Jarbidge River

General Information

The headwaters of the Jarbidge River are in northeast Nevada on the Humbolt National Forest. The river flows northward into Idaho and confluences with the Bruneau River. The study area is about a 5,600 ft length of river at the U. S. Geological Survey gaging station (13162225), which is located about 1 mi. downstream of Jarbidge, Nevada. The gage site is at an elevation of about 6,050 ft. The drainage area upstream of the gaging station is 30.6 mi^2 and the geology of the watershed is predominantly volcanic extrusive (rhyolite).

This U.S. Geological Survey gage was installed in April of 1998. Streamflow records are available from April 22, 1998 to present (Water Year 2012). Sediment transport measurements are available for water years 1998, 1999, 2000 and 2002. Additional information collected at the site includes a survey of a stream reach and pebble counts of the surface bed material. Figures 1 and 2 show photographs of the surveyed reach.

Figure 1. Jarbidge River looking downstream near the middle of the surveyed reach.

Figure 2. Jarbidge River looking downstream at the lower portion of the surveyed reach.

Streamflow records are available beginning on April 22, 1998. As of December 2012 the gage was still in operation. The average annual streamflow (Q_a) for the period of record is 35.4 ft^3/s (15.7 in). During the period of record, daily mean discharges ranged from 1.0 ft^3/s to 633 ft^3/s. The highest instantaneous discharge recorded was 1230 ft^3/s on May 16, 2005.

Channel Profile and Cross-Section

The surveyed river segment is about a 580 ft reach beginning about 0.6 miles downstream of the USGS gage. Figure 3 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 surveyed reach is 0.0160 ft/ft. Cross-sections of the channel were surveyed at three locations. Figure 4 shows the channel cross-section (XS26) near the middle of the surveyed reach.

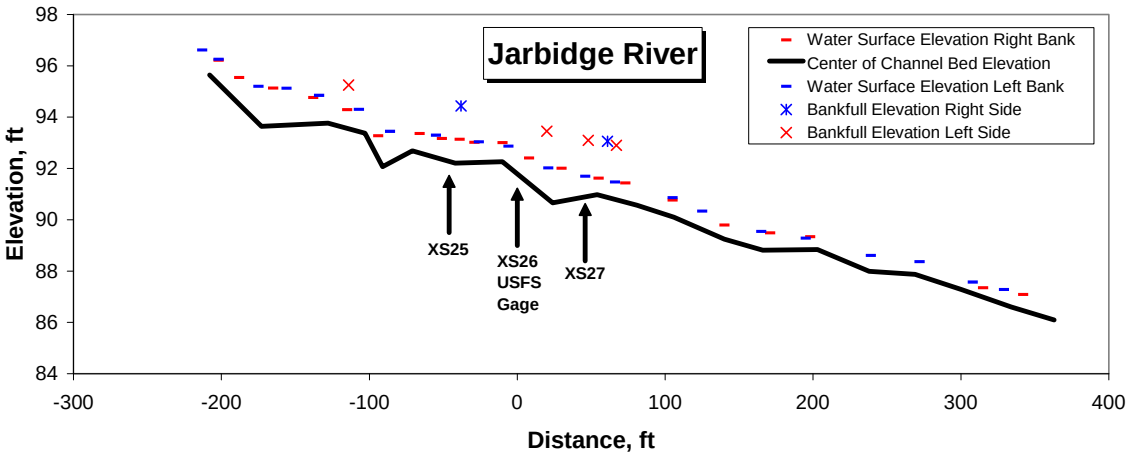

Figure 3. Longitudinal profile of the surveyed reach of the Jarbidge River.

