Hawley Creek

General Information

Hawley Creek (Figure 1) is a tributary to Eighteenmile Creek in the upper part of the Lemhi River watershed near Leadore, Idaho. The study reach is about a 300 ft length of stream about 0.7 miles upstream from the National Forest boundary. The site is on land administered by the Salmon Challis National Forest at an elevation of about 6,630 ft. The drainage area is 42.2 mi^2 and the geology of the watershed is predominantly sedimentary.

This site is associated with an existing Forest Service gaging station. Streamflow records are available from water year 1990 to 1995 and sediment transport measurements are available from water year 1990 to 1996. Additional information collected at this site by Case Western Reserve University personnel include a survey of the stream reach and pebble counts of the surface material.

Figure 1. Cross-section 3 of Hawley Creek.

Streamflow was recorded for water years 1990 through 1995 typically from the beginning of the spring snowmelt hydrograph and into the fall. Estimated average annual streamflow (Q_a) for the stream is 18.9 ft^3/s and the estimated bankfull discharge (Q_b) is 46.9 ft^3/s. Recorded daily mean stream discharge for this period ranged from 4.60 ft^3/s to 98.6 ft^3/s.

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 0.0233 ft/ft. Cross-sections of the channel were surveyed at three locations. The gaging station is about 16 ft upstream of cross-section 2. Discharge and sediment transport measurements were usually made in the vicinity of the gage and cross-section 2.

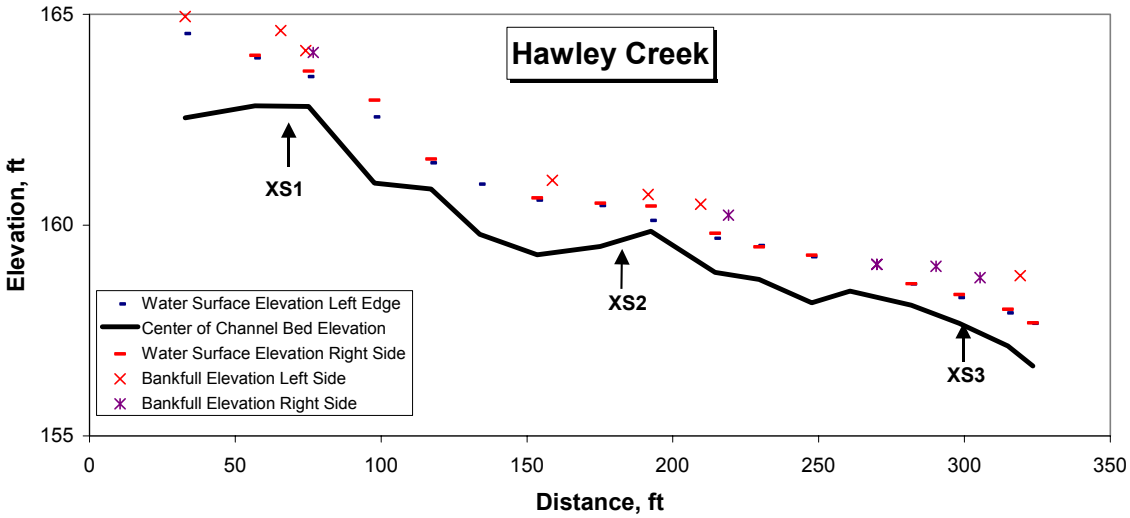

Figure 2. Longitudinal profile of the study reach in Hawley Creek.

