900.0	551.3	950.0	549.3	1,000.0	547.3	1,050.0	546.3
1,100.0	545.3	1,150.0	545.3	1,252.5	583.3	--	--
Cross section 7							
0.0	601.7	32.5	588.3	50.0	577.3	66.0	578.3
75.0	580.3	86.0	584.3	100.0	585.3	125.0	585.3
150.0	585.8	200.0	586.3	240.0	587.3	300.0	586.3
330.0	584.8	350.0	585.3	400.0	586.3	435.0	586.3
450.0	586.3	500.0	585.3	550.0	585.3	600.0	586.3
650.0	586.3	657.0	586.3	662.0	684.3	700.0	583.3
735.0	584.3	750.0	584.3	800.0	581.3	831.0	582.3
841.0	585.3	900.0	584.3	950.0	583.8	976.0	583.3
994.0	580.3	1,000.0	580.3	1,050.0	579.3	1,100.0	576.3
1,125.0	574.3	1,150.0	569.3	1,175.0	567.3	1,202.0	579.8
1,212.3	593.3	--	--	--	--	--	--
Cross section[2] 7/8							
0.0	601.7	18.0	586.8	28.0	586.3	39.0	579.3
50.0	576.3	68.0	577.3	75.0	578.8	86.0	583.3
100.0	583.8	150.0	584.3	200.0	584.3	227.0	585.8
250.0	585.8	265.0	585.8	300.0	584.8	317.0	585.3
350.0	583.3	400.0	583.8	408.0	585.3	450.0	585.3
500.0	585.3	540.0	585.3	600.0	585.3	625.0	585.8
650.0	585.3	700.0	585.3	725.0	586.3	750.0	584.3
800.0	585.3	850.0	585.3	878.0	584.8	900.0	583.3
950.0	581.6	960.0	581.3	967.0	581.8	979.0	584.8
1,000.0	585.6	1,050.0	585.8	1,100.0	585.6	1,125.0	584.3
1,150.0	583.8	1,175.0	582.8	1,200.0	582.8	1,250.0	582.3
1,269.0	583.3	1,273.2	592.0	--	--	--	--

Table 14a.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 8, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 9							
0.0	595.4	15.0	584.8	50.0	583.3	65.0	582.8
75.0	583.8	87.0	585.8	100.0	585.8	150.0	584.8
169.0	585.3	200.0	584.8	250.0	584.8	300.0	584.8
350.0	584.8	400.0	585.8	416.0	583.8	450.0	584.8
500.0	585.3	550.0	585.8	582.0	585.8	600.0	584.3
615.0	584.8	640.0	585.3	650.0	586.8	700.0	587.8
750.0	587.8	790.0	586.3	815.0	586.5	858.0	587.0
883.0	587.5	941.0	588.5	944.0	587.3	950.0	587.3
968.0	582.8	1,000.0	583.8	1,050.0	585.3	1,100.0	585.3
1,150.0	585.3	1,200.0	584.8	1,225.0	585.8	1,286.0	584.3
1,308.1	604.8	--	--	--	--	--	--
Cross section 10							
0.0	595.8	34.0	584.8	50.0	585.8	75.0	586.3
100.0	585.8	113.0	585.3	127.0	587.3	150.0	587.8
185.0	587.8	200.0	587.8	250.0	585.8	300.0	587.3
350.0	586.8	390.0	586.8	450.0	586.3	490.0	583.8
507.0	583.8	523.0	585.3	550.0	585.3	600.0	586.3
650.0	586.3	655.0	587.3	673.0	587.3	680.0	586.3
715.0	586.3	728.0	587.3	750.0	587.8	774.0	586.3
800.0	586.8	847.0	587.3	861.0	587.3	862.0	586.7
877.0	587.3	891.0	588.2	943.0	587.4	962.0	585.8
977.0	585.9	995.0	585.5	1,000.0	586.1	1,010.0	587.2
1,030.0	588.3	1,066.0	587.3	1,102.0	587.5	1,126.0	587.0
1,156.0	589.3	1,220.0	589.8	1,263.0	589.3	1,267.0	587.8
1,286.0	584.3	1,300.0	584.3	1,317.0	583.3	1,350.0	584.3
1,358.0	583.8	1,367.0	585.3	1,379.0	586.3	1,406.3	606.7
Cross section 11							
0.0	590.7	5.6	589.4	21.9	587.5	67.5	585.1
71.6	587.5	139.0	589.1	215.4	589.5	246.2	587.9
270.2	589.4	347.5	589.0	386.9	588.9	425.5	587.5
497.6	587.2	617.1	586.2	622.7	587.4	649.8	589.3
662.9	589.5	663.0	588.4	663.0	588.4	748.0	589.5
758.6	589.4	783.3	588.3	803.3	587.3	855.8	586.8
903.7	588.7	978.3	589.1	1,024.1	587.4	1,091.6	589.4
1,107.8	588.4	1,116.4	587.0	1,185.2	588.9	1,195.5	583.1
1,208.8	587.7	1,234.2	586.6	1,242.8	589.4	1,248.8	604.4

Table 14a.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 8, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 12							
0.0	590.3	0.0	590.3	0.3	590.2	4.7	589.9
41.6	589.1	58.7	588.3	73.1	588.3	105.2	587.6
147.8	586.6	194.5	586.0	238.5	584.5	241.0	586.5
244.6	589.7						
Cross section 13							
0.0	591.3	55.2	588.2	80.9	586.2	88.7	585.5
149.2	585.7	153.8	588.1	165.7	591.7	--	--
Cross section 14							
0.0	591.5	17.4	588.3	37.0	587.7	57.4	586.5
111.4	586.8	128.0	588.3	133.9	588.7	142.3	588.3
149.6	587.9	178.2	587.6	195.6	586.6	201.1	588.8
211.0	595.2	--	--	--	--	--	--
Cross section 15							
-46.9	591.4	-43.3	589.6	-34.4	586.1	37.9	587.0
50.9	589.4	60.9	590.7	--	--	--	--
Cross section 16							
112.8	593.1	147.4	590.1	147.4	590.1	155.7	589.1
166.3	587.7	183.6	585.2	214.3	592.0	--	--
Cross section 17							
-88.3	592.9	-76.5	591.6	-54.7	589.7	-3.4	588.7
31.7	589.7	69.6	590.6	105.1	591.9	105.2	591.4
133.8	590.7	137.2	589.3	146.1	588.9	153.1	589.3

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

[2] Distances are measured from the west (left bank) monument 7L to the east (right bank) monument 8R.

Table 14b.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 10, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 8							
0.0	601.4	27.9	581.8	29.4	580.0	62.6	579.2
70.6	582.4	83.1	582.6	98.3	582.3	106.2	581.9
110.2	582.2	117.9	583.0	139.3	583.2	156.4	583.2
170.2	583.3	188.4	583.8	211.3	584.5	251.3	585.2
305.7	584.8	333.7	583.9	365.1	583.5	395.4	583.5
422.6	585.0	495.7	585.5	551.2	585.2	592.6	585.0
599.4	585.4	606.6	585.0	636.2	584.8	675.0	585.8
681.1	585.3	682.7	584.5	702.1	585.4	713.1	585.3
730.6	585.3	744.9	585.2	749.1	586.6	764.6	586.6
774.2	587.6	774.2	587.6	774.3	587.3	778.5	586.9
784.6	584.4	829.0	585.2	856.2	584.9	895.8	584.6
909.2	583.6	929.2	582.7	936.5	582.1	982.9	582.1
989.2	582.9	990.5	584.6	1,010.6	585.5	1,080.9	585.8
1,113.4	584.7	1,136.3	584.9	1,167.6	582.8	1,174.1	582.3
1,183.1	582.7	1,197.0	582.9	1,201.9	583.6	1,211.2	582.8
1,220.7	582.9	1,230.7	583.3	1,238.8	582.3	1,248.4	582.2
1,251.2	582.4	1,265.6	582.6	1,273.2	592.1	--	--
Cross section 9							
0.0	595.1	18.7	584.9	23.4	583.2	33.5	583.8
45.0	583.9	56.0	582.9	64.4	582.9	72.4	583.1
83.4	583.9	97.4	584.9	97.5	584.9	104.1	585.9
111.8	586.4	121.7	586.8	135.3	586.8	137.7	586.6
146.5	585.4	151.9	584.3	157.3	584.5	167.0	585.3
180.7	585.6	206.5	585.2	228.6	584.7	244.5	584.8
272.6	584.9	289.4	585.0	315.2	585.0	332.9	584.6
359.8	585.2	380.8	585.4	402.1	585.7	415.9	584.9
429.5	584.3	446.0	584.7	475.9	585.2	494.9	584.9
513.9	585.4	521.3	585.4	530.2	585.1	542.8	585.3
552.1	586.1	566.4	586.1	573.3	586.6	586.3	586.3
589.8	585.7	603.8	584.2	617.6	585.2	641.3	585.7
659.8	586.7	669.4	587.3	674.7	587.0	686.9	587.6
698.0	587.4	721.5	587.0	736.4	587.6	751.7	587.9
758.8	586.8	766.9	586.6	774.1	586.0	782.1	586.2
789.6	586.4	801.7	586.1	814.2	586.6	814.6	586.7
816.4	586.3	816.4	586.3	831.8	586.8	852.8	587.2
881.5	587.9	904.9	588.5	928.8	588.7	933.9	587.7
935.2	585.9	936.2	585.1	983.0	583.3	989.7	582.0
997.4	583.6	1,011.0	584.1	1,036.3	585.1	1,051.4	585.2
1,058.7	585.4	1,082.0	585.3	1,098.5	585.3	1,109.4	585.2
1,120.8	584.9	1,132.9	585.0	1,146.0	585.4	1,159.6	585.5
1,173.0	585.4	1,188.2	585.0	1,197.3	585.7	1,205.9	585.9
1,221.7	585.6	1,225.8	586.4	1,236.5	587.0	1,308.1	604.5