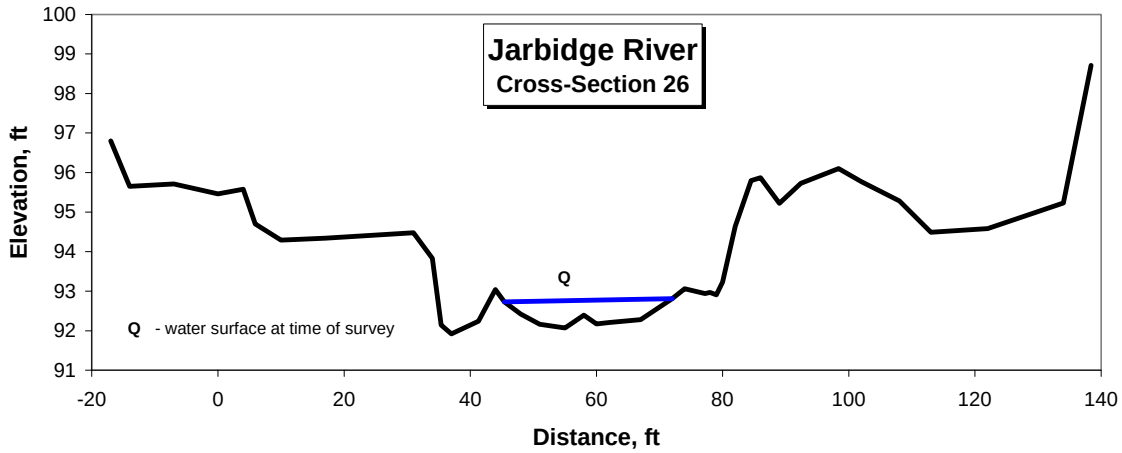

Figure 4. Cross-section 26 of the Jarbidge River.

Channel Geometry

Station geometry relationships (Figure 5) are shown for two sediment transport measurement areas. In 1998 most sediment transport measurements were made 100 to 150 ft upstream of the gage. In subsequent years, most measurements were made 10 to 50 ft downstream of the USGS gage. During high streamflows, sediment transport is measured from the bridge, about 10 to 20 ft downstream of the gage. Information from stream discharge measurements for 1998 through 2002, that spanned the range of discharges during which sediment transport was measured, were used to develop the power relationships. Over the range of discharges when sediment transport was measured (49.2 to 420 ft^3/s), estimated stream width, estimated average depth and estimated average velocity vary from 28.8 to 37.5 ft, 0.77 to 1.80 ft, and 2.21 to 6.21 ft/s, respectively, at the upstream site and from 28.9 to 47.2 ft, 0.77 to 1.47 ft, and 2.21 to 6.05 ft/s, respectively, at the downstream site.