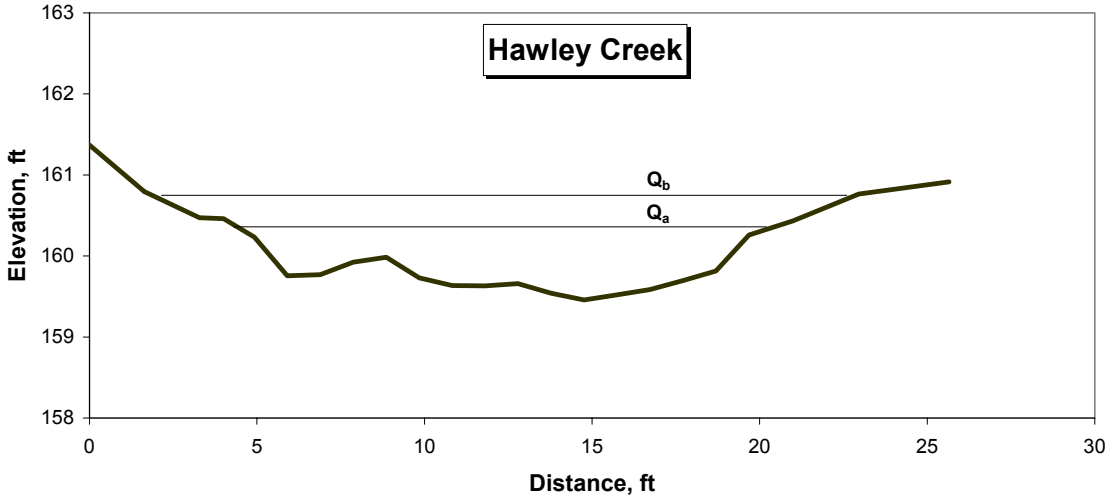

Figure 3. Cross-section 2 of Hawley Creek

Channel Geometry

Figure 3 shows the cross-section at the sediment transport measurement site, cross-section 2. The channel geometry relationships for this cross-section are shown in Figure 4. All data collected during discharge measurements in 1990 through 1996 were used to develop the displayed power relationships with discharge. Over the range of discharges when sediment transport was measured (9.83 to 94.6 ft^3/s) estimated stream width, estimated average depth and estimated average velocity varied from 14.7 to 25.1 ft, 0.50 to 0.98 ft, and 1.4 to 3.9 ft/s, respectively. The average reach gradient is 0.0233 ft/ft.