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14c.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 11, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 8							
0.0	601.4	27.9	81.8	29.8	580.0	62.6	579.2
70.6	582.4	83.1	582.6	95.4	583.3	98.3	582.3
1,06.2	581.9	110.2	582.2	117.9	582.8	128.6	583.0
139.3	583.2	156.4	583.2	170.2	583.3	188.4	583.8
234.2	583.7	236.4	584.4	249.5	586.1	292.6	586.1
297.5	585.0	334.9	585.6	342.5	583.9	365.0	583.1
380.0	583.4	389.6	583.7	407.4	584.8	491.3	585.1
580.3	585.3	774.4	587.4	982.9	580.3	989.2	582.9
990.5	584.6	1,010.6	585.5	1,080.9	585.8	1,113.4	584.7
1,136.3	584.9	1,167.6	582.8	1,174.1	582.3	1,183.1	582.7
1,197.0	582.9	1,201.8	583.6	1,211.2	582.8	1,220.7	582.9
1,230.7	583.3	1,238.8	582.3	1,248.4	582.2	1,251.2	582.4
1,265.6	582.6	1,273.2	592.1	--	--	--	--
Cross section 9							
0.0	595.1	20.5	584.8	22.3	583.5	33.6	584.0
52.3	583.2	67.4	582.5	77.2	583.2	97.3	584.6
123.9	586.8	126.5	584.4	134.5	584.6	140.1	584.5
145.4	584.4	148.6	584.4	152.4	584.4	154.1	583.7
157.7	584.4	166.5	584.7	177.7	585.1	190.3	584.9
200.8	585.1	213.8	584.8	225.4	584.7	236.2	584.9
247.5	584.9	257.4	584.9	268.6	585.0	279.5	584.8
292.3	585.0	303.5	584.9	315.0	584.5	324.6	584.3
336.0	584.5	350.5	585.1	360.6	584.6	371.0	585.2
390.7	585.6	411.1	584.0	433.1	584.5	458.9	585.1
480.1	584.9	497.5	584.8	504.8	585.1	510.0	585.3
518.6	585.3	532.5	585.2	541.2	585.3	569.9	586.4
589.4	585.7	603.0	584.3	618.9	585.1	640.2	585.7
679.7	587.1	745.1	587.6	770.2	586.1	814.6	586.6
926.3	588.7	926.5	588.7	928.9	584.9	983.0	583.3
989.7	582.0	997.4	583.6	1,011.0	584.1	1,036.3	585.1
1,051.4	585.2	1,058.7	585.4	1,082.0	585.3	1,098.5	585.3
1,109.4	585.2	1,120.8	584.9	1,132.9	585.0	1,146.0	585.4
1,159.6	585.5	1,173.0	585.4	1,188.2	585.0	1,197.3	585.7
1,205.9	585.9	1,221.7	585.6	1,225.8	586.4	1,236.5	587.0
1,242.6	585.1	1,245.2	583.9	1,249.4	585.0	1,254.3	585.5
1,273.6	586.0	1,279.2	584.4	1,292.6	587.2	1,308.1	604.5
Cross section 10							
0.0	595.5	8.0	588.3	19.4	587.6	22.8	585.5
31.0	585.2	43.1	585.6	69.2	586.4	94.0	585.9
108.7	585.8	117.7	585.8	117.8	586.1	130.2	587.9
166.6	588.0	202.0	587.2	219.6	585.9	231.6	586.3

Table 14c.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 11, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 10--Continued							
242.0	585.3	261.4	587.2	322.3	587.6	336.3	587.0
383.3	587.0	394.8	586.9	426.4	587.0	436.7	586.2
460.2	584.6	480.7	583.7	489.8	584.5	505.1	585.6
510.0	585.5	518.1	585.3	529.7	585.3	536.4	585.2
545.4	585.3	551.9	585.1	560.4	585.3	568.5	585.4
576.6	585.5	585.8	585.5	598.2	585.6	605.9	585.7
617.0	585.9	625.1	585.9	633.6	585.9	637.0	586.7
659.8	587.4	672.4	587.1	687.6	586.2	700.1	586.3
714.6	586.4	725.1	587.1	741.7	587.8	764.1	587.2
773.8	586.3	787.5	586.1	796.7	586.5	799.4	587.0
816.2	587.6	819.6	587.0	829.4	587.0	840.1	587.0
842.1	587.5	864.5	587.7	873.5	585.6	891.7	588.0
921.3	588.2	957.8	587.2	975.7	586.2	992.0	585.5
1,005.4	586.3	1,017.2	588.0	1,027.8	588.6	1,041.3	588.2
1,049.1	587.1	1,049.1	587.1	1,061.3	587.0	1,061.6	587.1
1,077.4	587.0	1,105.3	587.6	1,124.4	586.1	1,133.5	588.4
1,152.8	589.5	1,185.4	589.4	1,222.4	589.4	1,245.3	589.7
1,257.9	589.6	1,281.4	587.3	1,285.3	586.5	1,285.4	586.3
1,296.8	584.5	1,302.2	584.2	1,304.7	583.9	1,306.8	583.3
1,310.1	583.3	1,312.8	583.3	1,315.9	583.3	1,318.8	583.2
1,321.3	583.2	1,326.4	583.1	1,331.5	583.1	1,341.6	583.4
1,351.8	584.2	1,406.3	606.4	--	--	--	--
Cross section 11							
0.0	590.7	12.1	588.5	30.8	586.5	45.0	583.9
50.4	583.7	56.0	585.0	63.5	585.0	68.0	586.7
71.1	588.3	117.6	587.6	130.5	588.5	163.1	589.2
169.7	587.9	180.8	589.7	224.8	589.5	230.4	587.7
249.6	588.1	255.1	589.4	264.1	588.5	270.4	589.7
286.8	589.1	315.2	589.2	324.5	588.8	329.9	589.4
358.7	587.9	368.9	587.0	374.6	589.1	388.2	589.4
392.1	588.0	397.3	587.7	404.0	588.6	422.3	588.7
427.4	586.7	434.1	586.5	449.7	587.9	466.6	586.8
476.7	585.7	479.5	586.4	494.6	587.3	498.8	587.1
576.1	584.7	606.5	583.9	611.3	584.5	619.8	587.2
634.5	588.3	686.2	589.1	780.3	588.8	789.3	587.5
829.5	586.9	833.6	586.4	836.5	586.8	862.8	587.8
891.7	588.6	986.3	589.1	990.6	587.2	1,002.4	587.9
1,021.3	588.8	1,035.6	586.7	1,042.8	585.5	1,051.5	587.4
1,056.7	587.6	1,069.8	586.2	1,076.6	588.0	1,095.2	588.3
1,116.3	586.7	1,148.1	584.8	1,228.1	584.8	1,248.8	604.3

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14d.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 12, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.3	599.4	50.6	580.3	77.4	579.5	101.3	578.6
172.6	577.4	180.2	579.0	181.6	580.1	196.5	579.9
207.9	579.5	209.8	578.8	--	--	--	--
Cross section 7							
0.0	601.4	35.9	581.1	76.4	579.8	84.9	580.4
94.0	581.2	96.2	582.9	108.7	582.6	111.6	583.6
149.1	584.3	182.7	584.9	214.8	585.1	274.3	585.0
279.2	582.9	279.2	583.0	284.9	584.8	300.4	584.9
302.2	581.7	329.1	581.6	341.3	581.3	361.3	582.2
362.1	582.5	369.6	582.2	372.4	584.2	416.4	584.3
435.0	584.3	487.4	584.5	495.7	583.8	531.5	584.4
546.6	584.1	580.6	584.2	624.0	585.1	651.9	584.8
659.2	582.5	685.6	581.9	703.8	581.7	739.1	583.2
768.4	581.4	787.4	580.2	798.9	580.0	807.3	580.1
844.8	581.9	850.9	583.5	890.6	583.4	943.0	582.2
961.1	582.3	966.1	580.2	999.1	580.1	1,026.2	579.5
1,029.6	579.4	1,035.3	579.5	1,044.6	579.5	1,062.9	579.0
1,188.0	579.0	1,212.3	593.0	--	--	--	--
Cross section 8							
0.0	601.4	27.9	581.8	29.8	580.0	62.6	579.2
70.2	581.2	92.8	581.9	142.8	583.2	143.2	582.4
176.2	582.3	212.8	582.9	213.0	583.9	289.6	586.1
333.2	585.6	341.7	584.0	342.7	583.2	358.4	582.6
368.9	583.0	376.7	583.2	--	--	--	--
Cross section 9							
0.0	595.1	18.3	584.5	23.9	583.0	30.7	583.4
35.0	583.6	39.6	583.6	44.9	584.0	48.9	583.9
52.2	584.3	57.6	584.5	57.6	584.5	63.8	584.6
73.5	584.5	76.9	584.6	89.1	584.1	92.9	584.1
102.4	584.1	108.1	584.2	117.4	583.9	121.3	583.8
132.6	583.9	142.9	584.5	152.2	584.8	168.7	584.7
181.7	584.8	189.5	584.8	197.0	584.9	199.3	583.9
211.8	584.5	221.3	584.6	235.2	584.8	244.6	584.9
258.4	585.0	267.6	585.1	279.4	584.9	292.7	584.8
303.5	584.7	314.9	584.4	328.7	583.7	337.0	583.5
341.4	584.9	346.8	585.1	350.6	585.4	353.9	585.0
360.3	584.5	366.2	584.9	374.6	585.4	381.0	585.5