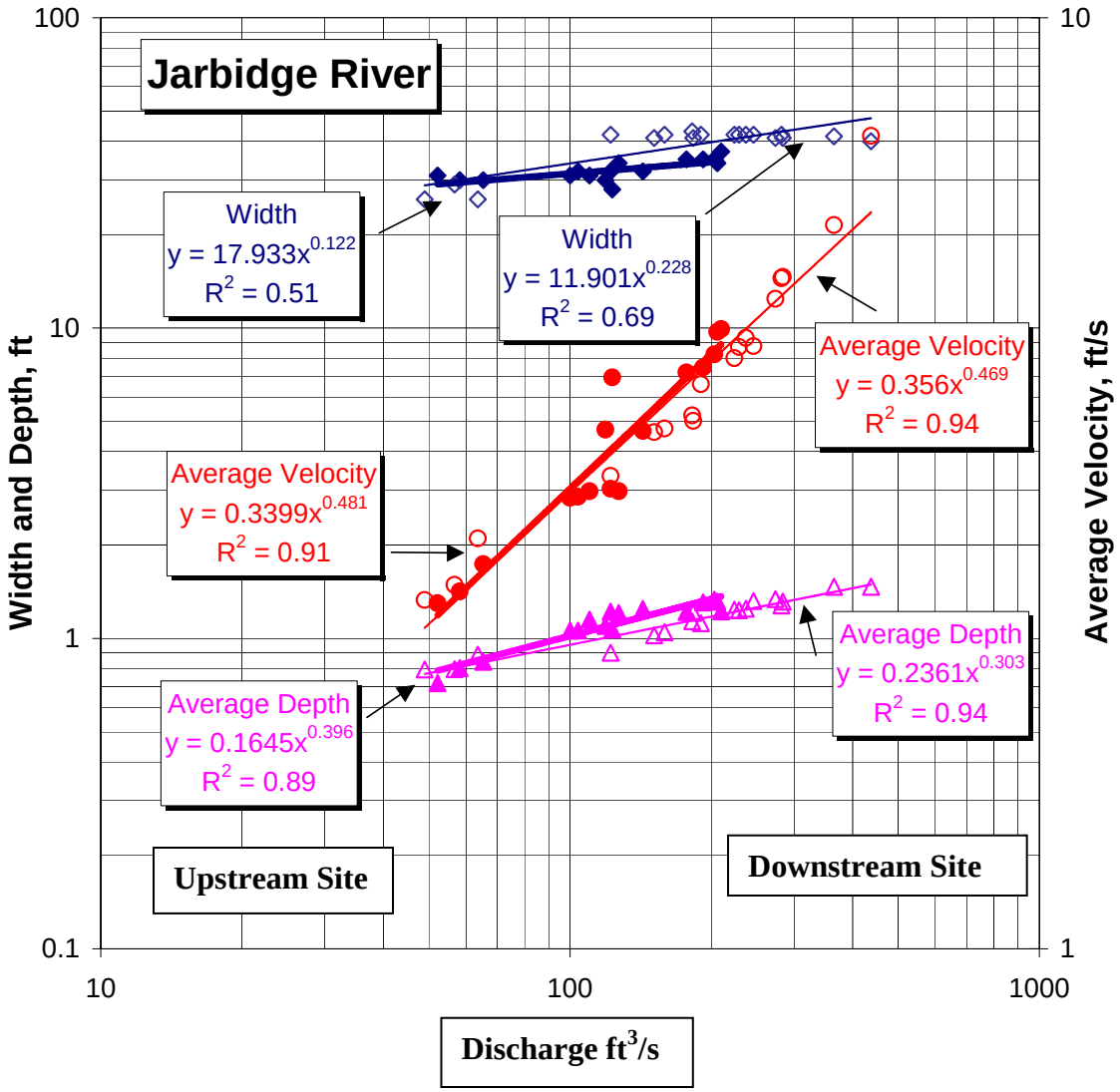

Figure 5. Width, average depth, and average velocity versus stream discharge for the two sediment transport measurement sites on the Jarbidge River.

Channel Material

A surface pebble count was made in the surveyed reach at cross-section 26 in October 1998. Additional surface pebble counts were made along three transects in October 2000 in a 200 ft. reach, beginning about 200 ft. upstream of the USGS gage. The average D_{50} and D_{90} for the surface material were 95 mm and 223 mm, respectively, in 1998 and 89 mm and 209 mm, in 2000 (Figure 6). About 5% (2000) of the surface material was sand (2 mm) size or smaller.

