West Fork Buckhorn Creek

General Information

West Fork Buckhorn Creek flows into Buckhorn Creek about 0.5 miles upstream of the confluence with the South Fork of the Salmon River. The study reach is about a 376 ft length of stream near the now discontinued Geological Survey (USGS) gaging station (13310670 West Fork Buckhorn Creek near Krassel Ranger Station, ID) on the Payette National Forest. The gaging station is on the left bank about 125 ft upstream of a bridge at an elevation of approximately 4,140 ft. The drainage area is 22.6 mi^2 and the geology of the watershed is predominantly intrusive igneous.

Sediment transport measurements were made by Forest Service personnel during the spring snowmelt flows in 1990 through 1994. Additional information collected at this site by Case Western Reserve University personnel include a survey of the stream reach and pebble counts of the substrate surface in 1994. Figure 1 shows the site looking upstream from the bridge.

Figure 1. West Fork Buckhorn Creek looking upstream from the gaging station.

Streamflow was recorded for water years 1990 through 1994. The range of daily mean discharge for this period is 2.4 ft^3/s to 270 ft^3/s. Average annual streamflow (Q_a) for the period of record is 23.4 ft^3/s. The estimated long-term average annual streamflow is 36.4 ft^3/s and estimated bankfull discharge (Q_b) is 202 ft^3/s. During the five year period of record, daily mean discharge exceeded bankfull flow in just one water year, 1993, for about 13 days. The maximum instantaneous discharge of 293 ft^3/s occurred on May 20, 1993.

Channel Profile and Cross-Section

Figure 2 shows the longitudinal profile for the channel bed in the center of the channel, the water surface elevations along each bank at the time of the survey and bankfull flow elevations (floodplains). The average gradient for the study reach is 0.0320 ft/ft. Cross-sections were surveyed at three locations. Sediment transport measurements were made about 15 ft downstream of the bridge.

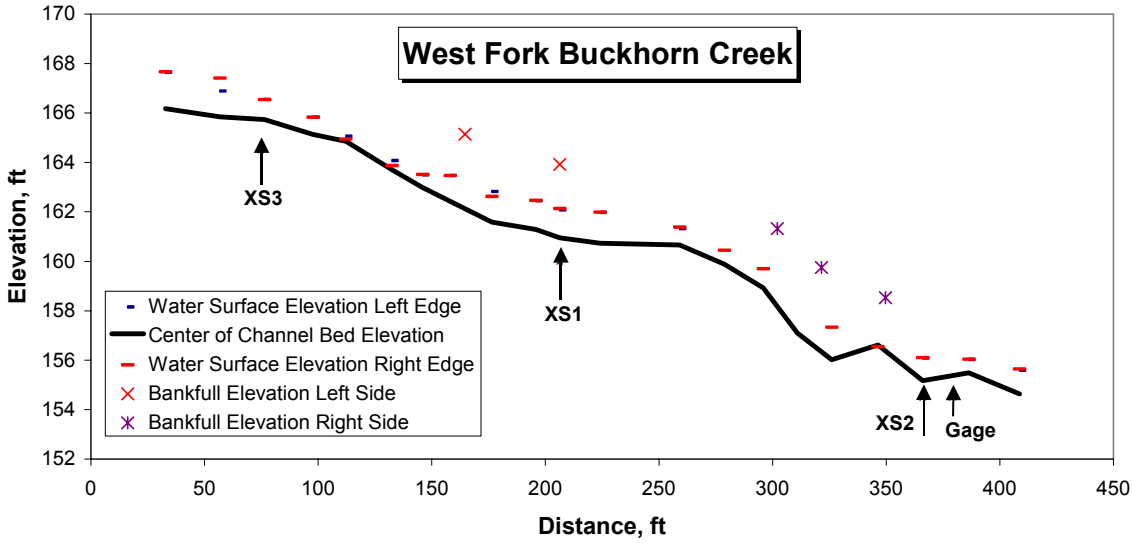

Figure 2. Longitudinal profile of the West Fork Buckhorn Creek study reach.

