GS407 / 507 River Environments – Summer 2003
Day 3 - Lab Exercise 3 at Whiskey Dick Campground – Middle Deschutes

1. Examine the Whitehorse section of the topographic map shown on p. 171 of the field guide.

2. Identify the bench mark elevations along the railroad tracks. Using the bench marks on the railroad grade, approximate the gradient of the Deschutes River in this region.

   A. Calculate the gradient in ft/mi (change in elevation / change in distance).

   B. Calculate the gradient in m/km

   C. Calculate the gradient in percent

3. Using the graph paper provided on p. 71 of your field guide, draw a topographic profile along line X-Y-Z as shown on the map on p. 171. This profile is across the Deschutes canyon at Whitehorse Rapids.
   A. Use a horizontal scale on the profile equal to the horizontal scale on the map.

   B. Determine the contour interval of the map on p. 171.

   C. Use a vertical scale with an exaggeration of x3 that of the horizontal (for example if 1 in on the map = 30 ft on the ground in the horizontal, then a x3 exaggeration on the vertical would be 1 in = 10 ft. Draw the profile

   D. On your topographic profile identify and label the following: cliff faces, colluvial hillslopes, landslide deposits, river channel.

4. Examine the gravel deposits behind and under the tents in camp. Measure the intermediate clast diameter (the "b" axis), in millimeters, of 20 clasts, and average them. Plug the average diameter into the Costa (1983) equation on p. 51 of the field guide. In that equation, d = grain diameter, Vc = critical velocity to move the clasts.
   A. calculate the critical velocity necessary to transport the gravel clasts near camp (answer in m /sec)

   B. Using the "float method" approximate the average surface water velocity of the Deschutes River today. (answer in m/sec)

   C. How do the velocities from 4 A and 4 B above compare? Are we transporting gravel bedload today?

   D. Using the continuity equation on p. 35, demonstrate how discharge is related to velocity. Now relate discharge to stream power, also shown on p. 35. What are two ways in which the river system could increase it's stream power to transport gravel of the caliber measured in camp? Explain your reasoning.