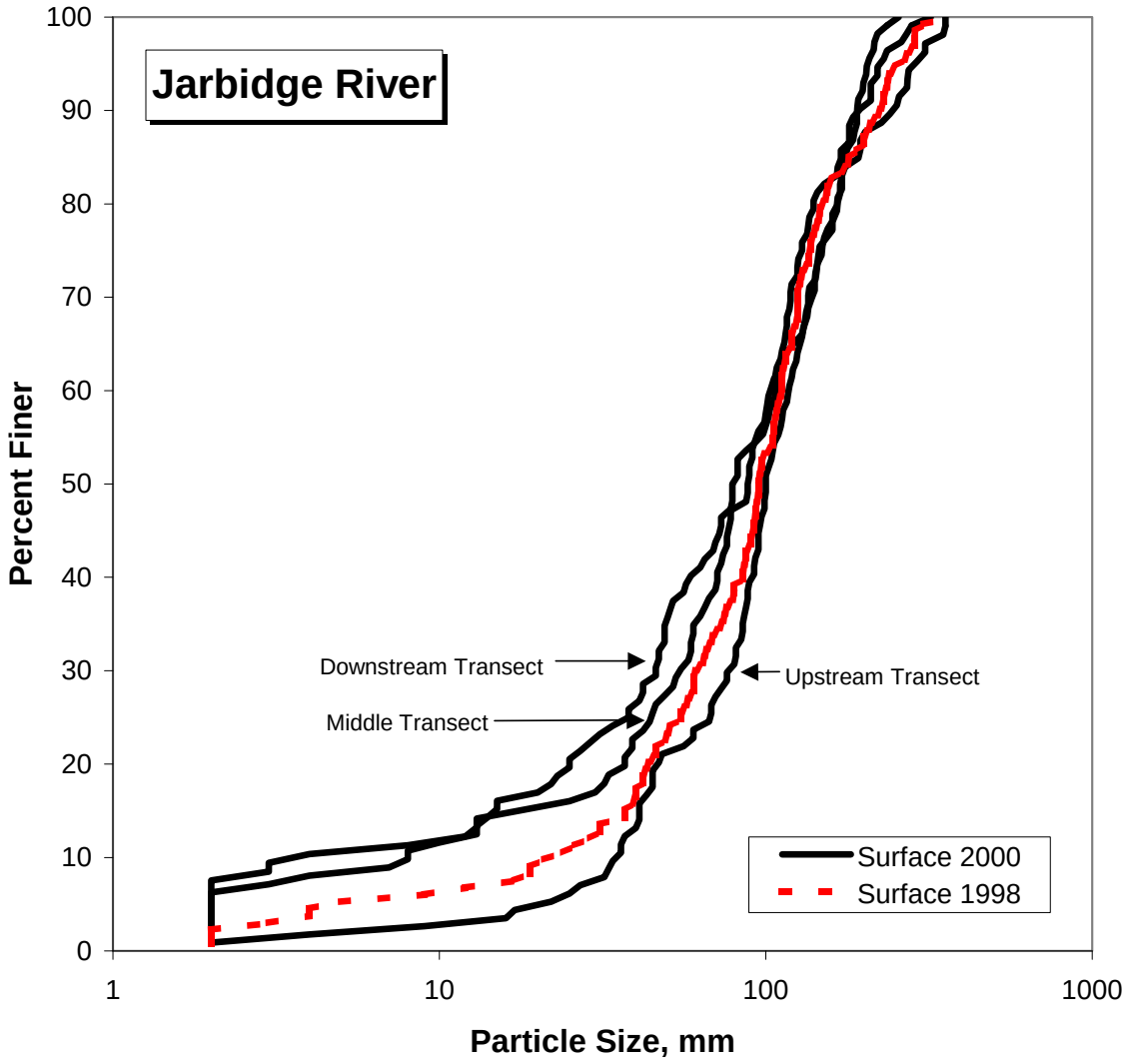

Figure 6. Particle size distribution for surface material collected in the Jarbidge River.

Sediment Transport

Sediment transport measurements were made in 1998, 1999, 2000 and 2002. The sediment transport data include 56 measurements of bedload transport and 28 measurements of suspended sediment. Sediment transport measurements spanned a range of stream discharges from 49.2 ft^3/s ($1.12Q_a$) to 420 ft^3/s ($9.55Q_a$). Bedload transport ranged from 0.0132 to 39.6 t/d and suspended sediment transport ranged from 0.373 to 76.7 t/d. Over the range of measured discharges, suspended transport accounts for the majority of the material in transport (Figure 7). At the lowest measure discharges predicted suspended transport is about four times that of bedload and at the highest measured discharge about 1.3 times.

