Lochsa River

General Information

The Lochsa River joins the Selway River near Lowell, Idaho to form the Clearwater River. The study reach is a 1,900 ft length of stream about 0.9 miles upstream from the confluence with the Selway River at the USGS gage (13337000 Lochsa River near Lowell, ID) . The site is on land administered by the Forest Service at an elevation of about 1,453 ft. The drainage area is 1,179.4 mi^2 and the geology of the watershed is intrusive igneous and metamorphic rock.

In 1994, 1995 and 1997, personnel of the US Geological Survey measured sediment transport at this site. Additional information collected at this site include a survey of the stream reach, pebble counts of the substrate surface and core samples of substrate subsurface material. Figures 1 and 2 show photographs of the Lochsa River looking upstream and downstream from the measurement location for stream discharge and sediment transport.

Figure 1. The Lochsa River looking upstream from the measurement site.

Figure 2. The Lochsa River looking downstream from the measurement site.

Streamflow records are available for this site for October 1910 to September 1912 and October 1929 to the present. Prior to November 21, 1930 the gage site was about 1 mile upstream of the current location. Estimated average annual streamflow (Q_a) for the stream is 2,860 ft^3/s (32.9 in) and the estimated bankfull discharge (Q_b) is 15,750 ft^3/s. Stream discharge was very low in 1994 and the largest daily mean discharge was only 11,900 ft^3/s. In 1995 the largest daily mean discharge recorded was 24,600 ft^3/s on November 30, well above bankfull discharge. The largest instantaneous discharge for the period of record is 35,100 ft^3/s on June 8, 1964.

Cross-Section

Figure 3 shows a cross-section of the channel at a location about 430 ft downstream of the USGS gage. The average gradient for the study reach is 0.0023 ft/ft. All sediment transport measurements were made from the cableway.

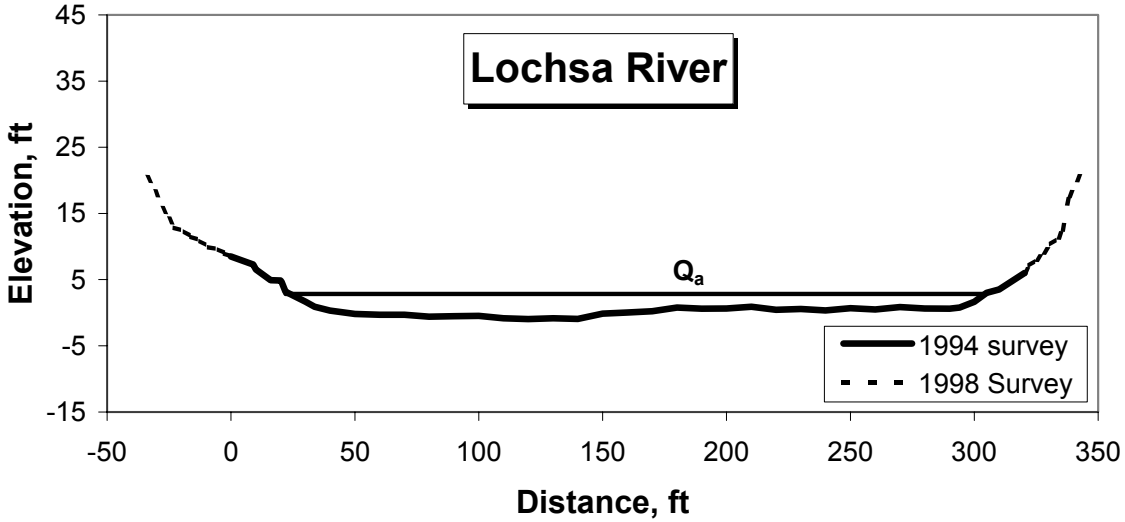

Figure 3. Cross-section of the Lochsa River about 430 ft downstream of the gage.

Channel Geometry

The channel geometry relationships for the cross-section where all the sediment transport sampling occurred (cableway) are shown in Figure 4. The cableway is about 40 ft downstream of the gage. Data collected at the cableway in 1994 through 1998 were used to develop the displayed power relationships with discharge. Over the range of discharges when sediment transport was measured (3,910 to 26,800 ft^3/s) estimated stream width, estimated average depth and estimated average velocity varied from 232.4 to 262.5 ft, 5.6 to 10.5 ft, and 3.0 to 9.7 ft/s, respectively. The average reach gradient is 0.0023 ft/ft.