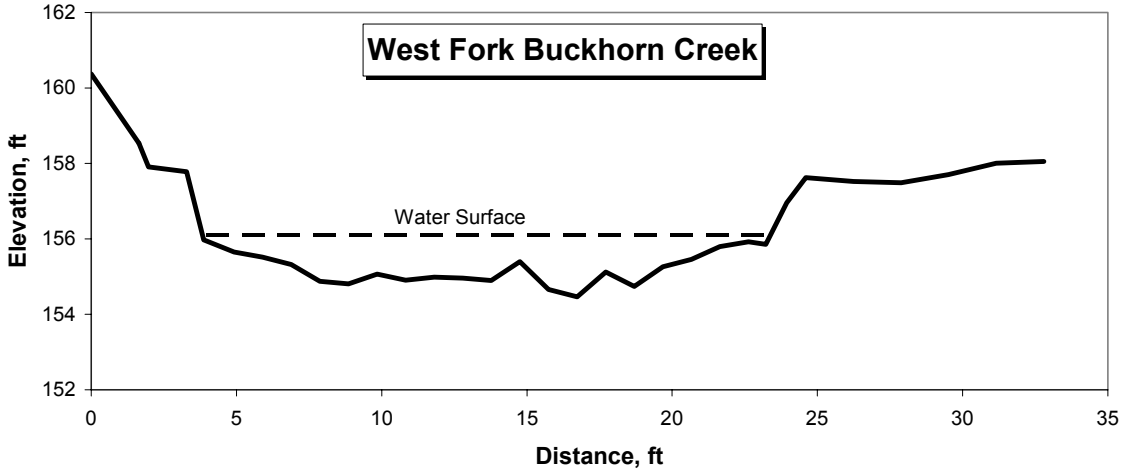

Figure 3. Cross-section 2 (XS2) of the West Fork Buckhorn Creek study reach.

Figure 3 shows the cross-section (XS2) of the channel about 15 ft upstream of the gage station and the water surface at the time of the survey, July 28 1994. The channel geometry relationships for various locations in the reach are shown in Figure 4. Data used were 1989 through 1994 information from USGS discharge notes that were not influenced by ice conditions. The power equations displayed are for locations 10 to 15 downstream of the gage. Over the range of discharges when sediment transport was measured (12 to 242 ft^3/s) estimated stream width, estimated average depth and estimated average velocity varied from 17.9 to 32.0 ft, 0.86 to 1.49 ft, and 0.8 to 5.1 ft/s, respectively. The average reach slope is 0.0320 ft/ft.