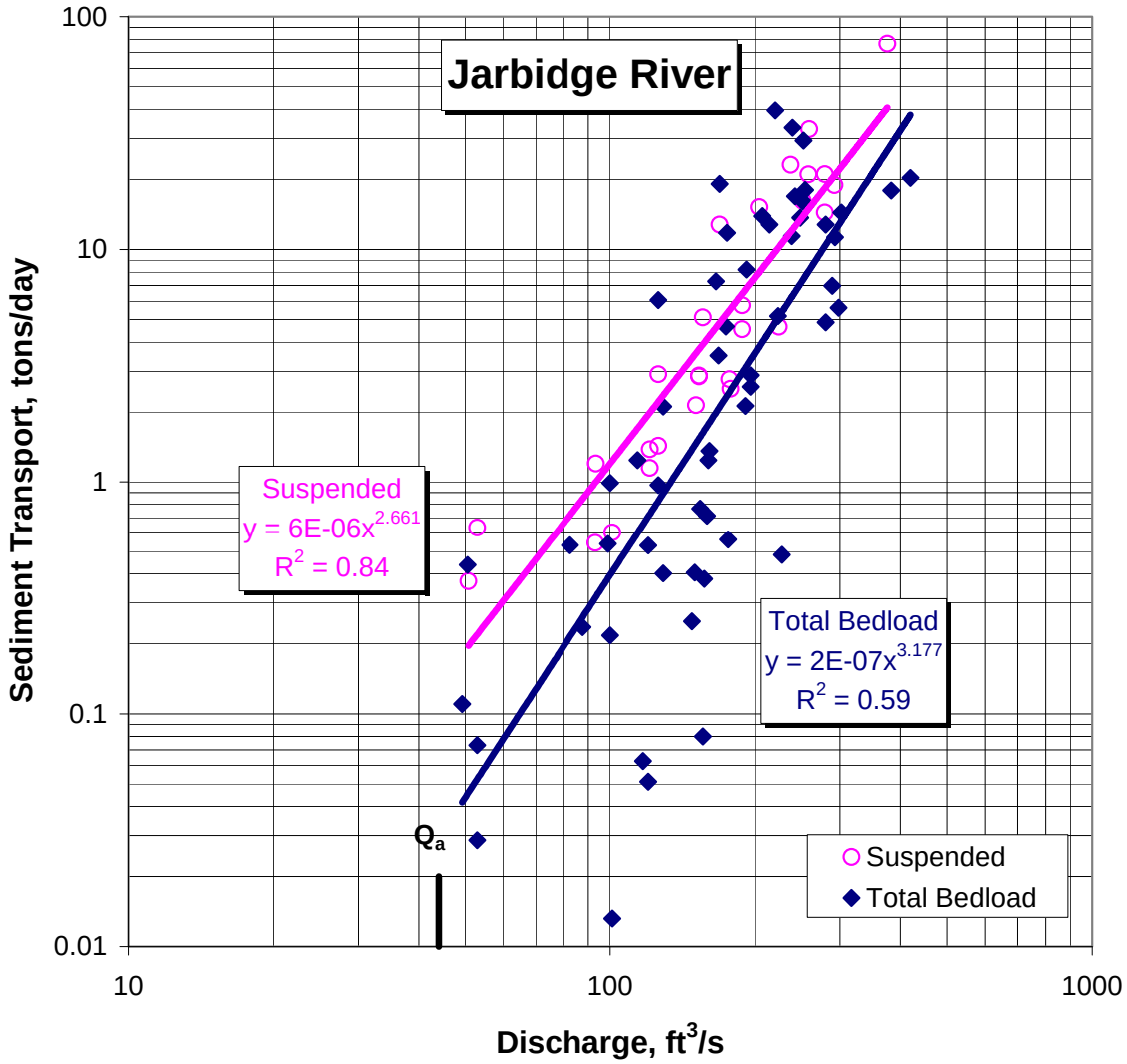

Figure 7. Bedload and suspended load transport rate versus discharge. (The bias correction factors for bedload and suspended load transport are 1.925 and 1.168, respectively.)

The bedload transport rates by size class (Figure 8) shows that the larger rates are associated with material in the 0.5 to 2mm diameter size class. Only 13 samples contained material >32mm diameter and associated discharges were greater than 126 ft^3/s.