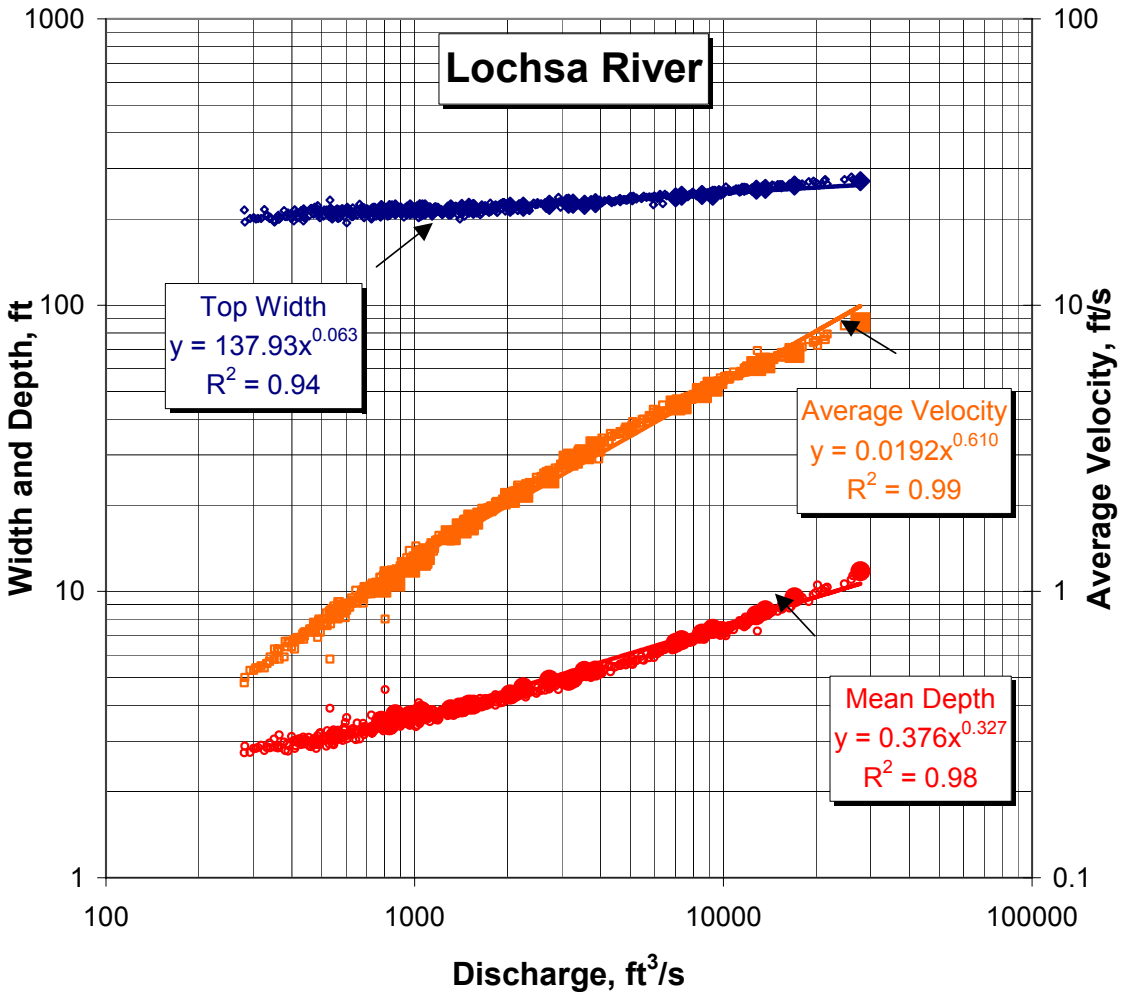

Figure 4. Width, average depth, maximum depth and velocity versus stream discharge at the measurement cross section on Lochsa River. (Solid symbols represent data used to develop the power relationship; open symbols were not used because they are either outside the range of discharges when sediment transport was measured or represent data collected priorto 1994.)

Channel Material

A surface pebble count was made in September 1994 at a cross-section about 430 ft downstream of the USGS gage. Surface pebble counts were also made along three transects in the reach in September of 1995 and three subsurface core samples were collected. The average D_{50} and D_{90} for the combined surface material were 148 mm and 320 mm in 1994 and 126 mm and 339 mm in 1995, respectively. The average D_{50} and D_{90} for the combined subsurface material in 1995 were 26 mm and 177 mm, respectively (Figure 5). Four of the five floodplain samples collected in 1997 had median diameters between 0.16 and 0.20 mm. The fifth floodplain sample had a median diameter of about 24 mm.