Table 14d.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 12, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 9--Continued							
391.8	585.7	404.8	584.9	412.1	584.2	422.2	584.4
444.7	584.9	480.6	585.2	500.2	585.1	526.2	585.0
548.0	586.0	572.7	586.2	588.3	585.6	595.0	584.7
600.0	584.2	606.5	584.4	617.9	585.2	628.2	585.0
638.3	585.7	649.4	586.6	814.3	586.7	883.4	588.1
886.0	583.9	980.0	581.8	1,000.0	582.8	1,060.0	583.8
1,200.0	584.8	1,290.0	585.8	1,308.1	604.5	--	--
Cross section 10							
0.0	595.5	22.8	585.7	25.5	584.9	32.3	585.0
43.8	585.7	73.9	586.4	94.8	586.0	107.3	585.8
117.5	586.0	124.9	587.1	209.8	587.3	226.0	585.8
236.7	586.2	247.4	585.7	272.4	587.2	371.5	587.3
451.1	586.1	472.6	585.0	479.1	584.6	484.3	584.0
490.4	583.7	500.8	584.2	514.1	585.5	531.0	585.3
550.8	585.2	570.0	585.6	587.6	585.4	613.2	585.9
643.1	586.6	672.5	587.2	693.9	586.3	706.1	586.3
724.2	587.1	748.3	587.8	781.0	586.3	787.7	586.4
794.5	586.5	829.5	587.0	985.2	586.1	1,000.0	586.2
1,006.7	586.2	1,280.9	587.6	1,288.3	585.7	1,300.5	584.3
1,307.2	583.4	1,351.8	583.4	1,406.3	606.4	--	--
Cross section 11							
0.0	590.7	30.8	586.5	39.1	585.1	43.1	584.5
46.8	583.7	53.7	584.7	64.4	585.0	67.8	586.7
71.0	588.2	416.0	589.1	423.0	587.0	439.4	587.9
465.9	586.9	473.3	586.3	478.2	585.8	484.9	586.9
493.6	587.4	500.2	587.1	525.5	587.2	568.4	585.6
580.2	584.6	608.4	584.3	620.4	587.3	800.0	587.6
1,109.4	588.2	1,116.6	586.6	1,128.5	585.1	1,138.0	584.9
1,174.0	584.9	1,196.6	586.6	1,248.8	604.3	--	--
Cross section 12							
140.0	587.7	169.7	587.0	179.7	587.1	185.1	587.4
195.3	587.0	201.2	586.2	206.1	585.1	210.7	585.3
241.5	587.6	--	--	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14e.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 13, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
34.4	586.1	37.9	583.8	41.4	579.7	41.4	579.6
116.8	576.0	135.2	576.7	143.3	576.6	151.1	576.6
158.2	576.4	161.5	576.4	164.3	577.0	176.4	576.8
196.4	576.8	215.9	576.6	233.6	576.2	235.4	575.3
237.9	574.9	--	--	--	--	--	--
Cross section 7							
0.0	601.4	35.1	579.1	65.5	579.0	71.2	579.2
74.2	579.1	76.1	579.1	77.5	579.2	83.7	579.6
92.2	579.6	98.5	579.6	103.8	579.6	116.6	580.0
130.1	580.8	132.3	584.1	146.5	584.5	242.3	585.3
299.4	584.9	299.8	581.6	352.1	581.5	360.8	581.0
362.3	580.5	363.4	580.4	364.2	580.5	369.0	580.7
374.1	580.4	380.8	579.9	385.8	579.6	389.7	580.0
396.7	579.9	402.6	580.2	403.5	581.5	410.4	584.3
412.5	581.3	413.8	584.4	429.0	584.3	495.5	584.2
624.1	585.1	726.9	582.8	798.0	580.1	938.1	582.3
960.8	582.3	961.5	581.8	964.8	580.4	988.5	580.3
1,025.0	579.8	1,029.7	579.5	1,063.0	579.3	1,065.2	577.5
1,074.7	574.6	1,077.4	576.6	1,150.5	575.9	1,171.5	575.3
1,188.4	576.6	1,212.3	593.0	--	--	--	--
Cross section 8							
0.0	601.4	30.0	580.0	34.3	578.4	36.7	578.5
84.6	579.0	112.1	579.4	136.5	580.6	161.6	581.1
175.4	581.3	176.1	582.7	183.6	582.6	193.3	582.5
195.8	581.8	205.7	581.9	212.1	581.5	216.5	581.8
217.1	583.8	234.5	583.7	248.7	586.1	275.4	586.0
292.9	586.1	296.1	585.2	304.8	585.1	306.7	582.6
314.0	582.3	324.2	582.6	340.3	583.0	340.9	582.5
347.1	581.7	353.4	582.0	358.6	582.2	406.9	584.8
500.2	585.5	637.5	585.1	774.4	587.4	809.5	584.9
812.4	580.4	815.7	579.2	821.6	579.2	827.0	579.2
833.0	579.2	838.4	578.7	841.4	578.3	894.3	576.6
905.5	577.5	911.5	578.7	971.8	579.1	991.7	580.0
998.9	583.9	1,106.8	584.0	1,199.2	582.5	1,265.4	581.7
1,273.2	592.1	--	--	--	--	--	--

Table 14e.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 13, 1994. Distances are measured from the west (left bank) end of section--continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 9							
0.0	595.1	37.0	583.7	37.4	583.1	41.4	581.4
44.4	581.3	49.7	581.6	57.2	581.8	66.2	583.1
115.9	582.9	132.7	583.7	133.3	584.4	169.2	584.9
187.5	584.8	190.5	584.1	203.7	582.8	213.8	583.1
233.6	583.4	246.9	583.4	262.3	583.2	274.7	583.4
292.8	584.0	310.7	584.5	314.8	584.5	320.8	584.3
333.6	583.3	340.2	583.3	350.6	584.2	351.5	585.0
383.4	585.6	408.9	585.2	413.8	584.3	421.4	584.1
460.1	584.9	493.0	585.0	511.1	585.3	541.5	585.1
576.4	586.6	592.0	585.5	604.0	584.2	609.8	584.9
616.9	585.0	625.2	585.0	638.6	585.5	814.6	586.7
883.9	587.9	887.0	582.5	892.6	580.7	976.4	579.8
996.4	581.4	1,006.0	582.7	1,127.0	584.3	1,218.6	584.7
1,269.8	585.3	1,289.5	584.9	1,308.1	604.5	--	--
Cross section 10							
0.0	595.5	20.0	587.4	23.4	585.7	24.8	584.9
33.0	585.0	41.4	585.7	66.7	586.4	93.9	586.0
105.5	585.8	117.4	586.0	129.8	587.7	428.1	587.1
448.0	586.1	462.1	584.3	468.0	583.2	471.7	583.1
488.9	584.9	534.5	585.1	553.0	585.0	577.6	585.6
602.3	585.7	629.5	586.6	660.3	587.4	672.3	587.2
689.0	586.2	704.9	586.2	724.9	587.1	829.5	587.0
980.6	586.1	995.7	585.0	1,004.8	586.1	1,283.1	587.3
1,290.7	585.0	1,295.3	584.5	1,307.5	583.1	1,311.1	583.0
1,351.8	583.0	1,406.3	606.4	--	--	--	--
Cross section 11							
0.0	590.7	20.5	587.8	31.0	586.4	39.0	585.2
46.6	584.0	53.3	584.8	61.0	585.0	67.4	586.7
70.2	588.4	447.7	588.1	466.8	586.9	473.7	586.0
479.8	586.2	484.6	586.8	490.3	587.1	494.4	587.4
526.3	587.3	541.9	586.9	554.3	586.7	563.8	586.2
573.2	585.5	610.7	584.8	620.0	591.2	620.1	587.3
829.7	586.9	833.7	586.6	836.5	586.7	1,109.1	588.4
1,118.0	586.5	1,130.1	585.2	1,147.0	584.9	1,153.1	584.5
1,163.0	584.5	1,198.0	586.5	1,248.8	604.3	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14f.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 14, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
33.7	581.9	43.1	574.3	57.9	572.3	70.2	573.1
91.6	573.3	124.2	572.8	140.3	572.1	211.5	573.2
213.1	575.2	222.8	574.8	233.3	574.4	239.1	571.3
Cros section 7							
0.0	601.4	32.4	582.7	37.4	577.7	45.9	576.6
56.8	577.3	131.7	577.2	140.5	584.1	299.1	585.0
302.8	581.5	341.9	581.7	347.6	578.3	373.9	577.3
380.6	577.4	408.1	584.2	624.0	585.0	863.9	583.2
868.9	573.3	895.6	572.7	930.5	573.0	957.4	572.9
967.0	572.4	983.4	572.4	1,000.3	572.1	1,024.5	572.5
1,042.1	573.1	1,044.3	574.3	1,050.6	574.5	1,052.6	575.5
1,157.0	576.2	1,188.0	576.8	1,212.3	593.0	--	--
Cross section 8							
0.0	601.4	24.5	582.9	37.2	578.0	46.7	576.9
107.3	577.5	131.1	578.0	189.9	579.1	210.0	578.8
227.8	579.5	231.4	583.6	284.5	585.7	289.6	580.0
295.1	579.8	298.5	579.7	333.1	580.5	410.5	585.0
774.3	587.4	803.9	584.8	810.3	577.7	814.3	577.5
815.3	576.2	821.2	576.2	831.4	574.7	937.9	574.5
951.9	575.4	954.4	579.8	983.9	580.0	1,011.7	584.9
1,014.1	579.9	1,069.1	585.5	1,270.6	585.5	1,273.2	592.1
Cross section 9							
0.0	595.1	31.4	583.6	32.5	582.4	47.8	581.9
57.9	582.6	59.4	583.1	189.1	585.0	213.3	583.2
213.8	582.5	257.1	582.2	288.5	582.0	328.8	581.1
336.7	583.1	344.2	583.6	346.1	585.5	600.0	586.1
814.5	586.7	836.6	586.7	845.7	580.0	894.6	578.2
931.4	579.2	944.3	579.3	1,012.2	583.4	1,127.0	584.3
1,218.6	584.7	1,269.8	585.3	1,289.5	584.9	1,308.1	604.5