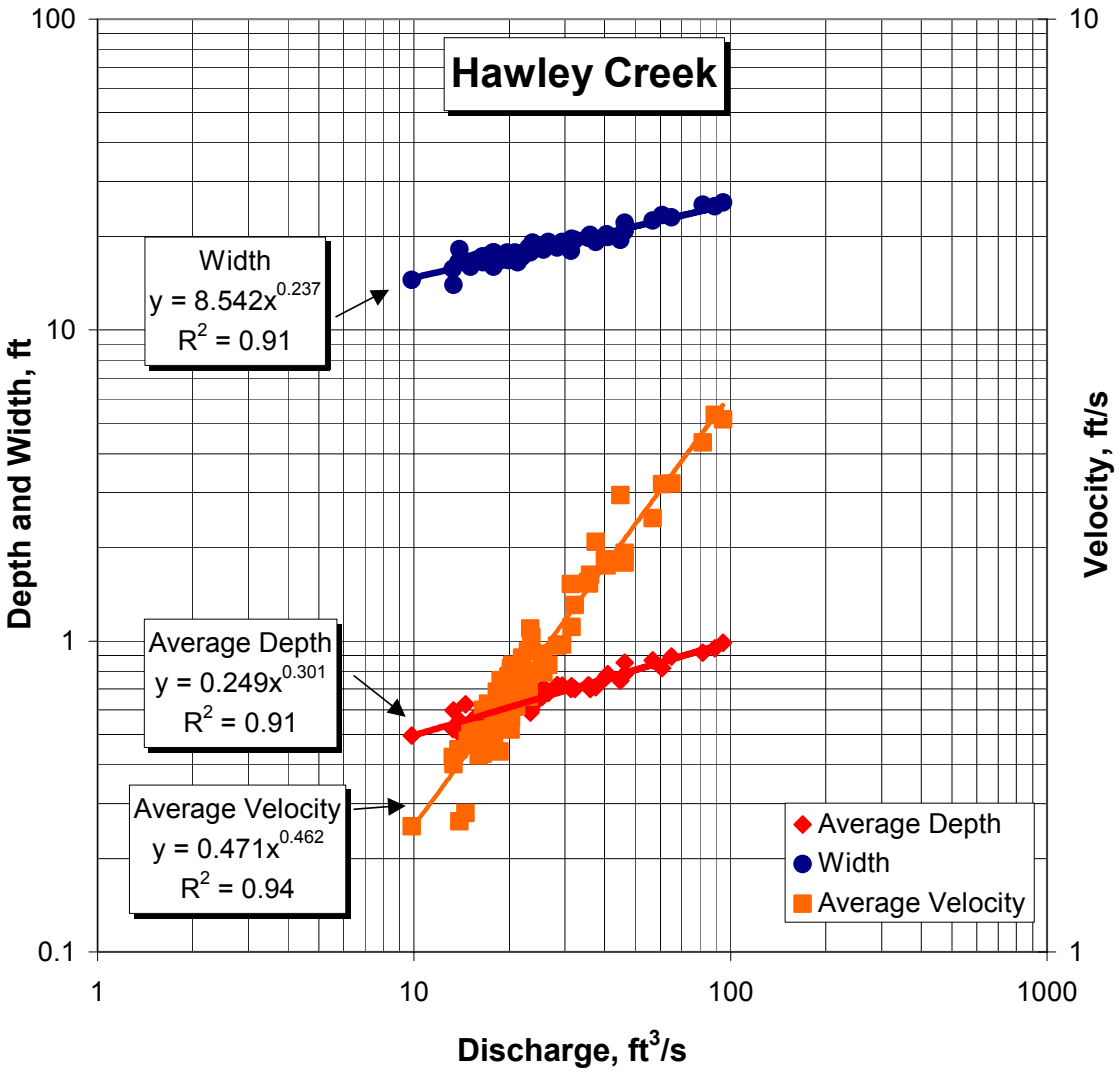

Figure 4. Width, average depth and average velocity versus stream discharge at the measurement cross section on Hawley Creek.

Channel Material

In July 1994 surface pebble counts were made at cross-section 2. The average D_{50} and D_{90} for the surface material in the reach are 40 mm and 140 mm, respectively (Figure 5). About 9 % of the surface material was 3 mm diameter or smaller. No subsurface core samples were collected at this site.