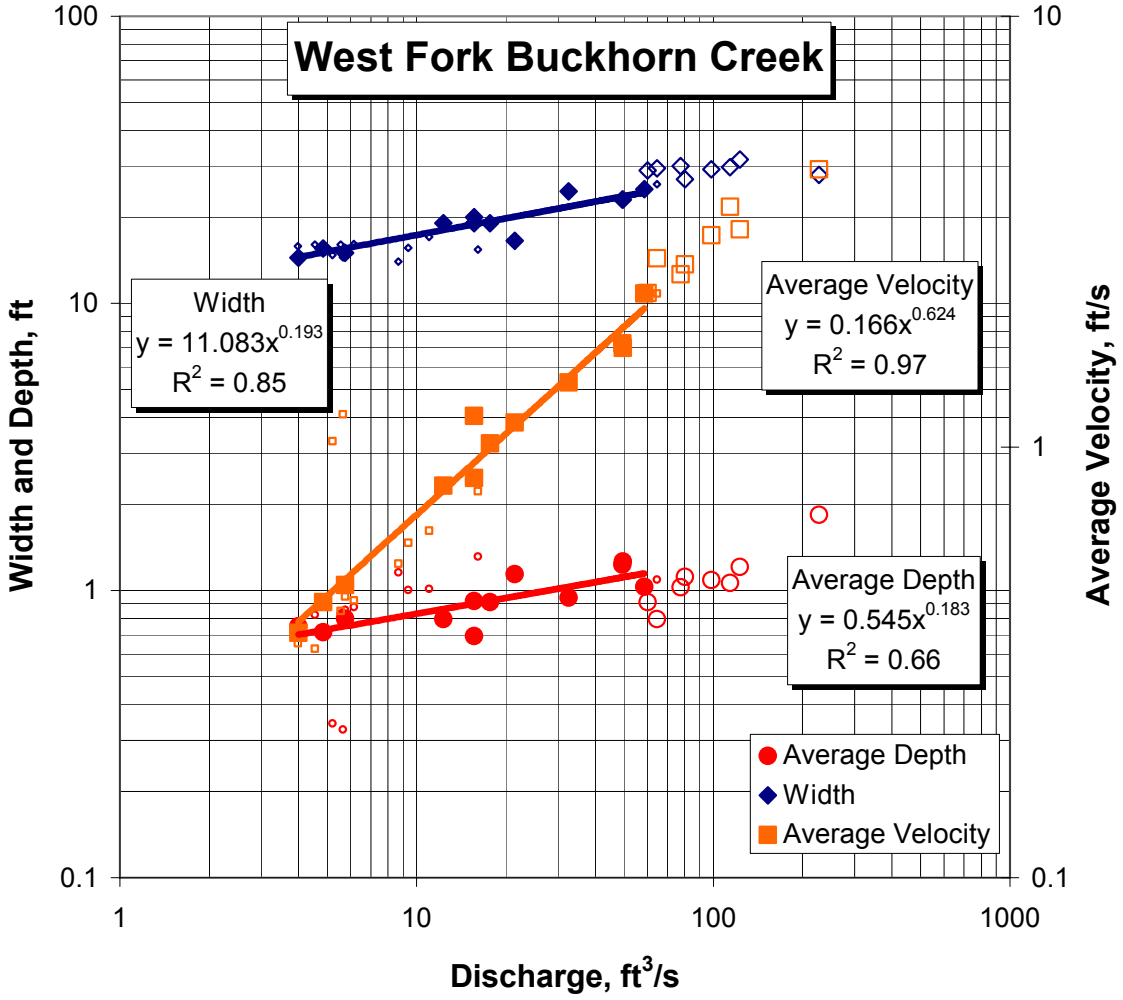

Figure 4. Width, average depth and average velocity versus stream discharge for the study reach on West Fork Buckhorn Creek. (Solid symbols represent locations 10-15 ft downstream of the gage; large open symbols are for locations 60 to 150 ft downstream and small open symbols are for locations within 5 ft of the gage.)

Channel Material

Surface pebble counts were made at cross-section 2 on July 28, 1994. No subsurface cores were collected at this site. The average D_{50} and D_{90} for the surface material in the reach were 180 mm and 750 mm, respectively (Figure 5).