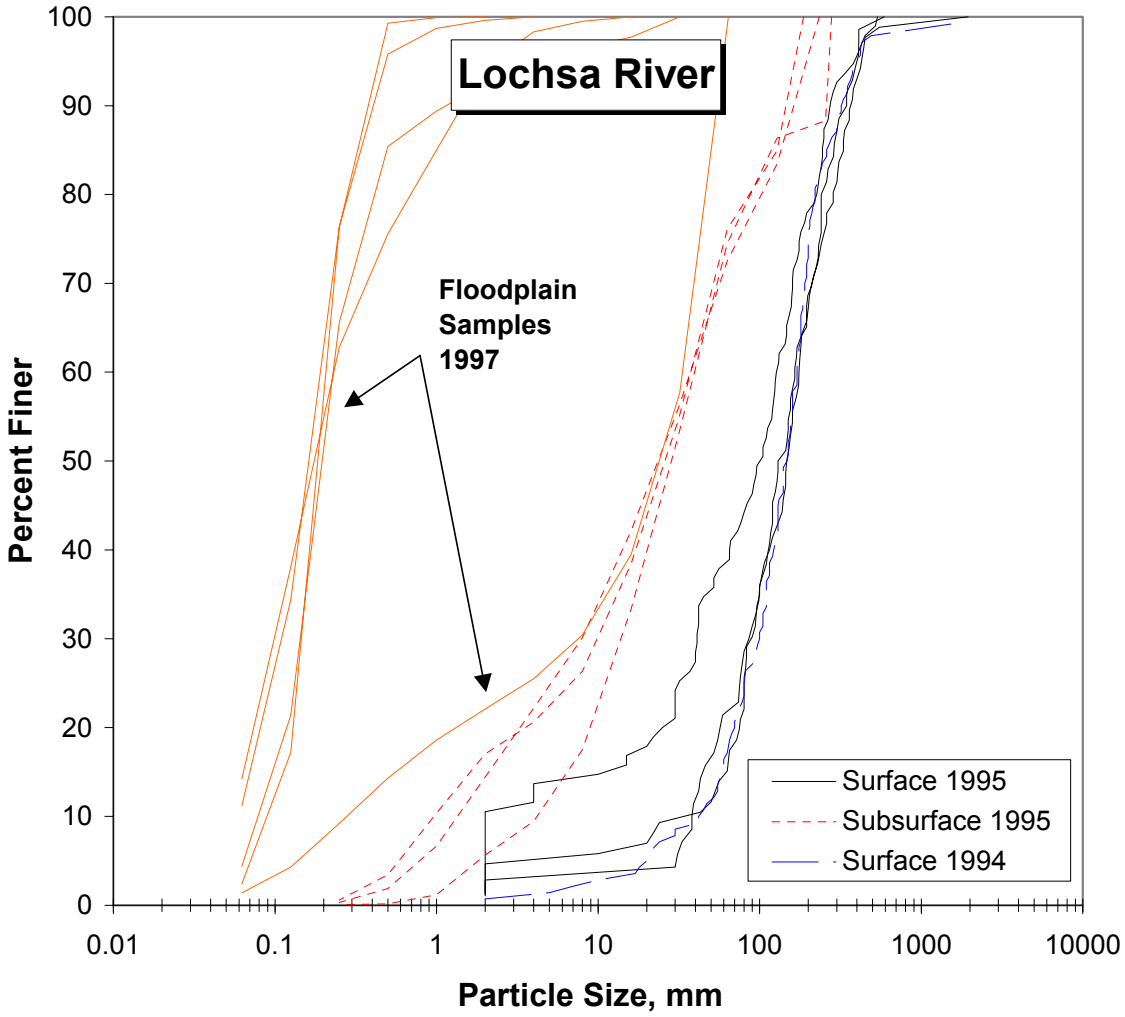

Figure 5. Particle size distribution for surface and subsurface material samples and for floodplain samples in the Lochsa River.