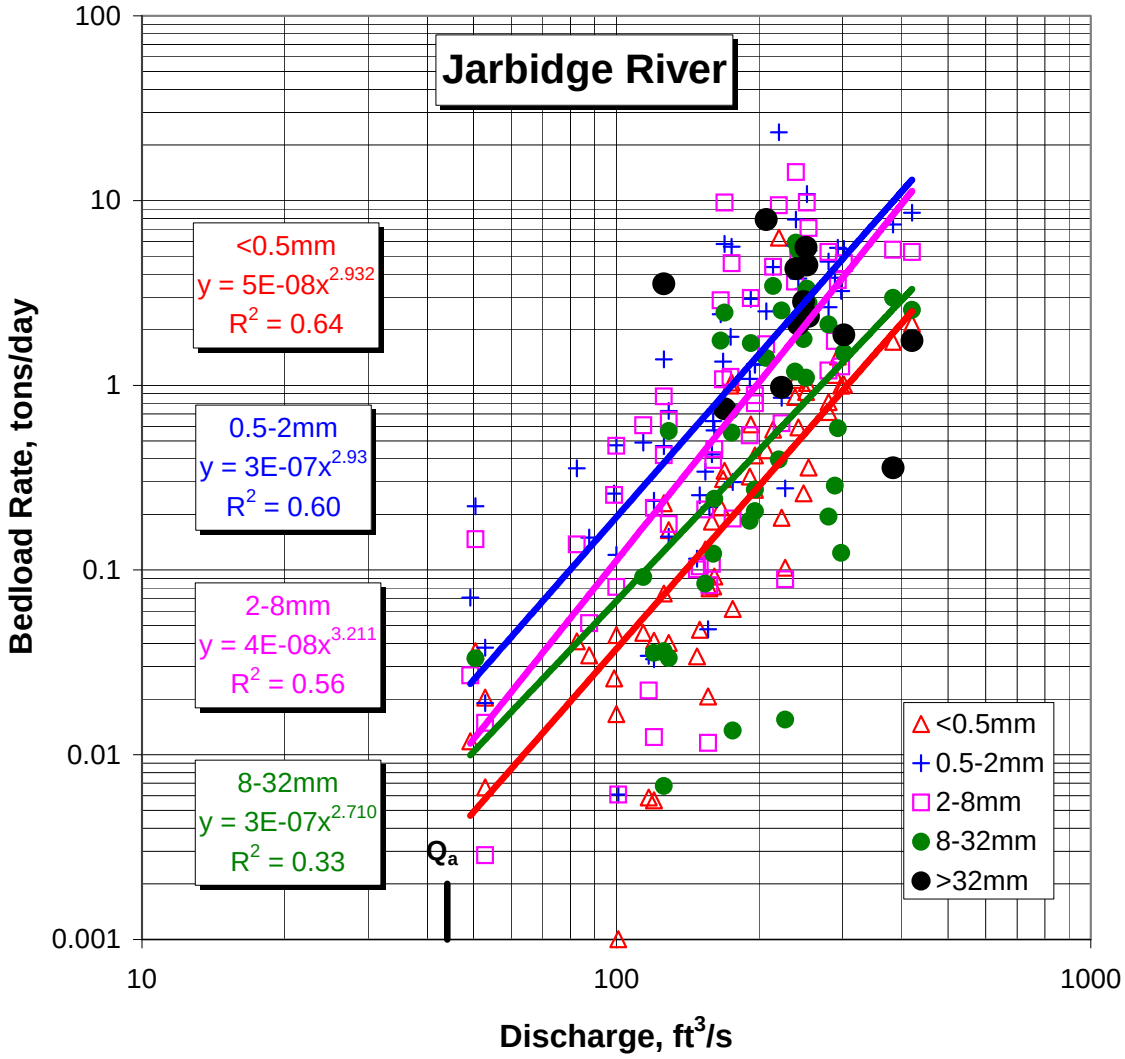

Figure 8. Bedload transport rate versus discharge for selected size classes.

The size of the largest particle size class in the bedload sample typically increased with discharge (Figure 9). The largest particle size class in a bedload sample was 32 to 64 mm at discharges of 126 ft^3/s and larger. The D_{50} exhibits a weak relationship with discharge. The D_{50} for the majority of the samples was <2 mm. The largest D_{50} was 35.4 mm associated with a sampling discharge of 126 ft^3/s. The information on the largest particle size class in the bedload sample suggests that discharges larger than the sampled discharges would be needed to transport the median diameter particles on the channel surface.