Table 14f.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 14, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 10							
0.0	595.5	23.4	585.6	32.7	585.0	41.8	585.6
75.2	586.5	94.7	586.1	94.9	586.1	109.0	585.4
116.5	586.0	140.3	587.7	241.5	585.5	460.0	585.3
472.3	583.3	549.7	583.0	558.4	585.4	576.4	585.5
650.2	587.2	680.5	586.5	695.7	586.3	718.2	586.6
739.0	587.8	829.4	587.0	1,000.0	587.1	1,282.5	587.9
1,293.6	584.3	1,301.4	584.0	1,327.5	582.2	1,351.8	582.2
1,406.3	606.4	--	--	--	--	--	--
Cross section 11							
30.7	586.7	53.2	584.7	67.8	586.7	71.7	588.4
511.0	587.3	539.3	586.9	578.2	584.9	611.1	585.1
618.1	587.0	800.0	587.5	1,110.8	588.4	1,122.1	585.9
1,147.2	584.9	1,155.1	583.2	1,170.0	583.2	1,177.0	584.9
1,202.1	585.9	1,248.0	604.3	--	--	--	--
Cross section 12							
0.0	590.3	113.5	587.7	134.3	587.1	168.0	586.4
172.6	585.9	181.0	586.3	192.7	586.5	195.6	586.2
210.0	584.1	235.7	583.6	240.5	586.3	241.8	587.3
242.0	590.8	--	--	--	--	--	--
Cross section 13							
0.0	591.3	28.7	590.5	69.3	588.5	91.8	586.5
141.5	585.6	153.8	588.4	154.0	591.8	--	--
Cross section 14							
0.0	591.5	23.6	589.5	26.1	589.4	35.6	589.2
52.3	588.0	63.7	587.4	99.6	587.6	112.2	588.2
128.0	589.4	130.0	591.8	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14g.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 15, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	599.6	48.3	573.3	49.3	572.5	52.5	571.7
80.2	571.5	102.1	571.8	180.6	572.1	261.4	571.0
321.1	569.3	322.0	599.6	--	--	--	--
Cross section 7							
0.0	601.4	31.5	583.9	38.3	575.8	108.2	575.1
180.7	575.1	193.7	575.1	204.6	584.8	435.0	584.0
443.6	584.2	624.2	585.0	837.6	580.8	850.9	583.0
856.6	573.2	869.5	572.6	908.9	572.3	990.4	572.5
1,009.8	572.7	1,031.1	572.3	1,058.2	572.1	1071.6	572.4
1,075.0	575.8	1,188.0	576.8	1,212.3	593.0	--	--
Cross section 8							
0.0	601.4	24.6	582.7	25.5	583.0	29.5	576.0
43.2	575.7	51.5	576.1	55.3	576.2	61.7	575.9
94.5	575.5	118.5	575.7	145.1	575.5	186.2	576.1
202.8	576.2	221.1	576.4	224.5	579.2	243.7	579.3
248.3	583.8	253.6	583.8	255.1	584.7	260.8	585.9
268.4	586.0	286.0	585.8	290.7	580.1	330.2	580.6
410.3	584.8	500.0	584.9	648.6	585.1	760.2	586.3
772.0	575.3	874.7	573.7	949.9	574.4	962.9	574.7
968.1	580.3	988.2	580.5	1,069.1	585.8	1,270.6	585.8
1,273.2	592.1	--	--	--	--	--	--
Cross section 9							
0.0	595.1	21.9	583.3	32.5	583.5	34.5	581.5
40.8	581.5	44.5	581.8	54.9	581.5	74.6	581.4
95.3	581.9	96.2	584.2	144.4	584.1	186.4	584.9
207.1	583.2	209.1	579.3	245.6	579.0	267.6	579.5
286.8	579.8	295.3	582.4	330.3	581.8	335.6	583.3
346.6	583.6	348.8	585.2	470.0	585.2	600.0	586.4
703.9	587.2	814.5	586.7	820.6	586.5	824.4	579.2
833.3	578.2	1,015.8	579.3	1,020.9	584.5	1,082.0	585.4
1,290.0	585.8	1,308.1	604.5	--	--	--	--

Table 14g.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 15, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 10							
0.0	595.5	16.7	587.7	22.3	585.6	30.7	584.8
41.1	585.5	71.7	586.4	94.1	586.0	106.4	585.6
117.0	585.9	128.7	587.7	168.8	588.0	235.9	585.3
307.0	587.6	422.7	586.9	469.0	583.6	505.9	582.2
525.9	582.1	572.3	584.0	573.0	585.5	705.3	586.2
829.4	587.0	1,000.0	587.8	1,238.3	589.7	1,282.1	587.8
1,306.4	583.4	1,325.0	582.1	1,351.8	582.1	1,406.3	606.4
Cross section 11							
0.0	590.7	19.9	587.7	30.9	586.7	43.7	584.4
58.4	584.7	65.9	586.6	68.6	588.4	500.5	587.3
564.3	586.2	580.1	584.1	607.0	584.0	615.7	586.2
800.0	587.0	1,108.0	588.5	1,145.1	584.7	1,158.7	583.9
1,212.0	583.9	1,225.1	584.7	1,248.1	604.3	--	--
Cross section 12							
0.0	590.3	105.2	588.8	143.5	587.8	180.6	587.2
189.3	587.4	196.6	586.9	211.7	585.0	240.4	587.1
241.5	588.0	242.0	590.8	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14h.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 16, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	599.6	48.3	572.1	75.7	572.1	81.3	572.3
84.1	572.2	102.3	572.1	109.7	572.2	115.7	572.1
150.2	572.1	172.8	570.6	197.1	571.5	228.4	571.3
238.9	570.3	267.6	570.9	297.4	570.3	350.4	570.0
384.1	569.9	385.0	590.8				
Cross section 7							
0.0	601.4	29.3	575.2	68.8	574.6	75.8	575.0
120.5	574.6	193.5	574.3	228.5	574.4	237.4	585.1
301.6	585.0	435.0	585.0	624.0	585.0	752.3	582.8
768.7	581.1	777.0	572.1	811.0	572.3	850.1	572.1
906.9	572.0	996.5	570.9	1,002.4	572.6	1,024.9	573.0
1,112.1	576.1	1,188.0	576.8	1,212.3	593.1	--	--
Cross section 8							
0.0	601.4	28.8	578.3	29.6	575.4	103.7	574.6
146.4	574.7	152.2	575.1	159.6	574.9	210.8	574.9
212.8	576.3	380.0	576.8	390.0	584.8	500.0	585.3
559.8	585.3	736.0	585.1	745.7	574.4	760.5	574.1
859.2	573.1	864.2	573.9	865.7	574.4	899.9	574.3
907.0	574.1	912.6	574.2	916.8	574.4	920.8	574.4
927.4	574.1	969.3	574.3	972.3	580.0	988.0	580.8
1,069.1	585.8	1,270.0	585.8	1,273.2	592.1	--	--
Cross section 9							
0.0	595.1	31.9	583.6	36.9	581.4	40.5	581.2
43.5	581.4	54.3	582.0	91.0	581.3	98.9	580.9
107.4	581.4	110.1	584.3	165.6	584.7	171.8	578.1
216.3	577.8	295.2	579.0	297.3	582.4	319.5	582.3
583.4	586.1	600.0	586.5	712.3	587.1	814.6	586.6
819.8	578.3	830.1	577.2	1,058.0	576.7	1,067.9	579.0
1,074.5	585.5	1,121.7	585.2	1,290.0	585.8	1,308.1	604.5
Cross section 10							
0.0	595.5	20.3	587.4	23.2	585.3	31.0	584.9
43.4	585.6	68.2	586.3	95.4	585.9	105.9	585.7
116.4	585.9	130.9	587.8	440.0	586.8	468.9	584.6
480.8	582.7	516.2	582.0	582.5	582.0	585.7	583.4
587.1	585.6	615.3	585.9	829.5	587.0	1,000.0	587.7
1,277.0	588.4	1,307.7	583.4	1,322.1	582.0	1,351.8	582.0
1,406.3	606.4	--	--	--	--	--	--