Sediment Transport

Sediment transport measurements made in water years 1994 through 1997 includes 72 measurements of bedload transport and 36 measurements of suspended sediment transport. Sediment transport measurements spanned a range of stream discharges from 3,910 ft^3/s ($1.37Q_a$; $0.25\ Q_b$) to 26,800 ft^3/s ($9.37Q_a$; $1.70Q_b$). Bedload transport ranged from 0.0800 to 346 t/d and suspended transport ranged from 14.7 to 37,100 t/d. Over the range of measured discharges, suspended transport accounts for the majority of the material in transport with between one and two orders of magnitude greater suspended transport than bedload transport (Figure 6).

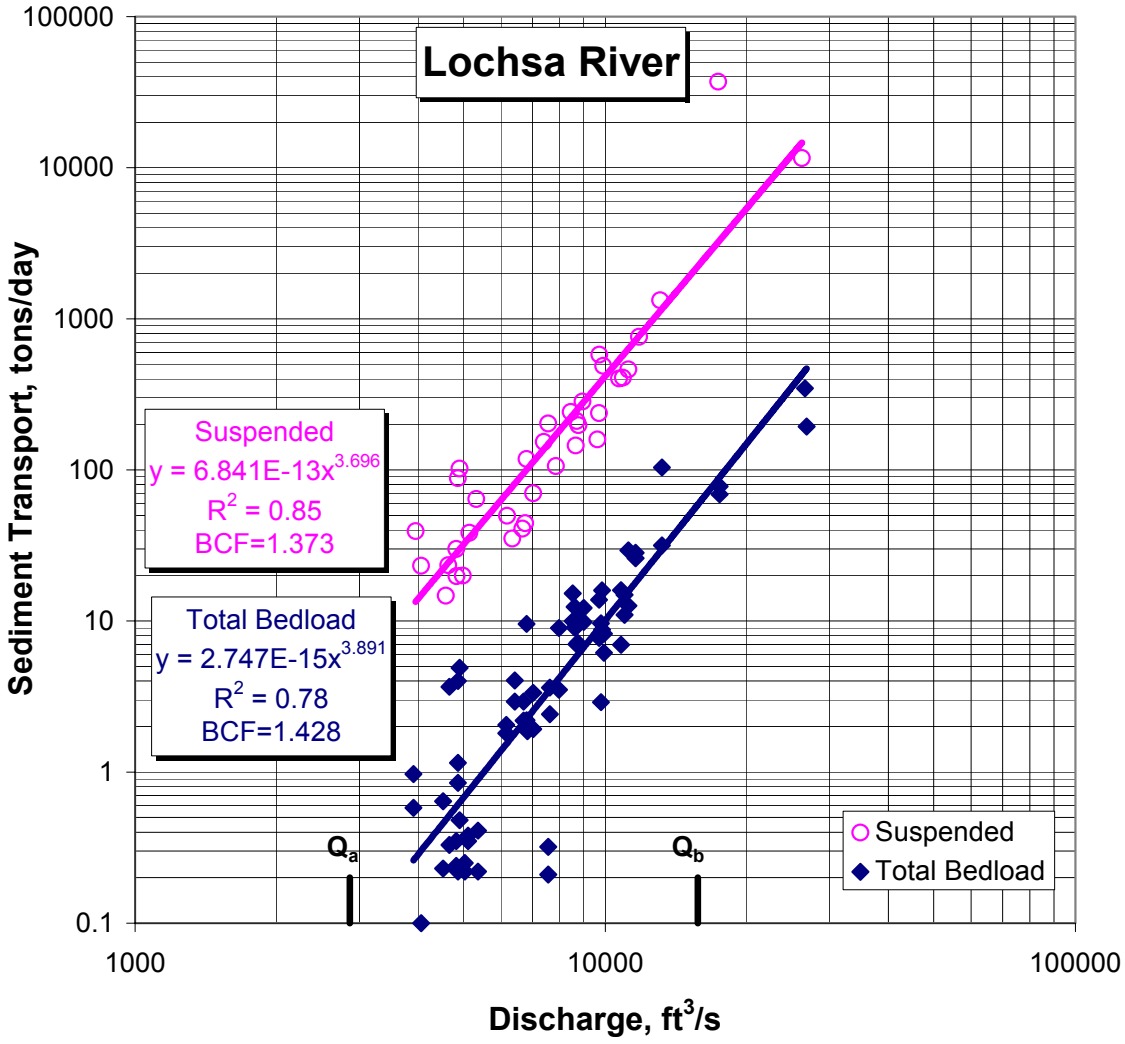

Figure 6. Bedload and suspended load transport rate versus discharge.