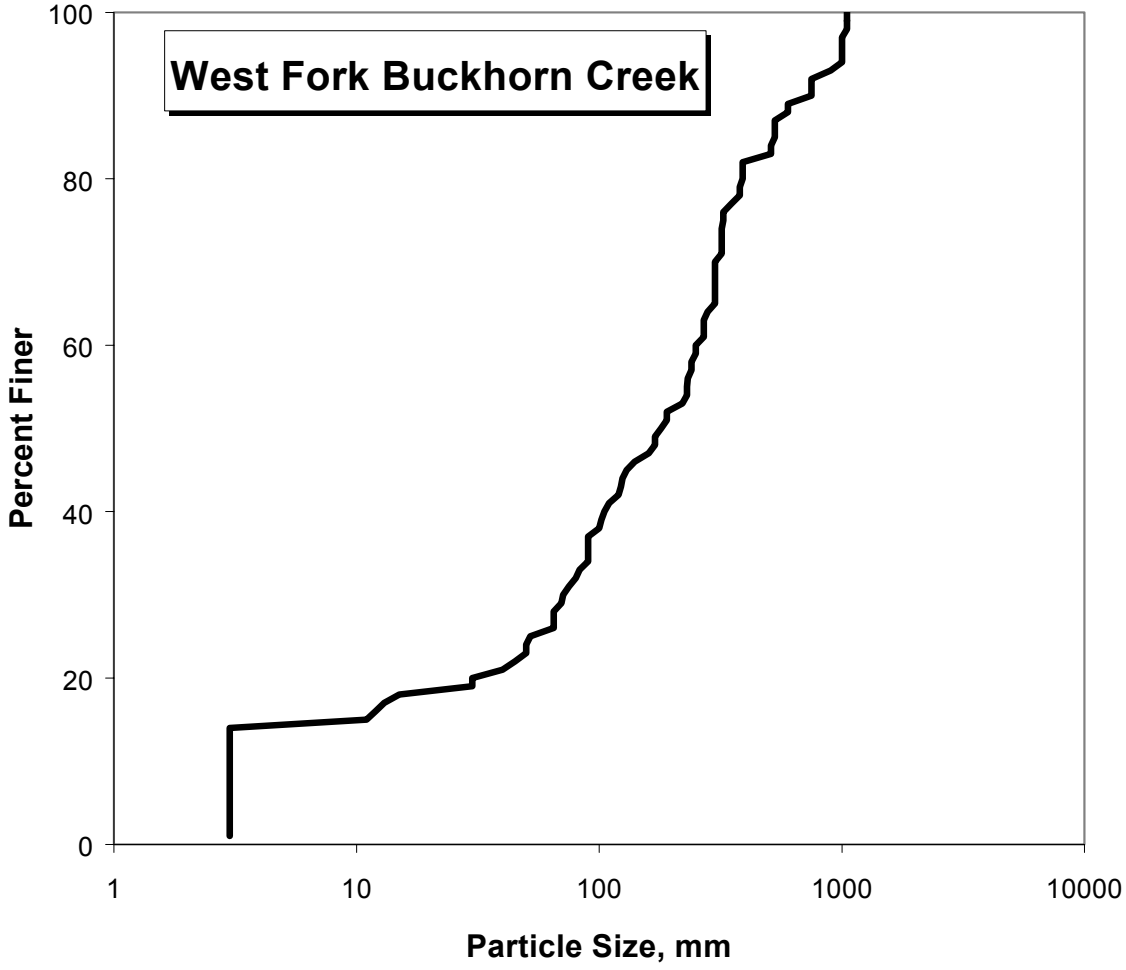

Figure 5. Particle size distribution for surface material samples in West Fork Buckhorn Creek.

Sediment Transport

The sediment transport data include 85 measurements of bedload transport and 68 measurements of suspended sediment transport. Sediment transport was measured about 15 ft downstream of the bridge or about 140 ft downstream of the gage station. Sediment transport measurements spanned a range of stream discharges from 12 ft^3/s ($0.33Q_a$; $0.06Q_b$) to 242 ft^3/s ($6.65Q_a$; $1.20Q_b$). Bedload transport ranged from 0.00442 to 7.89 t/d and suspended transport ranged from 0.0 to 209 t/d. Over the range of measured discharges, suspended transport rates are about 2 to 4 times those for bedload transport (Figure 6). 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.