Table 14h.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 16, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 11							
0.0	590.7	17.8	588.2	30.7	586.7	45.1	584.0
67.4	586.6	70.8	588.4	542.9	586.8	570.5	585.4
577.7	583.9	605.7	583.8	612.7	585.5	619.0	587.5
800.0	587.8	1,109.2	588.4	1,121.3	585.9	1,145.4	584.5
1,162.5	582.9	1,208.0	582.9	1,225.0	584.5	1,248.8	604.3
Cross section 12							
0.0	590.3	112.0	588.9	143.9	587.8	183.6	586.9
184.1	587.5	189.2	587.5	197.1	586.9	205.4	585.1
235.9	584.6	243.4	587.6	244.0	590.8	--	--
Cross section 15							
0.0	591.4	6.4	586.9	13.8	587.7	20.7	587.3
21.4	586.2	23.3	585.6	29.8	586.4	38.4	587.0
47.4	588.8	56.9	590.4	60.9	590.6	64.1	590.3
68.2	588.5	79.3	587.8	90.0	588.5	96.9	588.8
108.8	588.9	124.7	589.1	125.0	590.8	--	--
Cross section 16							
0.0	592.0	12.5	590.9	31.1	590.1	53.3	589.9
77.4	589.2	84.1	588.7	91.1	589.5	97.4	590.2
112.5	593.0	125.8	590.6	134.5	590.5	147.3	590.0
147.4	590.0	153.2	589.1	157.1	588.5	161.3	587.9
170.1	587.0	171.0	591.8	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14i.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 17, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 9							
0.0	595.1	35.7	583.7	43.2	580.4	54.4	580.0
64.8	580.5	109.1	580.9	112.5	584.2	149.7	584.6
164.5	584.6	172.9	578.6	186.9	578.4	196.0	578.3
197.5	577.6	204.7	576.6	210.6	576.1	256.5	577.1
265.9	578.3	270.7	578.6	272.7	578.4	291.7	578.0
314.8	578.6	324.9	578.3	335.9	578.0	344.8	577.4
357.7	578.2	362.9	584.6	544.6	585.8	600.0	586.3
711.7	587.1	800.2	586.0	815.0	577.3	876.0	577.5
904.6	576.7	973.1	578.0	981.3	578.3	985.8	578.1
1,021.6	576.9	1,058.0	576.7	1,067.9	579.0	1,074.5	585.5
1,121.7	585.2	1,290.0	585.8	1,308.1	604.5	--	--
Cross section 10							
0.0	595.5	20.4	587.3	23.1	585.5	32.0	584.9
41.5	585.6	64.0	586.2	94.1	586.0	107.2	585.5
116.5	586.0	129.7	587.7	315.2	587.8	430.3	586.9
465.6	584.6	499.9	582.5	499.9	582.0	506.6	580.8
605.8	581.2	609.4	583.1	610.6	586.0	621.5	585.9
663.1	587.4	829.5	587.0	1,000.0	587.8	1,257.6	589.6
1,285.0	587.3	1,310.6	583.0	1,318.4	581.4	1,351.8	581.4
1,406.3	606.4	--	--	--	--	--	--
Cross section 11							
0.0	590.7	21.3	588.0	31.3	586.7	36.7	585.9
52.4	584.4	61.8	585.1	67.9	586.7	71.5	588.5
522.8	587.2	547.0	586.8	569.6	585.5	570.4	584.8
575.3	582.9	618.2	584.9	619.3	587.2	619.8	587.4
628.8	587.7	800.0	587.8	1,105.7	588.4	1,136.7	585.0
1,149.0	584.0	1,159.8	583.4	1,161.7	582.4	1,217.0	582.4
1,219.0	583.4	1,229.0	583.8	1,248.8	604.3	--	--

Table 14i.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 17, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 12							
0.0	590.3	89.9	588.5	155.6	587.6	178.1	586.8
181.3	586.7	184.2	586.7	186.5	587.5	191.5	587.3
196.0	587.0	198.8	586.2	202.5	586.7	205.6	586.6
220.2	586.0	221.0	590.8	--	--	--	--
Cross section 13							
0.0	591.3	27.6	590.6	54.3	589.6	69.6	588.6
84.9	587.4	95.5	586.3	145.2	586.2	154.1	588.2
161.7	590.6	165.8	591.5	--	--	--	--
Cross section 14							
0.0	591.5	11.2	590.0	19.1	589.6	37.9	589.1
54.1	588.3	106.5	588.0	112.5	588.0	118.6	588.8
127.6	589.5	133.0	589.9	134.0	590.8	--	--
Cross section 17							
0.0	592.9	13.4	590.3	28.2	590.8	46.5	591.3
68.3	591.9	85.3	592.4	105.1	593.2	106.0	591.8

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14j.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 18, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	599.7	45.5	572.8	47.0	571.7	62.9	572.0
77.2	572.0	94.4	571.9	121.4	571.1	134.2	571.9
134.7	572.4	158.0	571.9	175.1	572.0	176.2	571.3
215.8	571.6	252.6	571.2	259.8	571.1	287.9	571.1
305.4	571.0	330.5	570.6	359.5	570.3	396.5	570.5
458.0	570.1	459.0	585.9	--	--	--	--
Cross section 7							
0.0	601.5	31.6	583.5	40.6	574.5	117.4	574.2
166.4	573.0	330.5	573.3	343.8	579.3	362.0	578.6
416.7	577.8	425.8	584.0	435.0	584.4	624.2	584.7
731.2	573.2	956.5	572.7	1,001.7	573.0	1,033.3	573.3
1,053.0	573.2	1,145.8	577.1	1,188.0	576.9	1,212.3	593.2
Cross section 8							
0.0	601.5	23.5	579.8	30.4	574.7	76.6	574.1
82.6	573.4	271.9	574.7	281.9	585.6	284.3	585.6
291.6	579.8	409.7	584.7	500.0	584.8	510.1	584.9
630.5	584.8	636.5	575.6	774.6	573.7	782.4	575.1
826.7	574.9	832.8	575.4	854.0	575.5	864.5	575.4
871.9	575.3	875.4	575.4	879.2	575.5	880.8	574.8
888.2	574.0	899.6	574.8	939.2	575.1	964.7	574.6
969.4	575.5	975.4	581.3	988.0	580.9	1,070.0	585.9
1,270.0	585.9	1,273.2	592.2	--	--	--	--
Cross section 9							
0.0	595.2	22.3	582.7	27.4	583.1	29.9	579.7
46.0	579.2	58.8	579.1	70.5	578.8	74.3	580.5
111.0	580.4	116.2	584.3	119.2	584.3	129.1	577.5
171.3	576.9	204.9	576.8	292.1	576.7	299.5	578.1
308.1	578.1	313.4	578.1	318.5	578.1	321.7	578.3
327.6	578.0	331.9	578.1	343.8	578.5	355.3	579.4
358.8	579.4	364.8	584.7	441.5	584.8	530.0	585.1
600.0	585.9	713.2	587.0	790.5	586.4	804.5	585.8
814.5	578.5	838.2	578.5	854.3	579.1	875.5	578.6
895.1	578.4	919.2	578.9	972.8	579.2	977.1	579.3
982.7	579.2	994.0	578.0	1,044.3	577.9	1,097.2	580.0
1,149.3	580.6	1,160.3	585.6	1,219.3	585.8	1,290.0	585.9
1,308.1	604.6	--	--	--	--	--	--

Table 14j.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 18, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 10							
0.0	595.6	19.9	587.3	22.9	585.2	31.2	584.8
41.8	585.5	72.4	586.2	97.1	585.8	106.7	585.6
115.6	585.8	130.1	587.6	171.8	588.0	243.6	585.5
272.1	587.4	341.6	586.8	441.6	586.8	493.4	581.8
532.2	582.9	534.7	581.7	539.2	580.6	605.1	580.6
610.0	580.8	612.8	582.1	614.6	585.6	625.6	585.7
633.0	586.9	829.5	587.1	1,000.0	587.4	1,278.6	588.4
1,308.6	583.2	1,311.6	583.1	1,313.5	581.5	1,351.8	581.5
1,406.3	606.5	--	--	--	--	--	--
Cross section 11							
0.0	590.8	20.7	587.9	31.7	586.7	41.6	585.0
67.6	586.4	71.7	588.6	115.3	587.7	518.2	587.2
570.0	585.8	571.4	584.5	584.8	583.5	638.1	583.4
640.5	584.8	643.0	589.0	800.0	588.8	1,112.3	588.2
1,132.1	585.4	1,157.2	584.2	1,162.6	582.4	1,232.0	582.4
1,237.2	584.2	1,248.8	604.4	--	--	--	--
Cross section 12							
0.0	590.4	89.6	588.5	152.4	587.9	153.1	586.9
155.2	585.8	184.3	586.7	189.3	585.4	203.7	585.9
210.3	585.6	216.5	586.1	223.4	585.0	224.0	590.9
Cross section 15							
0.0	592.5	33.5	586.6	39.1	587.1	44.2	588.1
49.1	589.2	54.0	590.2	61.1	590.7	64.9	590.3
68.0	588.7	79.3	588.5	90.7	588.6	126.8	589.4
127.0	591.9	--	--	--	--	--	--
Cross section 16							
0.0	592.1	9.8	591.3	36.1	590.2	83.8	588.8
91.8	589.7	112.6	593.2	124.5	590.8	147.2	590.2
151.3	589.8	155.6	588.8	161.1	587.9	162.0	591.9