The bedload transport rates by size class (Figure 7) shows that the larger rates are associated with material in the 0.5 to 2mm diameter size class. No relationship is shown for sediment >32mm diameter since only three of the samples contained this size class of material. All discharges transporting material >32mm exceeded 6,800 ft^3/s.

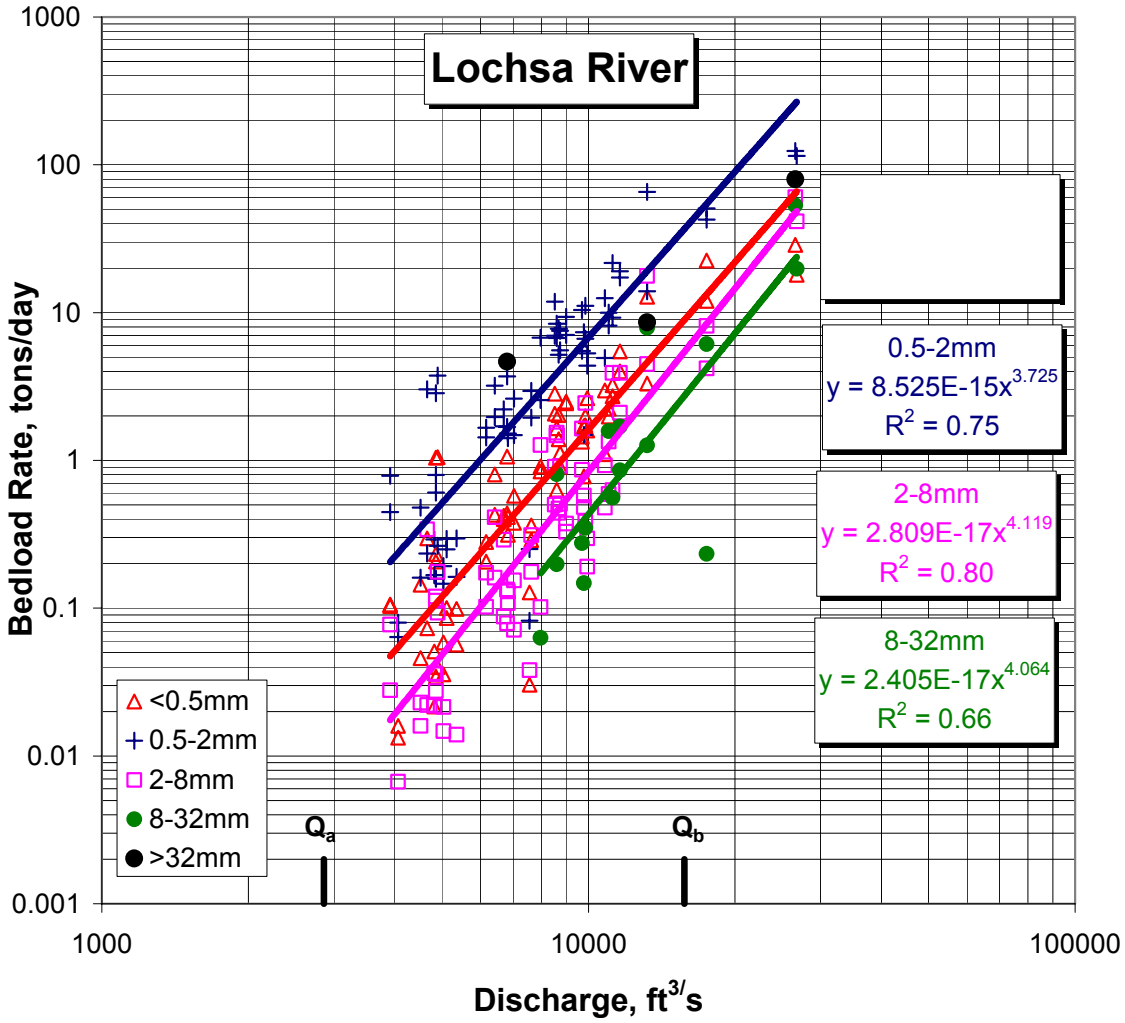

Figure 7. Bedload transport rate versus discharge for selected size classes.