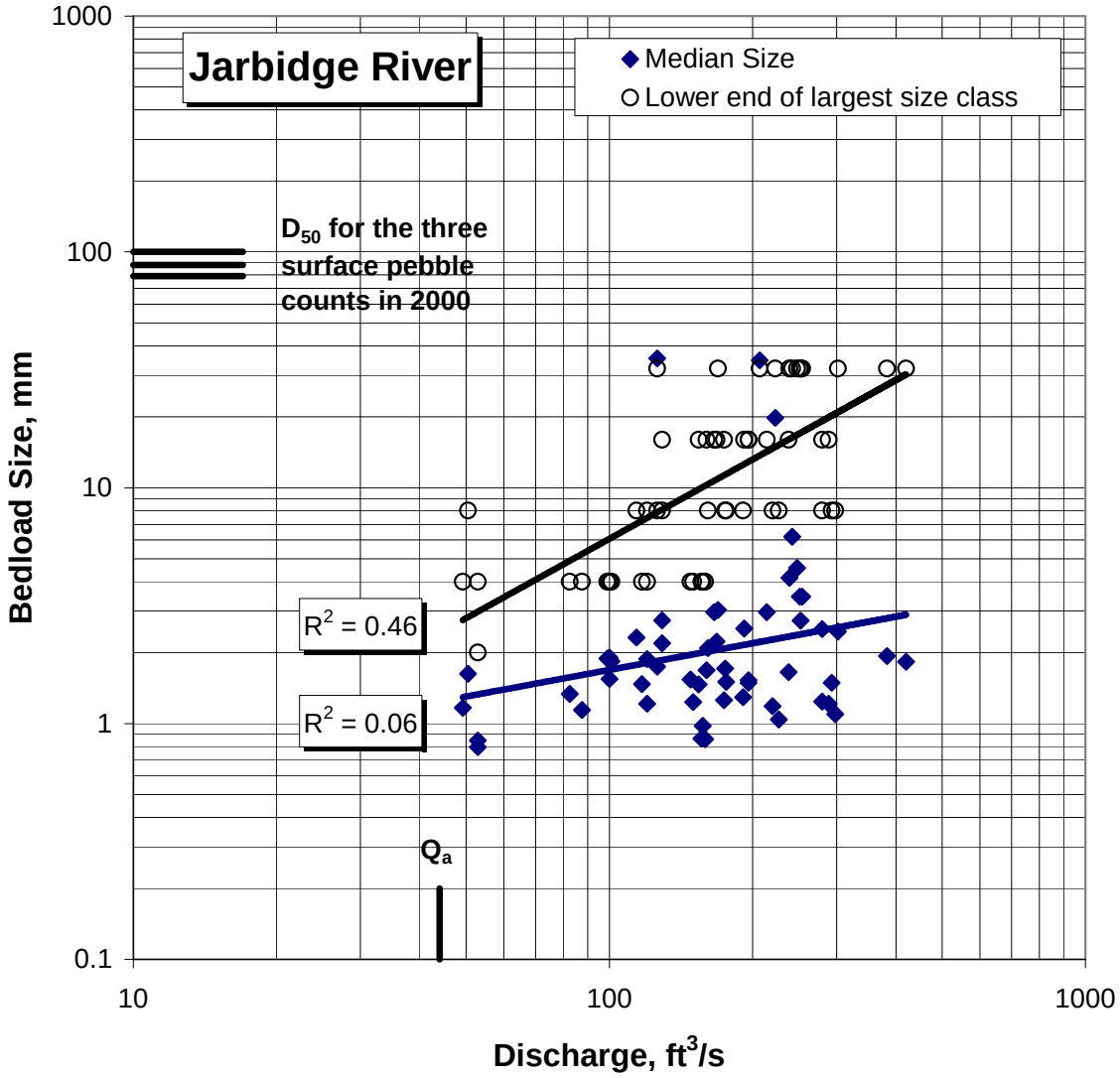

Figure 9. Lower end of the largest size class in the bedload sample and median size of the sample versus stream discharge for the Jarbidge River.