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14k.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 19, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	599.0	117.2	570.6	131.6	571.0	149.4	570.6
154.0	571.9	178.1	571.9	228.4	571.7	265.2	570.9
314.3	571.0	353.8	571.2	394.0	570.5	420.5	570.5
470.5	570.2	471.0	585.8	--	--	--	--
Cross section 7							
0.0	601.4	32.6	578.7	35.4	575.0	99.7	573.8
159.1	573.7	179.9	573.8	207.1	574.1	240.4	574.2
279.0	574.0	284.2	582.7	377.1	578.7	413.1	584.3
435.0	584.3	489.0	584.2	544.9	584.0	569.7	585.0
579.2	573.2	620.3	572.6	882.3	571.6	921.8	571.9
970.2	571.8	995.6	572.2	1,029.8	572.1	1,188.0	576.8
1,212.3	593.1	--	--	--	--	--	--
Cross section 8							
0.0	601.4	28.9	577.3	30.1	574.8	85.0	573.5
128.5	574.3	204.7	574.0	232.7	574.6	267.7	574.7
279.9	585.9	344.9	581.3	413.9	585.1	497.0	585.3
500.0	585.3	579.1	585.2	588.0	573.9	625.7	573.9
657.3	573.9	687.3	574.5	714.1	574.6	743.2	574.5
748.0	572.7	825.4	572.8	846.6	573.8	873.8	574.0
909.5	573.7	918.8	573.3	927.6	573.7	949.6	574.2
978.6	574.3	979.0	580.8	988.0	580.8	1,020.0	585.8
1,270.0	585.8	1,273.2	592.1	--	--	--	--
Cross section 9							
0.0	595.1	27.3	583.3	31.3	578.4	38.2	578.1
43.6	577.6	45.8	578.0	59.6	578.6	72.3	578.7
74.1	580.6	83.8	580.9	110.2	580.6	115.3	578.1
129.9	577.6	143.1	577.3	211.0	577.1	227.0	577.9
244.3	577.8	258.0	578.0	263.0	578.0	268.9	577.7
275.8	576.3	288.4	577.2	322.7	577.6	344.5	577.7
375.4	577.9	380.9	585.6	511.3	585.3	600.0	586.1
711.6	587.2	790.5	586.0	797.3	578.0	801.5	576.5
1,185.5	579.2	1,189.2	585.3	1,226.8	586.7	1,290.0	585.8
1,308.1	604.5	--	--	--	--	--	--

Table 14k.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 19, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 10							
0.0	595.5	21.7	586.7	24.6	585.4	31.8	585.0
36.2	585.3	114.3	585.7	130.1	587.9	298.2	587.5
353.5	586.9	432.0	587.0	444.7	581.3	489.1	581.4
528.1	581.8	558.5	581.3	691.9	580.7	697.1	583.2
699.0	586.3	829.4	587.0	1,000.0	588.2	1,187.8	589.6
1,276.5	588.1	1,294.7	584.5	1,301.5	584.0	1,303.1	582.9
1,305.9	581.1	1,351.8	581.1	1,406.3	606.4	--	--
Cross section 11							
0.0	590.7	27.5	587.3	32.7	586.4	50.5	584.7
63.3	585.1	66.9	586.4	71.0	588.6	444.9	587.9
479.1	586.2	512.6	587.0	542.4	586.9	545.7	584.2
549.7	582.5	640.7	584.5	644.3	589.1	800.0	588.7
1,115.7	587.9	1,135.7	585.0	1,146.0	584.9	1,147.6	583.7
1,227.6	583.7	1,248.8	604.3	--	--	--	--
Cross section 12							
0.0	590.3	59.8	589.7	112.5	588.6	121.1	588.5
121.6	587.2	123.9	585.5	124.0	590.8	--	--
Cross section 13							
0.0	591.3	42.6	590.1	81.3	587.5	92.6	586.5
93.0	591.3	--	--	--	--	--	--
Cross section 14							
0.0	591.5	9.3	590.2	18.1	589.6	33.1	589.4
49.0	588.4	57.7	588.0	58.0	591.8	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14l.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 20, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	598.8	39.4	574.5	43.6	572.5	93.7	571.6
132.3	572.3	171.8	572.3	175.6	572.4	178.8	572.3
183.3	571.0	199.6	571.9	237.2	571.4	322.2	571.8
370.8	571.3	376.0	571.3	379.6	571.4	382.6	571.1
414.0	570.7	429.5	571.0	439.4	571.2	454.3	570.6
456.0	597.7	--	--	--	--	--	--
Cross section 7							
0.0	601.4	34.9	576.0	36.9	574.6	97.9	573.8
107.1	573.9	153.3	574.5	193.7	574.2	247.7	573.8
291.0	573.9	331.0	573.8	332.1	578.4	377.9	578.7
399.6	578.6	407.8	584.0	435.0	584.0	459.7	584.0
551.1	583.6	719.1	571.7	778.9	572.3	827.1	572.6
861.5	572.0	906.6	572.5	963.1	572.6	1,001.2	571.9
1,039.3	572.3	1,188.0	576.8	1,212.3	593.1	--	--
Cross section 8							
29.1	577.3	29.9	574.8	90.0	574.1	119.0	574.8
183.7	574.6	231.2	573.8	272.6	574.7	290.7	574.9
294.6	580.3	397.8	583.7	456.3	584.8	500.0	585.1
524.4	585.2	575.0	585.1	587.6	574.6	640.3	572.8
645.0	571.5	801.9	573.2	837.2	573.3	860.2	572.5
885.8	573.1	903.4	573.6	911.4	574.2	948.0	574.5
975.0	580.8	1,011.0	580.8	1,024.0	585.8	1,270.0	585.8
1,273.2	592.1	--	--	--	--	--	--
Cross section 9							
0.0	595.1	26.6	583.4	32.8	577.3	84.1	576.6
124.4	577.2	147.4	577.4	178.8	577.2	188.3	576.4
214.2	577.4	228.0	578.1	242.5	577.9	276.5	577.1
296.4	577.5	321.3	577.2	340.8	576.9	387.6	585.6
585.5	586.1	600.0	586.1	712.6	587.2	791.7	586.2
798.4	577.5	849.5	577.3	854.7	575.5	907.2	576.5
978.7	577.2	1,084.7	576.9	1,116.8	577.4	1,157.3	577.9
1,194.2	578.5	1,207.2	585.8	1,236.4	587.1	1,290.0	585.8
1,308.1	604.5	--	--	--	--	--	--

Table 14l.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 20, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 10							
0.0	595.5	49.1	586.0	131.7	587.8	200.4	587.2
301.6	587.7	418.0	586.9	421.3	581.3	480.2	581.4
530.7	580.9	577.3	580.3	635.0	580.1	637.9	581.4
642.2	581.5	646.7	581.5	661.9	580.9	695.8	581.9
698.7	586.2	829.5	587.0	1,000.0	587.2	1,055.3	587.2
1,111.0	588.0	1,188.2	589.5	1,258.9	589.5	1,296.2	584.3
1,298.2	581.6	1,351.8	581.6	1,406.3	606.4	--	--
Cross section 11							
0.0	590.3	27.5	587.3	32.7	586.4	50.5	584.7
63.3	585.1	66.9	586.4	71.0	588.6	444.4	587.9
479.1	586.2	494.0	587.4	543.6	586.9	549.2	583.6
554.6	581.8	638.7	583.6	644.3	588.9	800.0	588.5
1,114.9	587.7	1,137.3	584.9	1,139.2	582.4	1,219.2	582.4
1,248.8	604.3	--	--	--	--	--	--
Cross section 12							
0.0	590.3	91.6	588.6	115.5	588.7	116.5	586.9
117.0	590.8	--	--	--	--	--	--
Cross section 13							
0.0	591.3	32.4	590.4	84.9	587.3	94.8	586.5
96.0	590.8	--	--	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14m.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 21, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	598.8	54.5	571.9	70.0	571.4	79.3	571.9
99.1	572.0	102.0	571.6	121.2	571.9	123.0	572.1
139.2	572.2	160.6	572.1	161.7	571.5	179.9	570.7
208.7	571.3	222.1	571.4	232.3	571.1	246.4	570.7
269.1	571.3	289.4	571.3	312.4	571.0	362.1	570.8
500.0	570.5	692.3	570.3	756.3	570.5	786.3	571.0
846.7	570.7	873.9	571.1	918.1	570.9	953.3	570.5
982.5	570.7	1,020.8	570.6	1,039.0	570.2	1,040.0	598.8
Cross section 7							
0.0	601.4	39.6	573.5	42.2	573.9	48.6	573.2
55.2	573.9	64.8	574.4	73.3	574.2	77.8	572.7
152.3	572.6	154.5	574.0	159.9	574.3	188.0	574.2
221.8	573.4	232.6	573.1	303.3	573.5	325.6	577.9
333.8	573.3	361.2	573.2	396.6	579.2	404.3	583.9
435.0	584.0	444.6	584.1	511.9	584.2	578.0	571.0
623.3	571.3	666.0	571.8	693.5	571.5	719.5	571.5
751.7	571.9	768.7	572.8	820.6	572.4	865.1	572.5
906.6	572.5	958.9	572.5	977.0	572.3	1,005.9	572.3
1,026.4	571.9	1,048.5	572.3	1,188.0	576.8	1,212.3	593.1
Cross section 8							
0.0	601.4	29.4	575.1	32.6	574.2	43.2	574.0
54.4	574.3	63.0	572.7	118.0	572.9	121.8	574.2
122.9	574.8	151.1	574.9	201.5	573.9	217.2	573.6
254.5	573.8	277.8	574.0	307.7	574.0	308.6	581.1
337.1	580.6	339.8	581.9	411.1	585.1	500.0	585.1
545.5	585.1	581.1	585.3	590.4	574.3	596.5	573.7
603.3	573.5	604.5	572.9	608.1	571.6	708.0	572.4
739.8	573.1	767.6	573.6	812.9	573.3	834.4	573.8
864.1	572.8	901.5	573.9	916.9	573.8	941.1	574.3
975.0	580.8	1,011.0	580.8	1,024.0	585.8	1,270.0	585.8
1,273.2	592.1	--	--	--	--	--	--