The size of the largest particle in the bedload sample increased with discharge (Figure 8). The largest particle measured in a bedload sample was 45 mm at a discharge of 26,600 ft^3/s. The D_{50} for most of the bedload samples was in the sand size, 0.5 to 2.0 mm. The largest median diameter of a bedload sample was only 3.0 mm. The information on the largest particle in the bedload sample and observations of recently moved large rocks and associated instantaneous peak discharges for that snowmelt period suggest that the median diameter particles on the channel surface begin to move at discharges larger than the bankfull discharge.

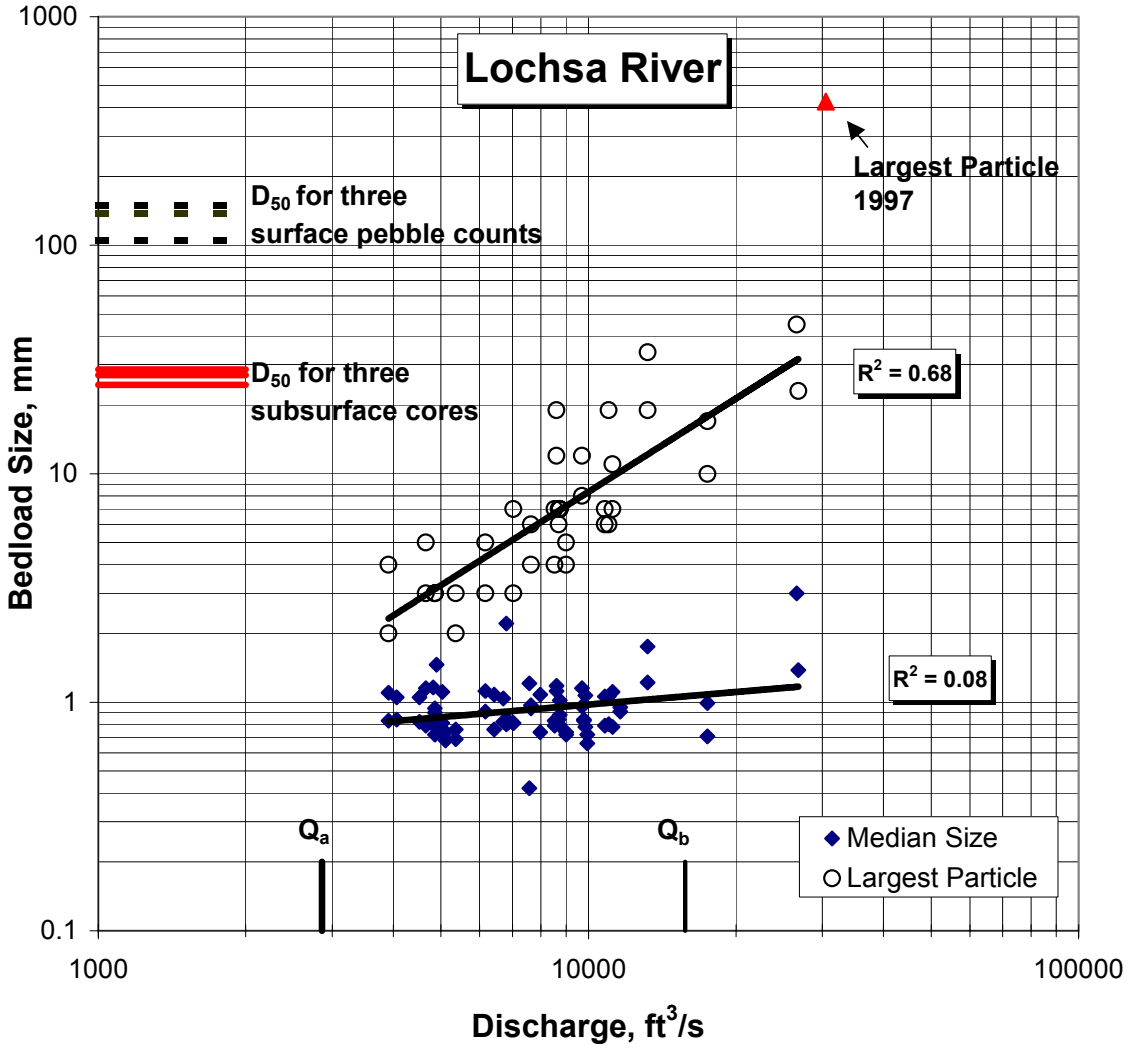

Figure 8. Median size of the bedload sample and the largest particle size versus stream discharge for the Lochsa River.