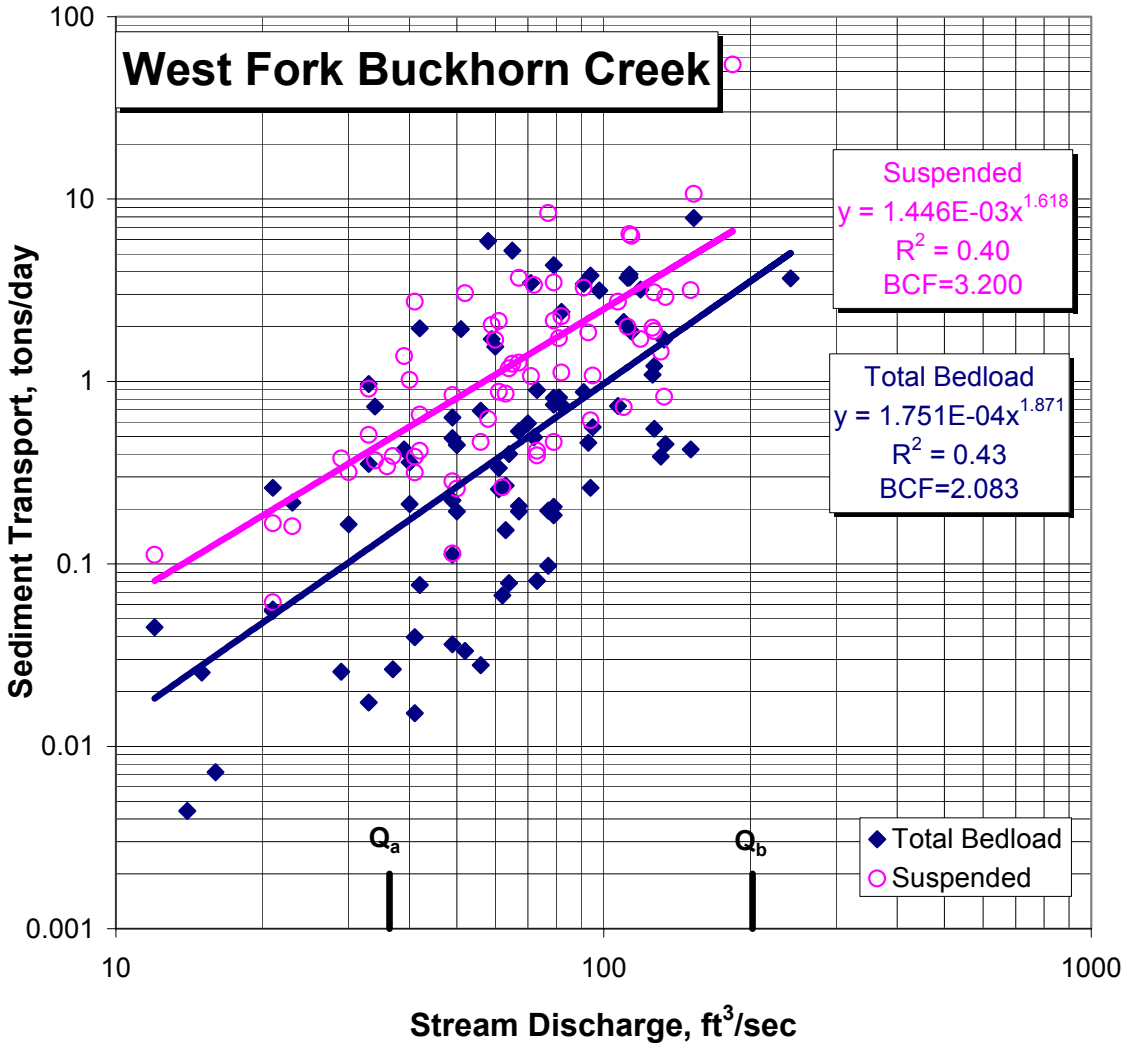

Figure 6. Bedload and suspended load transport rate versus discharge.

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.