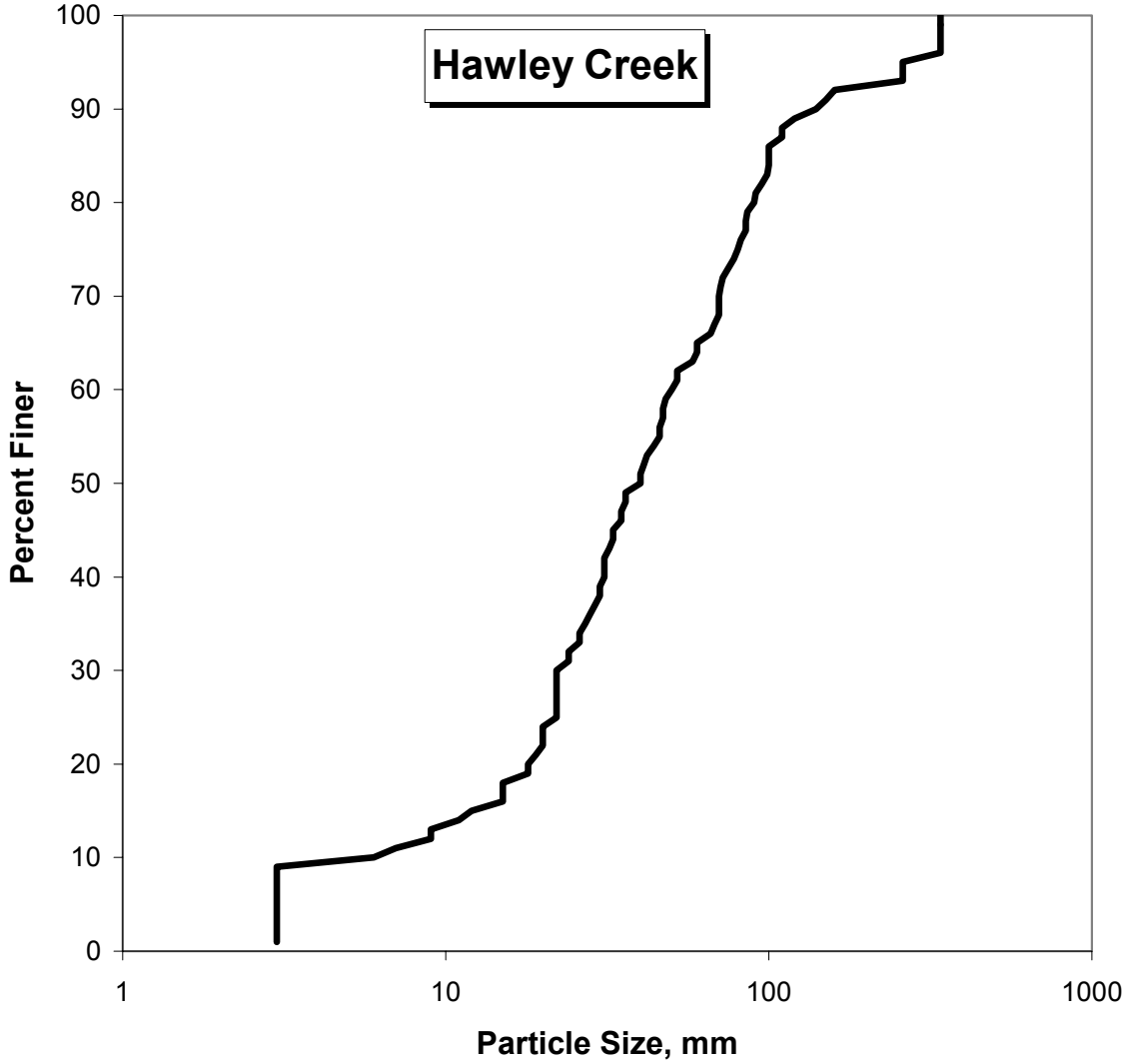

Figure 5. Particle size distribution for surface material samples collected in Hawley Creek.

Sediment Transport

The bedload and suspended load measurements in water years 1990 through 1996 were all made in the vicinity of the gaging station. The sediment transport data includes 85 measurements of bedload transport and 82 measurements of suspended sediment. Sediment transport measurements spanned a range of stream discharges from 9.83 ft^3/s ($0.52Q_a$; $0.21Q_b$) to 94.6 ft^3/s ($5.01Q_a$; $2.02Q_b$). Bedload transport ranged from 0.00704 to 2.89 t/d and suspended transport ranged from 0.016 to 47.3 t/d. Over the range of measured discharges, suspended transport accounts for the majority of the material in transport with approximately two to three fold difference at the lowest discharge and over a six fold difference at the highest discharge (Figure 6).