Table 14m.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 21, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 9							
0.0	595.1	22.6	582.6	26.6	583.6	31.8	577.8
35.8	576.1	42.1	574.7	61.5	576.7	76.5	576.3
182.1	576.8	226.3	577.4	246.8	577.6	262.4	577.7
268.3	577.5	274.4	577.7	302.5	577.8	346.9	577.4
366.7	577.2	371.3	577.4	375.0	577.3	380.8	577.8
391.5	585.7	489.9	585.2	600.0	586.2	648.3	586.5
749.4	587.9	788.8	586.4	798.0	577.4	835.3	577.0
849.2	577.3	852.2	575.4	907.2	576.5	948.2	576.9
983.5	577.0	992.8	576.6	1,008.5	576.4	1,211.7	577.9
1,216.0	585.8	1,227.8	586.6	1,290.0	585.8	1,308.1	604.5
Cross section 10							
0.0	595.5	49.1	586.0	131.7	587.8	200.4	587.2
301.6	587.7	429.2	587.1	438.8	581.1	458.2	580.7
473.0	581.1	485.1	581.3	495.0	581.4	512.8	581.2
565.4	581.5	569.2	579.9	638.7	580.2	643.1	581.3
651.6	581.7	660.0	581.4	680.5	580.6	690.7	580.6
695.1	581.7	700.6	586.3	829.5	587.0	1,000.0	587.1
1,055.3	587.2	1,111.0	587.0	1,188.2	589.5	1,259.0	589.5
1,294.2	584.6	1,295.0	580.8	1,351.8	580.8	1,406.3	606.4
Cross section 11							
0.0	590.7	27.5	587.3	32.7	586.4	50.5	584.7
63.3	585.1	66.9	586.4	71.0	588.6	444.4	587.9
479.1	586.2	509.8	587.2	545.1	586.8	550.6	583.2
559.9	582.5	585.1	581.9	635.8	582.3	637.6	583.5
643.7	588.6	800.0	588.5	1,109.0	588.4	1,118.7	586.3
1,121.5	582.3	1,201.5	582.7	1,248.8	604.3	--	--
Cross section 12							
0.0	590.3	94.1	588.6	111.1	588.9	111.9	586.8
116.5	585.0	117.0	590.8	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14n.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 22, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	598.8	56.9	572.0	74.9	572.0	111.1	571.8
125.3	571.2	149.3	571.7	191.1	571.5	251.0	571.3
271.9	570.9	318.1	570.0	359.1	570.5	391.6	570.5
392.0	570.5	436.2	570.5	469.8	570.3	471.0	598.8
Cross section 7							
0.0	601.4	36.5	573.8	38.2	573.1	45.9	573.3
53.6	572.0	118.8	572.1	150.6	572.9	164.8	573.5
166.3	574.2	188.9	574.1	189.4	574.1	191.2	573.5
202.6	572.3	234.9	573.4	261.9	573.0	294.4	573.6
305.1	573.5	323.4	572.6	378.5	578.0	385.7	572.6
402.1	578.2	416.2	579.2	423.9	584.0	435.0	584.0
441.0	584.0	472.9	584.1	481.5	572.0	545.6	571.7
596.1	572.1	701.0	571.6	1,048.0	572.3	1,188.0	576.8
1,212.3	593.1	--	--	--	--	--	--
Cross section 8							
0.0	601.4	29.8	574.7	42.4	573.9	49.5	572.3
108.0	572.2	118.4	573.8	120.1	574.7	143.6	574.6
181.5	574.7	182.8	574.3	193.1	571.9	224.6	574.0
262.9	574.0	291.3	573.1	306.9	574.2	313.9	580.4
336.9	580.3	339.6	581.6	420.5	584.9	500.0	585.0
545.9	585.0	582.8	585.1	589.9	574.3	603.3	573.0
652.0	573.1	950.0	573.8	975.0	580.8	1,011.0	580.8
1,024.0	585.8	1,270.0	585.8	1,273.2	592.1	--	--
Cross section 9							
0.0	595.1	26.3	583.3	30.2	575.6	59.5	574.4
91.6	575.1	110.1	575.3	133.9	575.5	166.5	576.8
182.0	577.3	209.5	577.5	250.9	576.6	353.6	577.7
385.1	578.6	530.6	585.2	600.0	585.8	748.1	586.5
778.5	586.2	789.2	576.9	819.2	576.6	843.6	577.2
846.0	575.3	861.5	574.6	881.3	575.8	915.5	576.2
973.3	576.7	1,037.9	576.4	1,212.0	575.8	1,216.0	585.8
1,290.0	585.8	1,308.1	604.5	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14o.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 23, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 6							
0.0	598.8	42.9	572.6	44.9	571.6	51.2	571.6
62.5	571.9	77.8	572.0	88.6	571.7	125.1	571.2
141.2	571.6	157.1	571.8	167.5	571.7	178.5	571.9
181.8	571.5	219.9	571.1	269.2	571.3	305.4	571.1
333.0	570.3	386.0	570.6	463.4	570.5	507.0	570.5
574.0	570.5	626.3	570.5	727.7	570.2	929.2	570.0
975.6	570.5	1,014.5	570.4	1,016.0	598.8	--	--
Cross section 7							
0.0	601.4	35.2	576.1	35.8	574.0	39.8	572.3
94.2	573.4	133.2	573.4	156.4	573.9	161.2	574.5
167.7	574.1	179.9	573.9	196.6	574.2	213.1	573.9
227.0	573.4	240.1	574.0	253.9	573.4	271.7	574.0
298.8	573.7	328.6	573.5	366.8	573.1	385.6	578.2
408.2	578.8	420.0	584.2	435.0	584.2	441.4	584.2
473.7	584.1	481.4	572.4	506.4	572.3	540.7	572.4
578.5	572.3	612.5	572.5	663.8	571.6	703.2	572.0
756.2	571.7	810.7	570.8	813.7	572.4	853.4	572.7
911.7	572.9	954.5	572.7	1,011.4	572.3	1,188.0	576.8
1,212.3	593.1	--	--	--	--	--	--
Cross section 8							
0.0	601.4	28.4	577.4	29.8	574.8	35.0	573.3
103.0	573.7	127.5	574.0	146.3	574.6	157.5	575.0
168.5	574.5	185.7	574.4	239.9	574.2	261.9	574.1
267.8	574.4	278.9	574.6	294.3	574.4	309.1	574.4
324.8	580.0	341.3	579.8	344.9	581.2	357.3	580.8
363.3	580.9	368.2	582.8	413.3	584.9	500.0	585.0
520.6	585.1	579.0	585.2	589.7	574.4	593.2	573.5
620.2	572.5	644.7	572.6	766.6	571.9	770.5	573.0
799.3	573.3	846.3	573.2	872.8	573.1	879.9	573.1
895.8	573.3	900.4	573.2	904.1	573.8	910.9	573.8
915.9	573.6	919.2	574.3	939.5	574.3	965.0	574.1
975.0	580.5	1,011.0	580.8	1,024.0	585.8	1,270.0	585.8
1,273.2	592.1	--	--	--	--	--	--

