

Cat Spur Creek

General Information

Cat Spur Creek flows into the St. Maries River about 3 miles upstream of Clarkia, Idaho. The study reach is a 425 ft length of stream about 1.5 miles upstream from the confluence with the St. Maries River. The site is on land administered by the Panhandle National Forest at an elevation of about 2,930 ft. The drainage area is 10.8 mi² and the geology of the watershed is predominantly metamorphic.

This site is associated with an existing Forest Service gaging station. Streamflow records and sediment transport measurements are available from water year 1987 to 1995. Additional information collected at the reach by Case Western Reserve University personnel include a survey of the stream reach and pebble counts of the substrate surface. Figure 1 shows a photograph of looking upstream from the gaging station.



Figure 1. Cat Spur Creek looking upstream from the measurement site.

Streamflow was recorded for water years 1987 through 1995. Estimated average annual streamflow (Q_a) for the stream is $14.0 \text{ ft}^3/\text{s}$ and the estimated bankfull discharge (Q_b) is $83.3 \text{ ft}^3/\text{s}$. Daily mean stream discharge for this period ranged from $1.07 \text{ ft}^3/\text{s}$ to $162 \text{ ft}^3/\text{s}$.

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 0.0111 ft/ft . Cross-sections of the channel were surveyed at four locations. Discharge and sediment transport measurements were made in the vicinity of cross-section 2 (XS2) which is at the gage station.

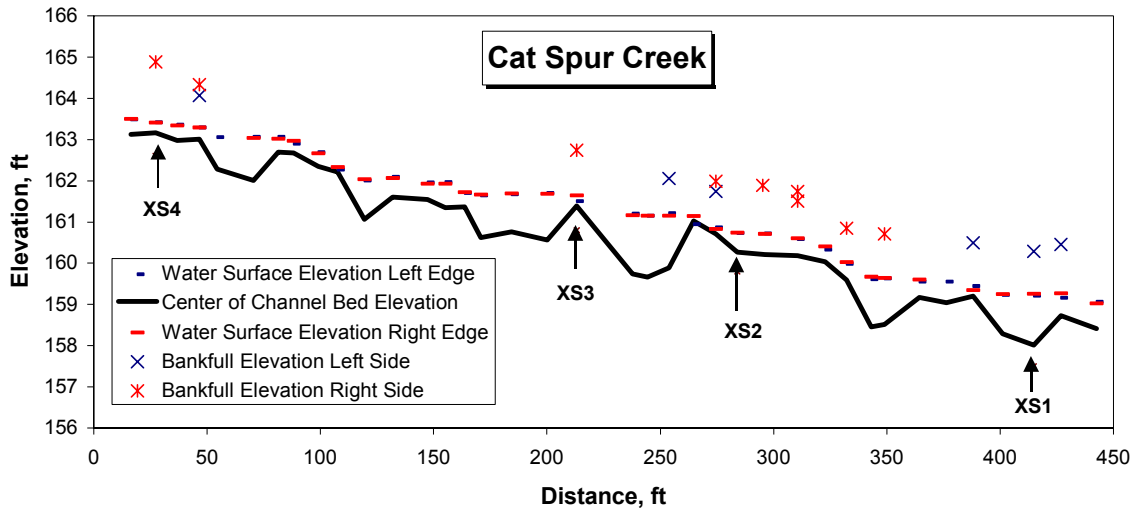


Figure 2. Longitudinal profile of the study reach in Cat Spur Creek.