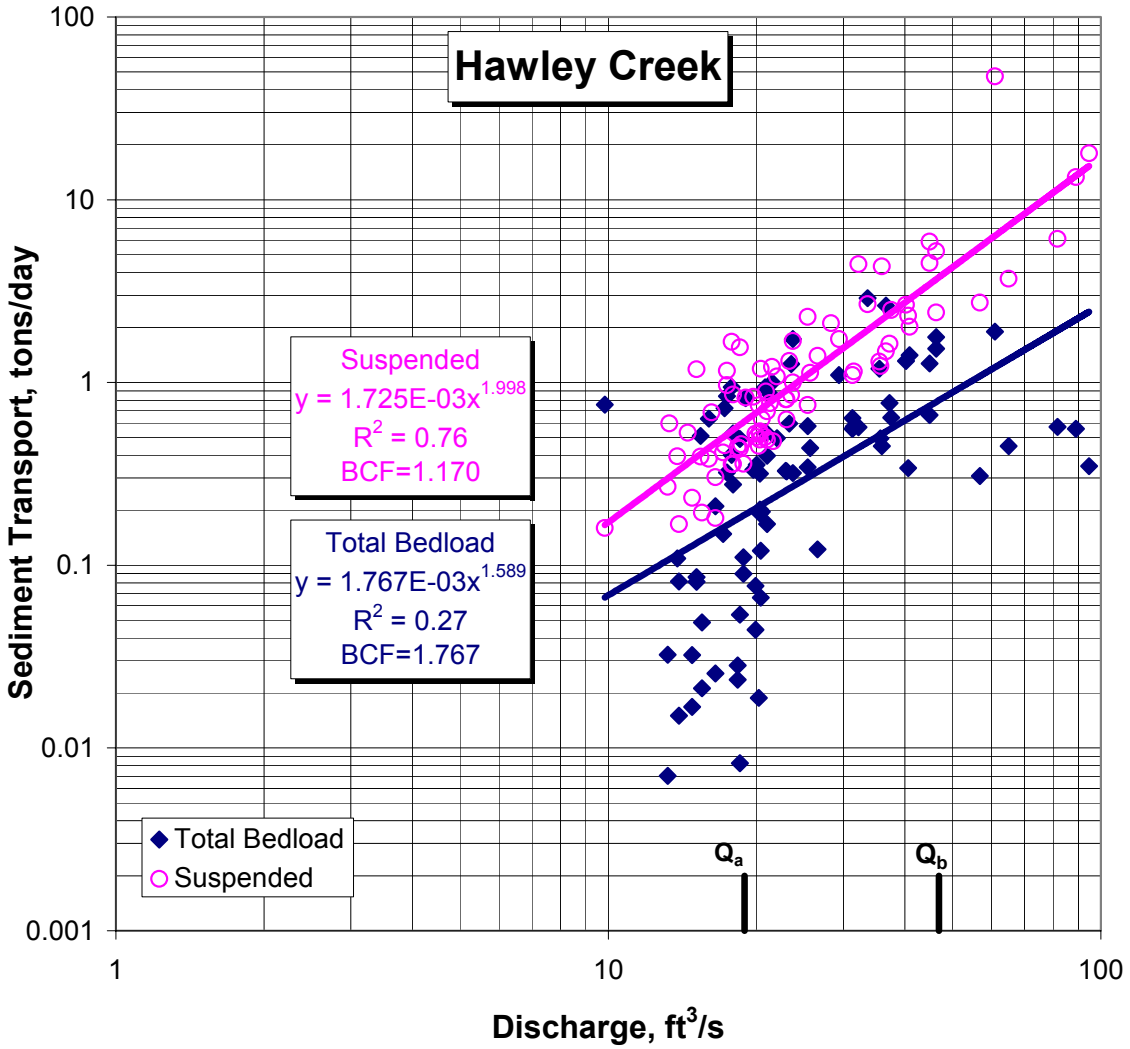

Figure 6. Bedload and suspended load transport rate versus discharge.

The bedload transport rates by size class (Figure 7) shows that the larger rates are associated with material in the 0.5 to 2 mm diameter size class. Only two bedload samples contained material larger than 32 mm diameter and these were at discharges of 33.6 and 36.6 ft^3/s.