Table 14o.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 23, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 9							
0.0	595.1	24.2	582.9	32.0	575.6	34.9	574.4
42.7	574.1	48.6	575.3	78.4	575.2	104.4	574.5
154.3	575.0	195.6	575.7	206.6	576.1	219.6	575.9
229.7	575.9	241.9	576.2	259.8	576.5	272.5	576.8
286.1	576.7	295.8	576.9	314.0	577.4	341.9	577.4
363.9	577.2	396.3	577.1	438.9	578.3	445.9	585.0
579.7	586.2	600.0	587.1	752.4	587.9	762.5	586.7
790.4	586.2	802.6	577.0	833.5	576.9	850.3	577.2
852.9	575.4	859.2	575.3	875.2	574.8	886.3	575.7
927.1	576.5	976.4	577.2	1,001.8	576.3	1,020.3	576.4
1,209.5	575.6	1,214.0	577.8	1,219.8	585.5	1,228.0	586.6
1,235.4	587.1	--	--	--	--	--	--
Cross section 10							
0.0	595.5	9.1	586.0	131.7	587.8	200.4	587.2
301.6	587.7	339.3	586.9	406.1	586.9	441.4	586.9
457.1	580.8	465.9	580.6	469.3	578.8	546.7	579.8
586.6	580.3	620.4	580.0	637.8	580.4	641.1	581.7
645.5	581.5	658.6	581.1	661.9	579.9	669.3	579.1
680.6	580.0	690.7	580.8	699.7	586.3	829.5	586.9
1,000.0	588.1	1,261.0	589.3	1,293.6	584.8	1,296.0	579.2
1,351.8	579.2	1,406.3	606.4	--	--	--	--
Cross section 11							
0.0	590.7	27.5	587.3	32.7	586.4	50.5	584.7
63.3	585.1	66.9	586.4	71.0	588.6	444.4	587.9
479.1	586.2	500.1	587.2	527.9	587.1	542.6	586.8
549.6	582.8	557.1	581.7	569.9	583.0	586.2	582.2
602.3	581.4	648.1	582.1	650.5	583.0	653.8	589.3
800.0	588.8	1,106.9	588.4	1,109.4	580.1	1,189.4	580.1
1,248.8	604.3	--	--	--	--	--	--
Cross section 12							
0.0	590.3	77.0	589.2	108.7	588.7	110.6	586.2
112.4	585.3	113.0	590.8	--	--	--	--
Cross section 13							
0.0	591.3	83.5	587.4	90.9	586.5	94.0	585.0
130.9	584.1	137.7	584.9	149.3	586.3	153.5	587.2
155.0	590.8	--	--	--	--	--	--

Table 14o.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 23, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 14							
0.0	591.5	25.1	589.6	49.9	588.6	61.5	588.1
71.5	586.9	73.5	586.2	105.0	586.6	109.9	588.1
113.6	588.5	138.7	590.5	140.0	591.8	--	--
Cross section 15							
0.0	591.4	1.6	586.2	13.5	586.9	21.0	586.8
23.3	585.5	29.7	586.3	40.6	587.2	46.1	588.4
51.3	589.6	61.0	590.6	71.2	587.6	79.0	587.5
84.5	587.7	100.6	588.8	102.0	591.8	--	--
Cross section 16							
0.0	597.8	0.1	592.0	34.5	590.3	54.0	590.0
83.0	588.6	90.3	589.6	112.7	593.1	123.8	591.0
126.2	590.6	147.3	590.0	151.8	589.4	157.2	588.3
167.7	587.2	169.0	597.8	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

Table 14p.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 26, 1994. Distances are measured from the west (left bank) end of section*
[Dist., distance; Elev., elevation; --, no data]

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 7							
0.0	601.4	36.8	575.7	37.5	575.2	41.6	572.2
65.4	573.9	94.5	574.3	127.4	573.9	143.6	573.7
146.2	574.3	186.4	574.5	231.2	573.9	269.6	574.0
310.9	573.7	355.2	573.8	356.7	573.9	384.3	574.5
387.5	578.1	407.8	578.9	419.4	584.0	435.0	583.9
442.6	583.9	474.3	584.0	482.7	574.6	488.2	572.5
1,011.0	572.5	1,143.8	576.0	1,188.0	576.8	1,212.3	593.4
Cross section 8							
0.0	601.4	28.5	575.5	28.7	575.1	34.6	572.4
52.5	572.2	58.0	574.1	77.5	574.0	95.8	573.8
107.3	574.4	118.9	574.0	128.1	574.4	133.6	574.4
137.9	573.6	145.0	573.9	150.7	574.7	168.2	574.8
196.1	575.1	209.2	574.2	215.0	574.7	233.8	574.6
235.1	575.0	237.1	574.7	244.5	574.1	249.2	575.1
256.5	575.1	265.0	575.1	269.6	575.0	296.9	574.6
303.3	573.9	307.3	574.4	309.1	575.1	315.2	580.7
335.9	580.6	339.3	581.9	345.1	581.4	352.1	582.2
367.7	582.8	381.5	583.5	414.0	585.0	453.3	584.9
500.0	585.0	507.7	585.0	579.7	585.2	590.8	574.7
610.7	573.0	626.9	571.6	903.8	572.9	910.3	574.0
915.9	574.2	963.9	574.5	974.9	580.3	1,011.1	580.3
1,023.7	585.6	1,081.0	585.5	1,270.0	585.8	1,273.2	592.0
Cross section 9							
0.0	595.1	29.0	577.0	31.7	575.3	42.9	574.3
46.6	573.9	56.6	574.6	75.1	575.2	81.7	574.7
144.1	575.0	187.4	575.1	222.8	575.1	234.8	575.8
263.1	576.4	268.5	576.7	301.2	576.5	309.0	576.9
328.1	577.3	354.8	577.2	361.7	577.2	376.7	576.9
380.6	576.8	382.1	577.5	395.6	577.5	407.4	577.6
410.2	577.8	412.4	577.7	433.4	575.8	455.4	576.8
460.4	576.1	468.0	576.0	473.5	577.0	490.2	576.5
507.1	575.9	511.9	577.9	519.0	585.0	538.2	585.4
570.7	586.4	585.6	586.1	600.0	584.2	601.9	584.0
611.9	584.7	637.2	585.1	649.6	586.6	670.2	587.2
673.9	586.8	684.2	587.2	711.6	586.9	725.6	587.2
731.5	587.7	746.0	587.6	746.0	587.6	754.2	586.9
769.9	585.8	786.9	586.2	799.3	577.5	823.2	576.2
850.9	577.3	854.0	575.5	860.8	575.5	873.9	574.3
880.2	574.2	885.2	575.4	912.7	576.5	941.8	576.8
992.7	576.3	1,003.6	575.4	1,013.0	575.2	1,024.4	575.5

Table 14p.--*Cross-section profile coordinates for Lake Mills Delta deposit, April 26, 1994. Distances are measured from the west (left bank) end of section--Continued*

Dist. (feet)	Elev.[1] (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)	Dist. (feet)	Elev. (feet)
Cross section 9--Continued							
1,033.8	575.3	1,041.7	576.0	1,054.0	576.0	1,060.4	574.4
1,085.7	575.1	1,110.4	576.4	1,137.8	577.2	1,194.0	576.8
1,215.8	575.7	1,221.8	577.7	1,223.9	585.4	1,232.0	586.6
1,232.0	586.6	1,290.0	585.8	1,308.1	604.5	--	--
Cross section 10							
0.0	595.5	20.8	586.9	26.2	584.9	43.1	585.6
80.4	586.2	113.5	585.6	131.1	587.5	165.8	588.0
209.1	586.0	241.1	585.3	260.3	586.9	309.7	587.6
332.7	586.7	352.7	586.8	416.3	586.7	433.8	580.2
441.2	578.3	485.2	578.3	513.5	579.0	583.0	580.3
593.7	580.3	626.4	579.2	632.8	579.2	636.9	579.4
642.7	581.8	649.7	581.7	661.7	581.0	663.3	579.6
670.0	579.2	689.2	580.7	699.6	586.4	730.5	587.6
771.2	586.4	815.5	587.6	819.6	587.0	829.6	587.0
860.5	587.7	873.5	585.9	909.9	588.0	950.2	587.7
998.3	585.1	1,000.0	585.5	1,010.5	587.3	1,025.6	588.4
1,044.0	587.3	1,067.1	586.8	1,085.3	587.3	1,111.8	587.9
1,123.7	586.6	1,139.3	589.1	1,188.8	589.4	1,217.8	588.7
1,254.6	589.9	1,264.1	588.3	1,292.2	585.0	1,296.9	580.7
1,307.7	578.5	1,351.8	578.5	1,406.3	606.4	--	--
Cross section 11							
0.0	590.7	27.5	587.3	32.7	586.4	50.5	584.7
63.3	585.1	66.9	586.4	71.0	588.6	146.7	588.7
159.1	589.3	169.1	587.8	183.3	589.8	194.2	588.3
201.8	589.4	225.2	589.7	240.9	588.0	252.2	588.4
255.1	589.3	271.1	589.7	332.2	589.6	365.2	587.6
372.3	589.7	385.9	587.6	397.0	589.1	417.3	589.1
425.5	587.1	448.7	587.9	481.1	586.1	495.2	587.4
543.9	586.9	553.1	582.6	558.2	582.0	560.4	581.9
565.9	582.4	573.6	583.0	580.6	582.2	600.9	581.5
619.4	581.0	648.8	580.5	654.2	582.4	660.1	589.3
663.0	589.5	738.6	589.3	788.9	587.7	800.0	586.8
835.5	586.3	896.9	588.9	963.0	588.6	986.4	589.2
1,096.8	588.4	1,105.5	588.5	1,109.4	582.2	1,115.0	579.7
1,189.0	579.7	1,248.8	604.3	--	--	--	--

[1] Elevations are referenced to Bureau of Reclamation survey datum. Add 0.9 feet to convert them to National Geodetic Vertical Datum of 1929.

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