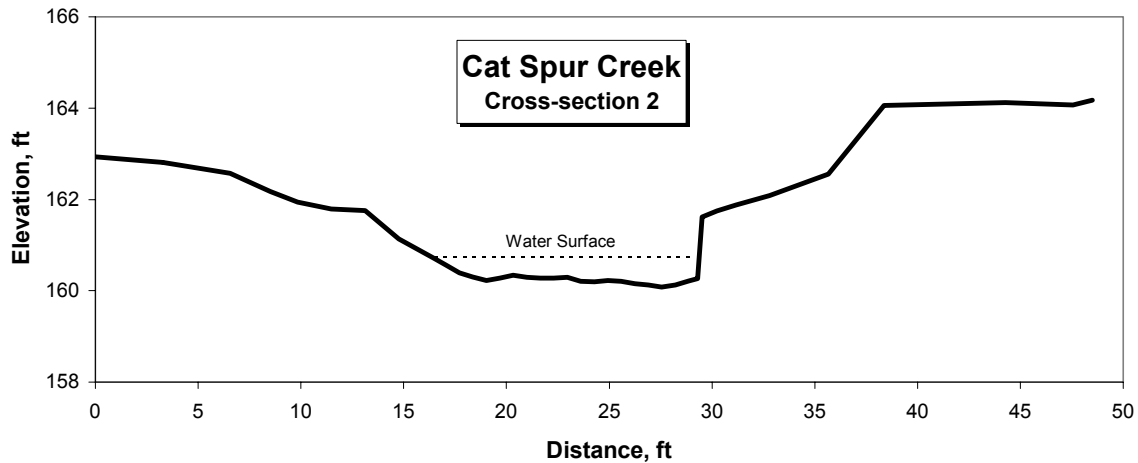


Figure 3. Cross-section of Cat Spur Creek at the gage station.

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. Data collected in 1992 through 1995 were used to develop the displayed power relationships with discharge. Over the range of discharges when sediment transport was measured (6.7 to 65.4 ft³/s) estimated stream width, estimated average depth and estimated average velocity ranges from 13.9 to 17.5 ft, 0.65 to 1.37 ft, and 0.75 to 2.74 ft/s, respectively. The average reach gradient is 0.0111 ft/ft.

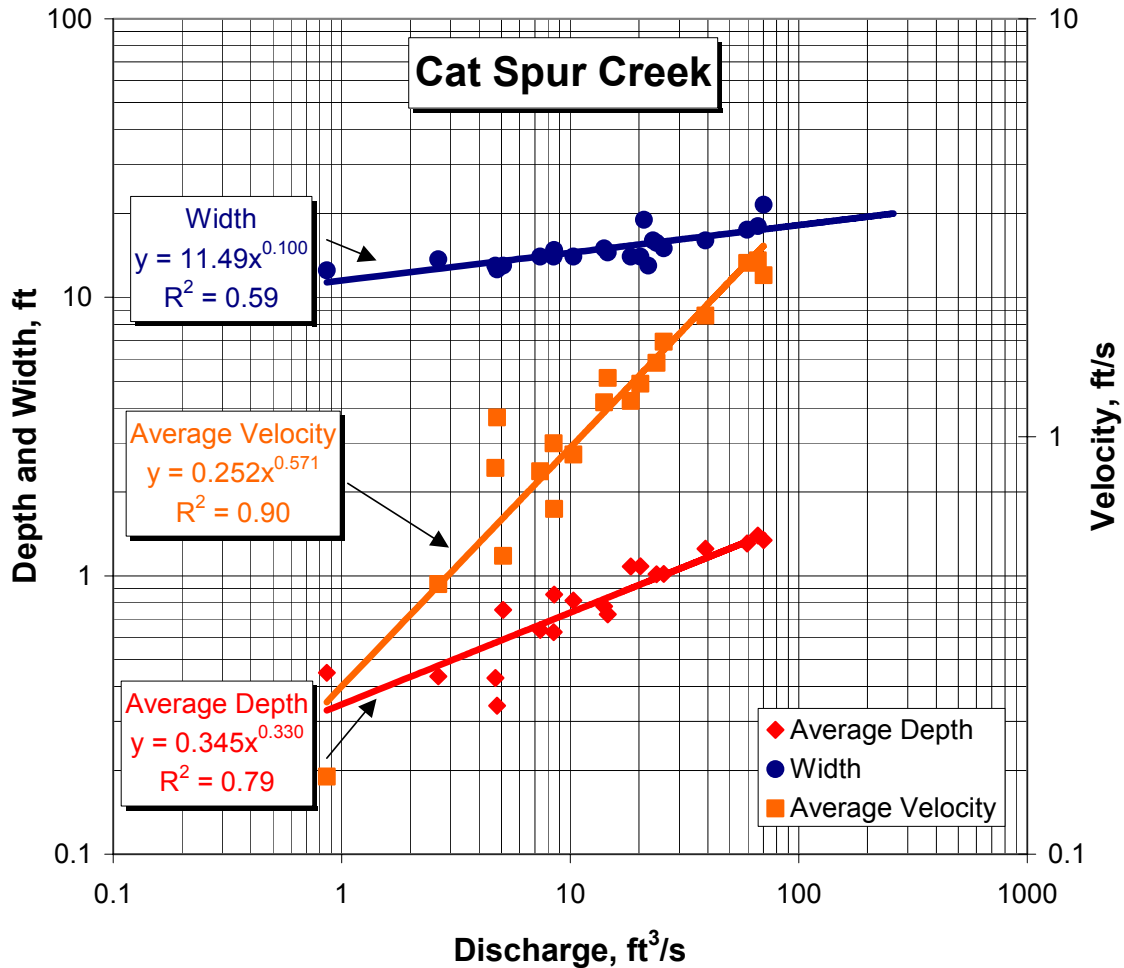


Figure 4. Width, average depth and average velocity versus stream discharge at cross-section 2 on Cat Spur Creek.