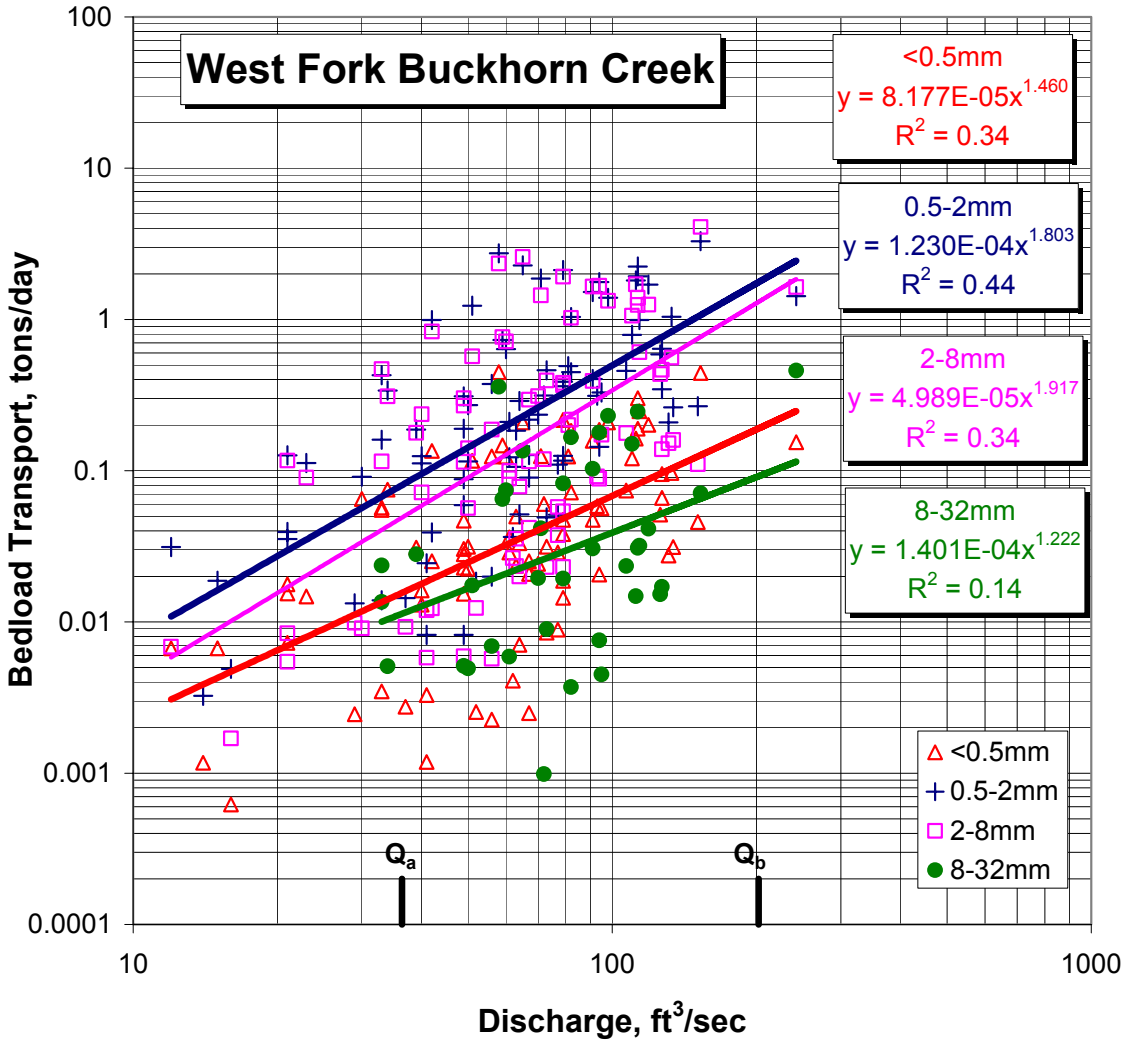

Figure 7. Bedload transport rate versus discharge for selected size classes.

Measurements of the largest particle in the bedload sample were not made for this site. However, size class data indicates that 4.72% and 44.7% of the bedload samples had particles in the 16-32 mm and 8-16 mm size class, respectively. There was a weak trend of increasing median diameter (D_{50}) of the bedload samples with increasing discharge. The D_{50} for 87% of the bedload samples was in the sand size, 0.5 to 2.0 mm. The largest median diameter of the bedload samples was 2.5 mm at a discharge of 40 ft^3/s.