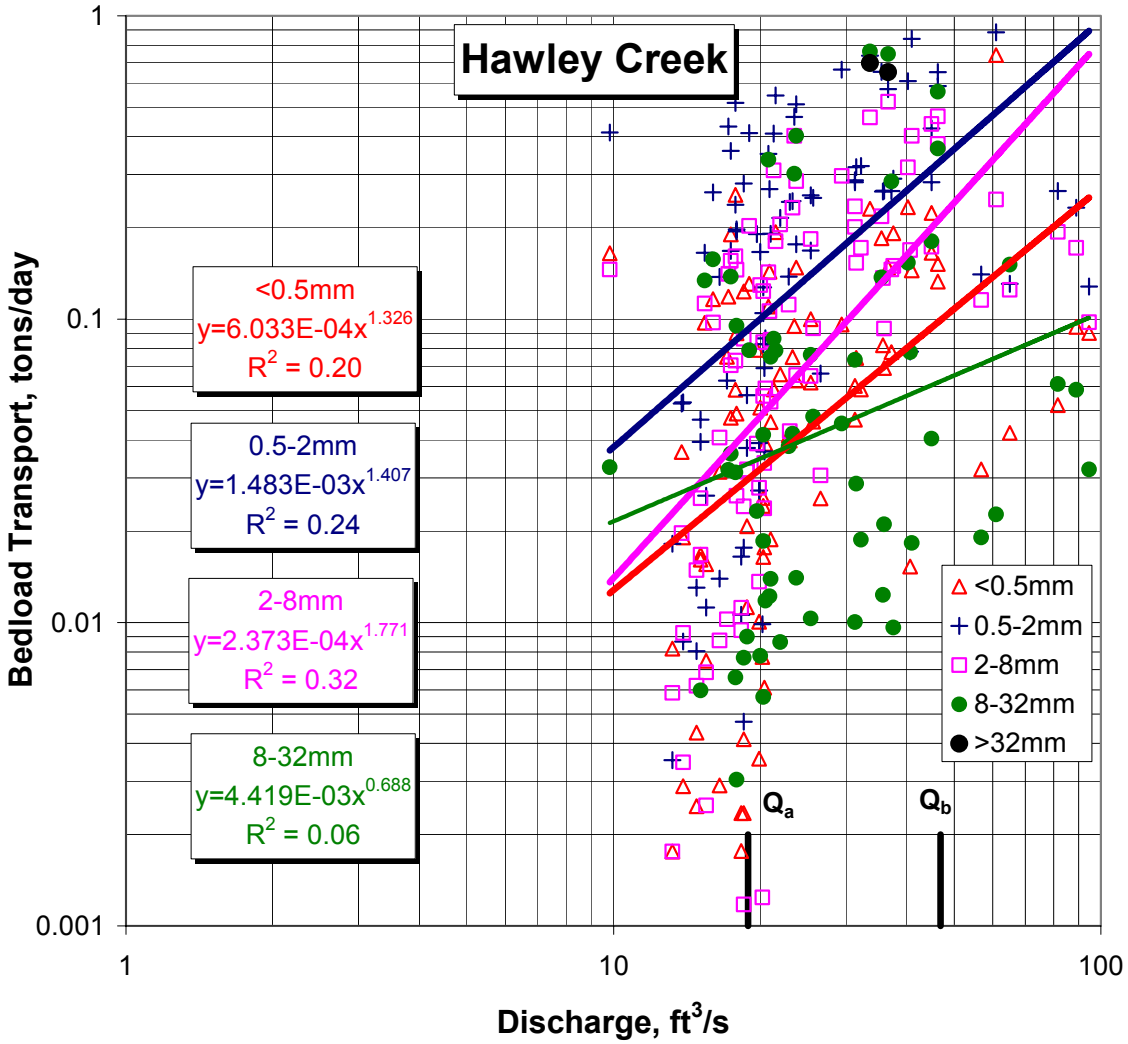

Figure 7. Bedload transport rate versus discharge for selected size classes.

The D_{50} for most of the bedload samples was in the sand size, 0.5 to 2 mm diameter (Figure 8). About 13% of the samples had a median diameter larger than 2 mm. The largest median diameter was 9.8 mm at a discharge of 36.6 ft^3/s. Data on the largest individual particle in bedload samples are not available for this site. However, the fact that material in the 32 to 64 mm diameter class occurred in two samples at discharges of 33.6 and 36.6 ft^3/s, provides some limited evidence that the median diameter of surface substrate material may be in motion at discharges near bankfull.