Channel Material

Surface pebble counts were made near cross-section 2 on October 7, 1994. The average D_{50} and D_{90} for the surface material in the reach were 27 mm and 80 mm, respectively (Figure 5).

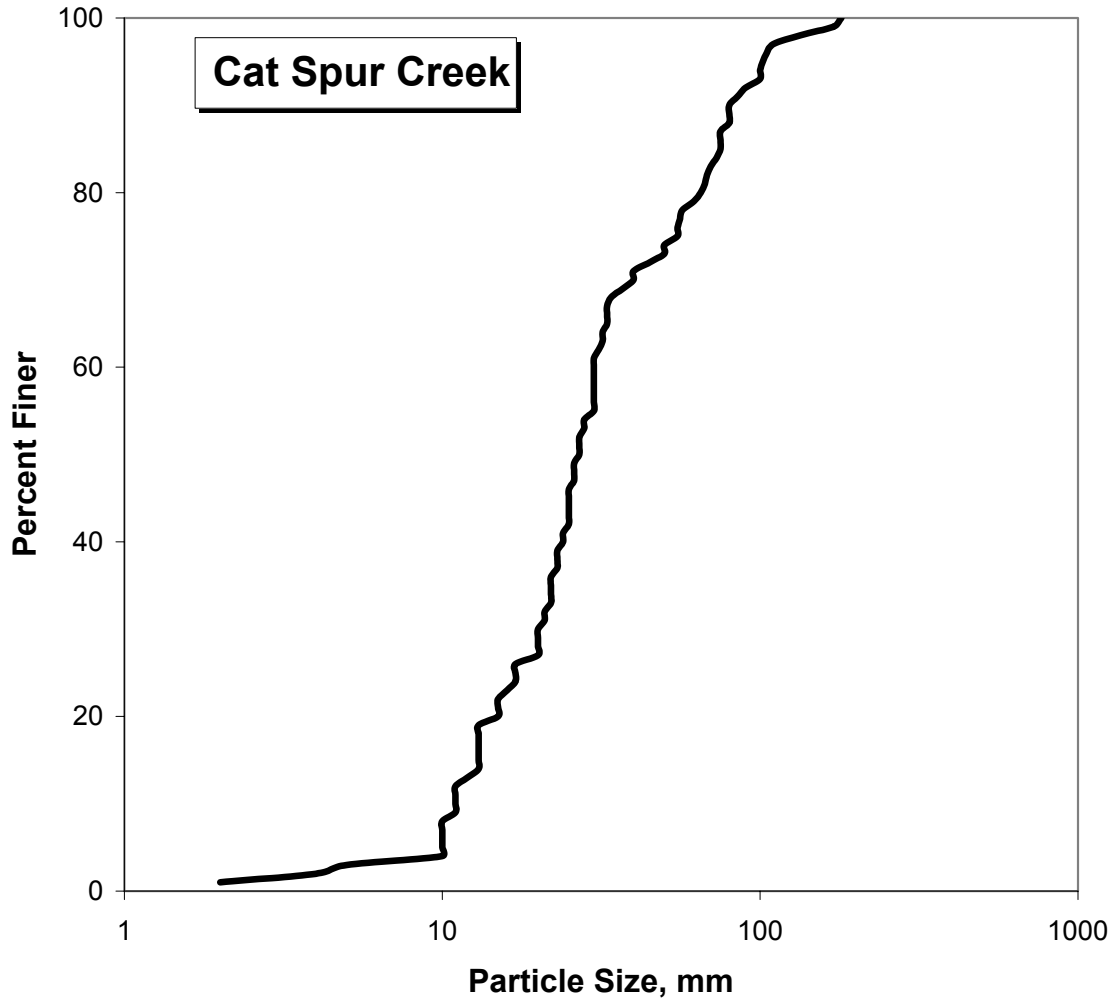


Figure 5. Particle size distribution for surface material in Cat Spur Creek.