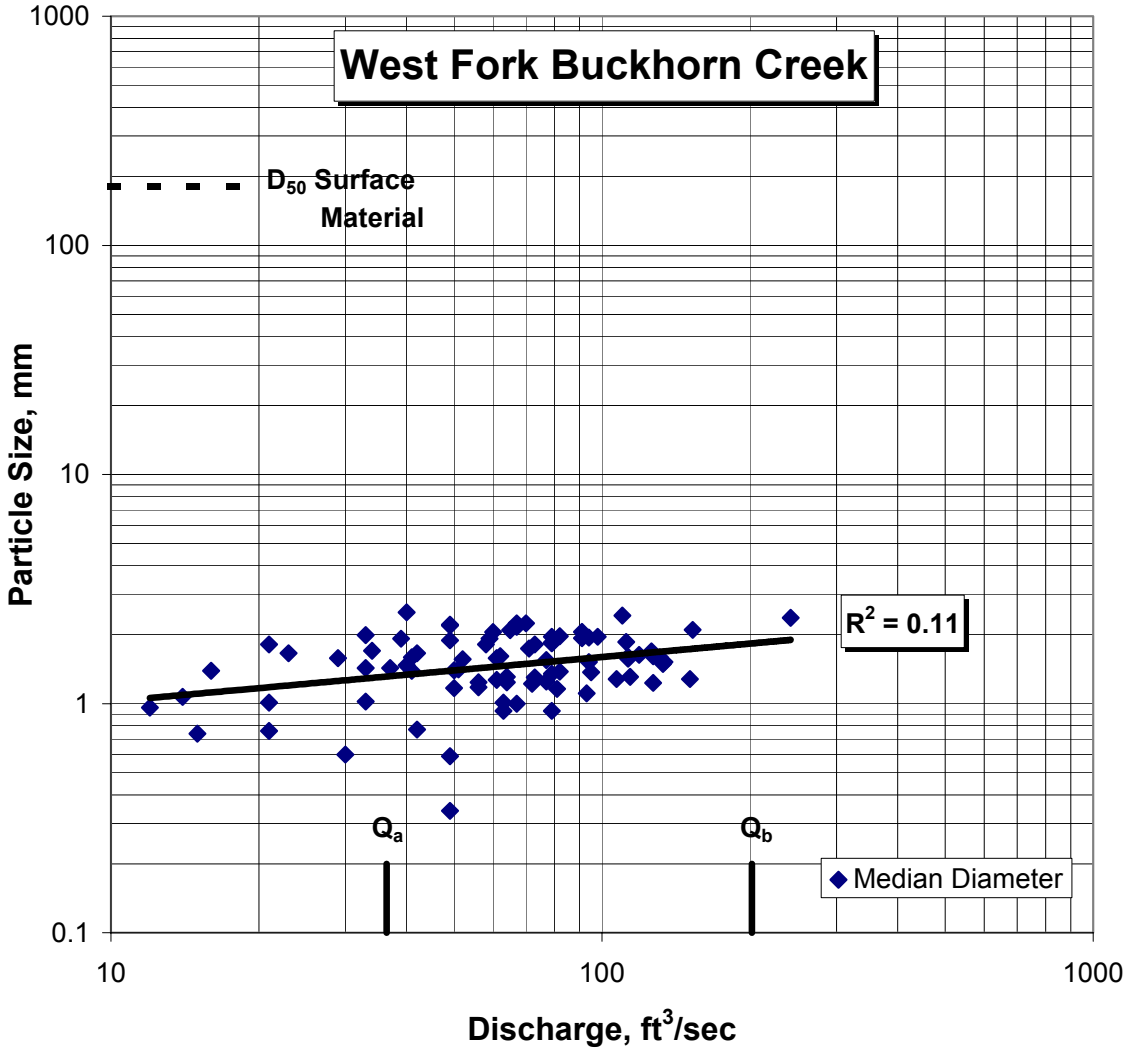

Figure 8. Median size of the bedload sample versus stream discharge for the West Fork Buckhorn Creek site.