**ES473 Environmental Geology**

**Review Questions for Woodward et al., 1999, Hydrogologic Framework of the Willamette Lowland Aquifer System (** <https://people.wou.edu/~taylors/g473/hydrogeo_willamette_valley.pdf> )

Read through the Woodward et al., 1999 technical report, answer the review questions. Draw sketches where required.

1. Why is the Willamette Valley described as a “structural forearc basin”, define the term and provide sketches.
2. Sketch a map of the Willamette Valley showing the 4 structural basins from north to south; label the basins and briefly described how they are delineated.
3. List and describe the range of landforms associated with the Willamette Lowland, and their associated deposits.
4. What is the average gradient, relief, and distance in river miles along the Willamette River, from Eugene to the mouth at the Columbia?
5. Which months of the season are associated with maximum precipitation and river discharge? Which months with the lowest?
6. Do all areas of the Willamette Valley receive the same amount of precipitation, why or why not?
7. List several of the major western tributaries of the Willamette basin. List several of the major eastern tributaries. Which tributaries are the largest in drainage area?
8. What are the major differences between hydrologic characteristics of the western tributaries, vs. the eastern? How does each group vary in snow pack, snow melt runoff, and sediment discharge?
9. From oldest to youngest (lowermost to uppermost), list and describe the 5 major hydrogeologic units in the Willamette Lowland.
10. Identify, list, and describe the major aquifers and confining units in the Willamette Lowland system.
11. What is the “Willamette Silt”? How did it form? How old is it? Where is it thickest and thinnest? What are it’s hydrogeologic properties?
12. Compare and contrast the hydrogeology of the Portland Basin vs. the Southern Willamette Valley. For each, describe aquifer materials, hydrostratigraphy, structure, and thickness/availability of aquifer materials.
13. Describe the distribution of alluvial fans in the Willamette Basin. Where are they most plentiful and thick? What is the dominant composition and hydrogeologic characteristics of the alluvial fans? How does the present position of the main stem of the Willamette River compare to the location of major alluvial fans in the basin?
14. Based on your answers above, assess the best aquifer potential or locations for high-capacity groundwater extraction wells in the Willamette Valley.