Sediment Transport

The sediment transport data include 35 measurements of bedload transport and 32 measurements of suspended sediment transport. Sediment transport measurements spanned a range of stream discharges from 6.7 ft³/s (0.48Q_a; 0.08Q_b) to 67 ft³/s (4.79Q_a; 0.80Q_b). Bedload transport ranged from 0.0009 to 2.07 t/d and suspended transport ranged from 0.0195 to 2.76 t/d. Over the range of measured discharges, suspended transport accounts for the majority of the material in transport with approximately an order of magnitude greater suspended transport at the lowest discharges and similar transport rates at the highest discharges during which sediment transport was measured (Figure 6).

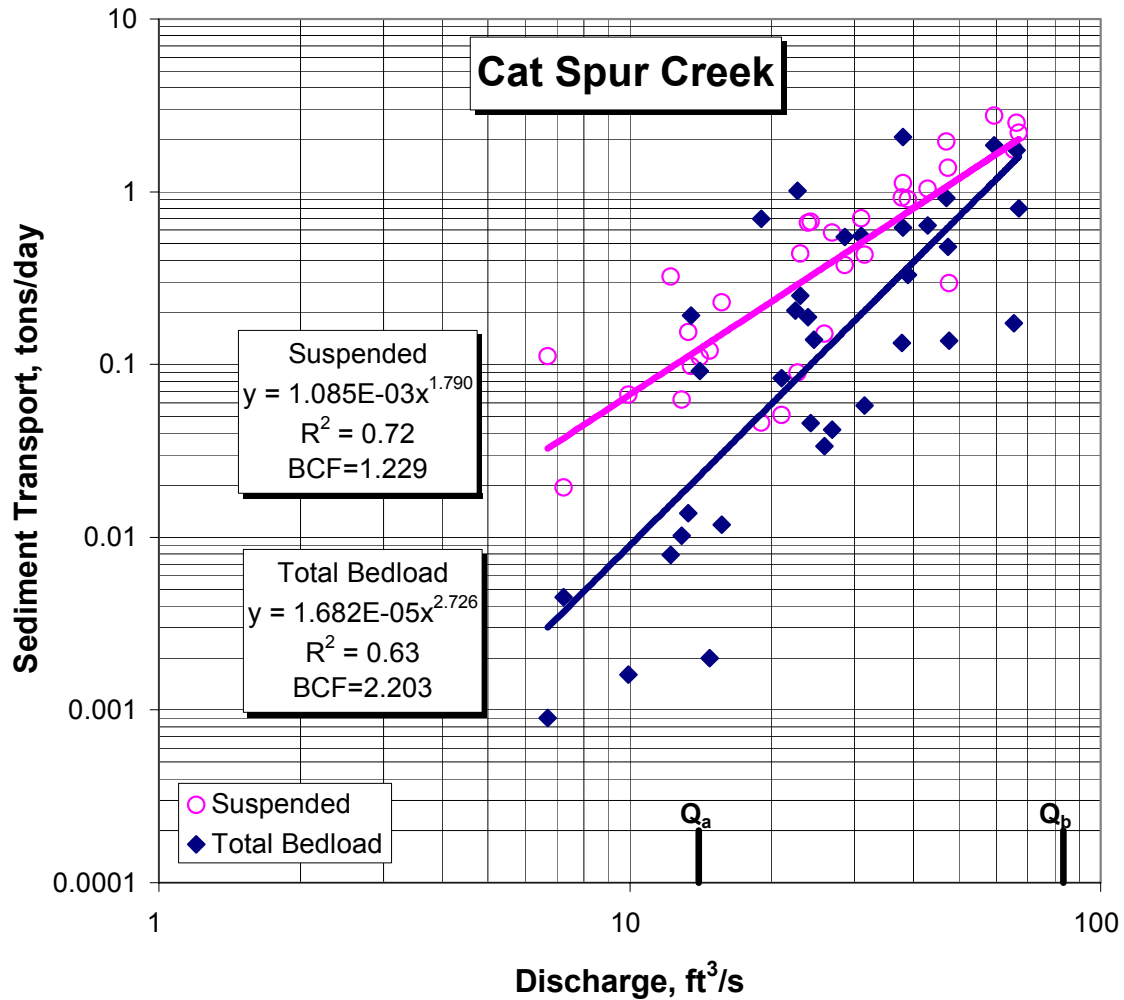


Figure 6. Bedload and suspended load transport rate versus discharge.