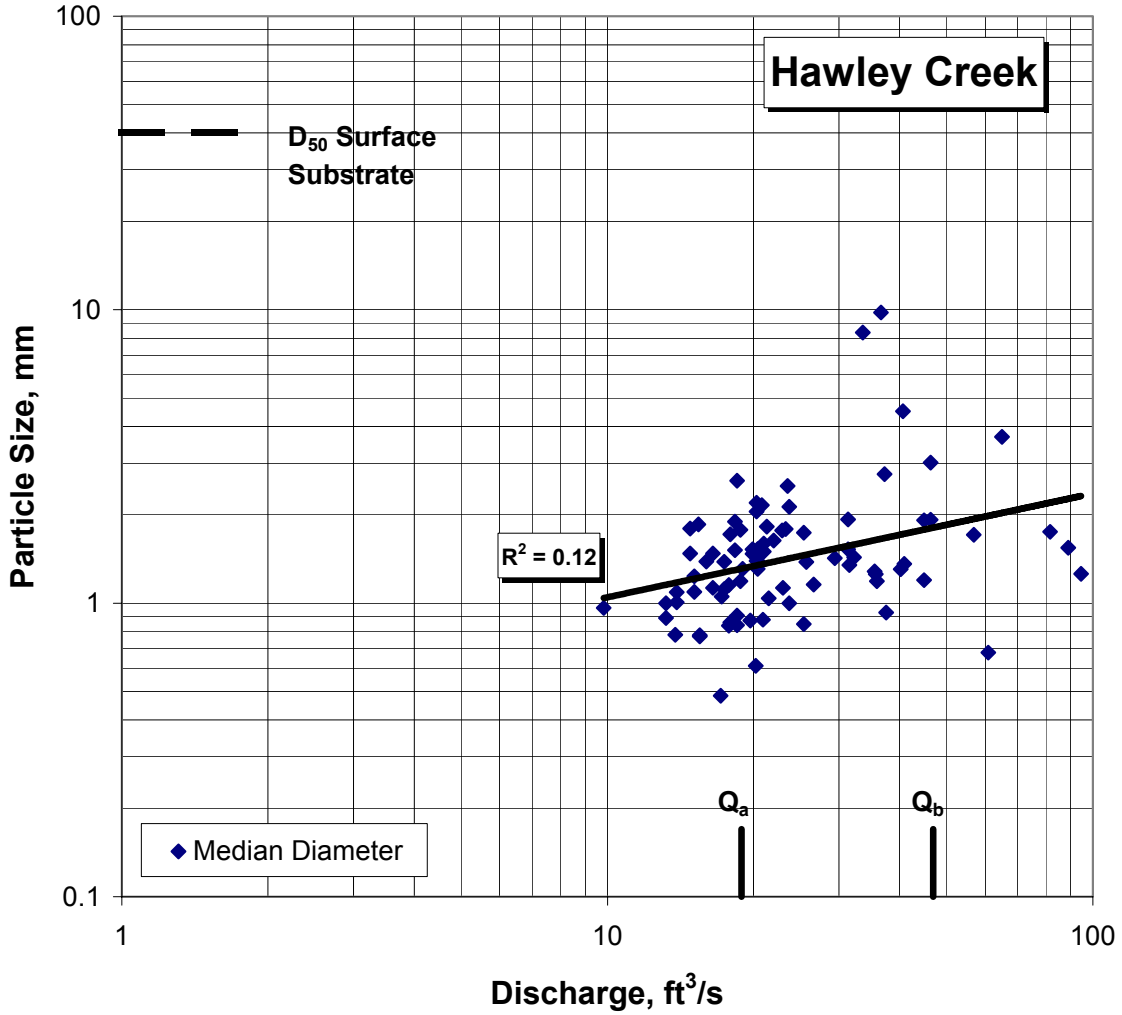

Figure 8. Median size of the bedload sample versus stream discharge for the Hawley Creek.