NSSI Geomorphology Module: Field Trip to Black Rock / Falls City Area GIS Background Exercise

Using your Luckiamute Data CD and the project files on the **K:\NSSI\GISData\ArcView Projects** folder, examine the following GIS themes and answer the related questions.

1. Open the streams.apr and find the Little Luckiamute sub-basins of the Luckiamute. Build a mental map of our destinations.

2. Open the location.apr and locate Falls City. Add the streams.shp theme from your CD. Describe the position of the upper Little Luckiamute relative to Falls City.

3. Using the streams.apr, determine the 4 quadrangles that occupy the upper part of the Little Luckiamute drainage system.

4. Using the precip.apr, determine the range of precipitation for the upper Little Luckiamute.

5. Do the same for bedrock (using the bedrock.apr on the K:\ drive), determine the bedrock units that underlies the upper Little Lukiamute west of Falls City.

6. Open the vegetation.apr, determine the dominant vegetative assemblage for:

Main valley floor of the Little Luckiamute

The upper hillslopes of the Little Luckiamute

7. Open the debrisflow hazards *.apr, determine the relative debris flow hazards for the upper Little Luckiamute Watershed. Overlay the polk_cont_100.shp file on the project and determine what type of topographic settings are associated with the highest hazard?

   Question: what topographic position on the landscape would you likely find landslide / debris flow deposits?

8. Using debris flow hazards theme, the polk_cont_100.shp theme, and the measure tool of ArcView, determine the hillslope gradients associated with the following geomorphic settings:

   Procedure: Pick two points, on contour lines and perpendicular to contour. Determine the change in elevation between the two points, and change in horizontal distance between the two points. Fill in the blanks below and calculate.

   NOTE: The elevations of the polk_cont_100.shp file are in feet and the contour interval between each line is 100 feet. Remember the horizontal map distances are in meters. You will have to convert elevation from feet to meters to calculate gradient below (1 m = 3.281 ft)

Calculate the hillslope gradient, in percent, for any two high-hazard debris flow polygons on the Fanno Ridge or Laurel Mountain Quadrangle portions of the upper Little Luckiamute.

Calculation 1 - High Hazard Zone Change in Elevation_____ (m) (i.e. rise)
Change in Distance_____(m) (i.e., run - use measure tool)
Tan (Elev. / Dist) *100% = _____ (this is percent gradient)

Calculation 2 - High Hazard Zone Change in Elevation_____ (m) (i.e. rise)
Change in Distance_____(m) (i.e., run - use measure tool)

Tan (Elev. / Dist) *100% = _____ (this is percent gradient)

Calculate the hillslope gradient, in percent, for any two moderate-hazard debris flow polygons on the Fanno Ridge or Laurel Mountain Quadrangle portions of the upper Little Luckiamute.

Calculation 1 - Moderate Hazard Zone
Change in Elevation_____ (m) (i.e. rise)
Change in Distance_____(m) (i.e., run use measure tool)
Tan (Elev. / Dist) *100% = _____ (this is percent gradient)

Calculation 2 - Moderate Hazard Zone
Change in Elevation_____ (m) (i.e. rise)
Change in Distance_____(m) (i.e., run use measure tool)
Tan (Elev. / Dist) *100% = _____ (this is percent gradient)

Calculate the hillslope gradient, in percent, for any two unclassified debris flow polygons on the Fanno Ridge or Laurel Mountain Quadrangle portions of the upper Little Luckiamute.

Calculation 1 - Unclassified Hazard Zone
Change in Elevation_____ (m) (i.e. rise)
Change in Distance_____(m) (i.e., run use measure tool)
Tan (Elev. / Dist) *100% = _____ (this is percent gradient)

Calculation 2 - Unclassified Hazard Zone
Change in Elevation_____ (m) (i.e. rise)
Change in Distance_____(m) (i.e., run use measure tool)
Tan (Elev. / Dist) *100% = _____ (this is percent gradient)

Final Question: Comment on the relationships between hillslope gradient and debris flow hazard in the Coast Range of Oregon. What types of slopes are associated with the highest hazard and the lowest?