The bedload transport rates by size class (Figure 7) shows that the larger rates are associated with material in the <2mm diameter size class. No relationship is shown for particles greater than 32 mm diameter, since only one sample contain material in this size class. The sample that contain this size class of material was collected at a discharge of 38 ft³/s.

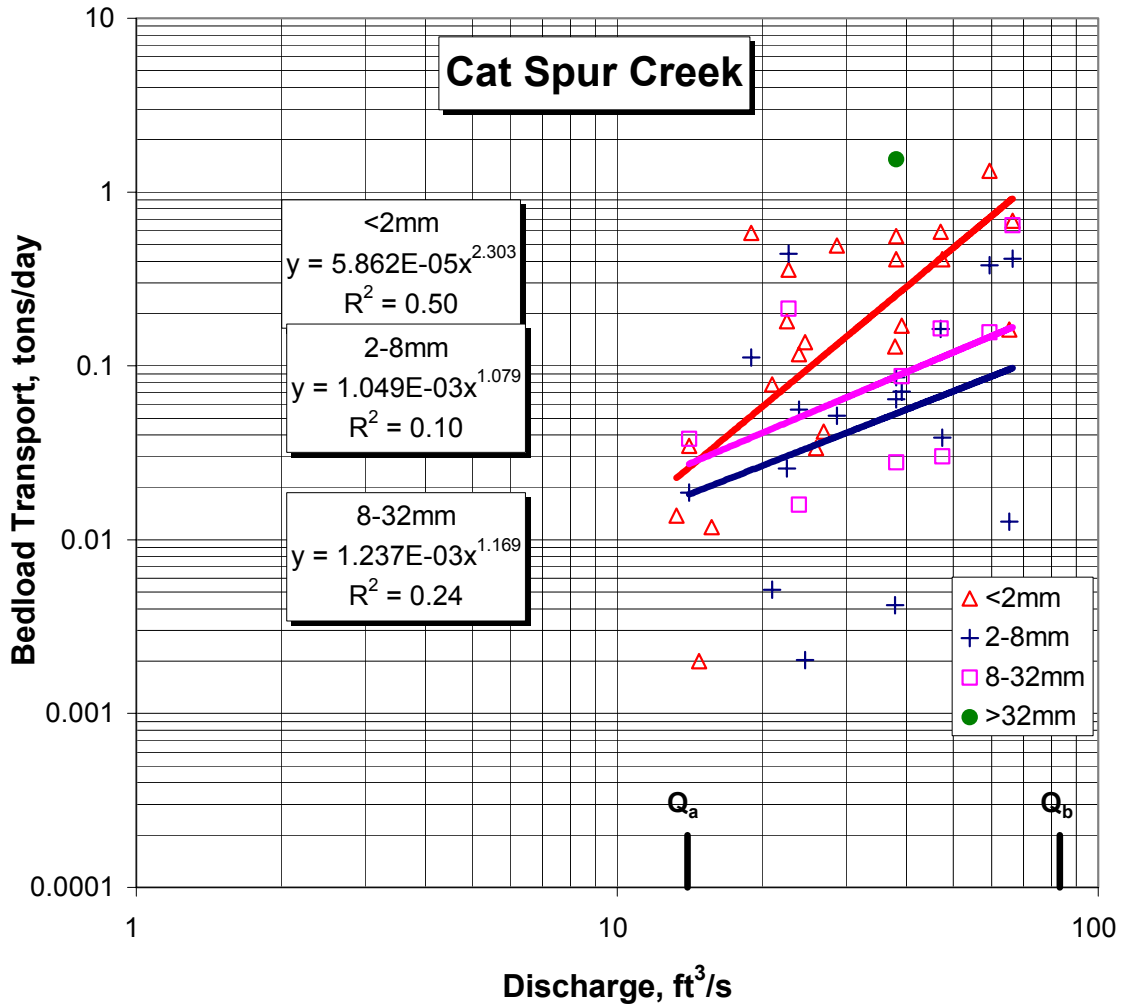


Figure 7. Bedload transport rate versus discharge for selected size classes (1990 to 1995 data)

Measurements of the largest particle in the bedload sample were not made for this site. However, size class data (1990-95 data) indicates that 4.5%, 13.6% and 40.9% of the bedload samples had particles in the 32-64 mm, 16-32 mm, and 8-16 mm size class, respectively. The D₅₀ for 82% of the bedload samples (1990-95 data) were less than 2.0 mm.