Storm Runoff Part 2 Stream Dynamics

Directions: We will continue work on the data collected from the Little Kickapoo Creek. Using the data answer the following questions to the best of your abilities. Where appropriate, show all of you work and use significant figures. I would suggest that you solve the problems by using Excel.

1. Calculate the hydraulic radius for your cross-sections for all days that you have data.

2. Using Manning’s equation, calculate the velocity for the Little Kickapoo during the days of observation. Also calculate the velocity for bank full conditions.

3. Calculate the Froude Number for all points where you have enough data on both days. Is the Froude number consistent along your stretch of the stream? Why or why not? Is the stream flow sub-critical, critical, or super-critical?

4. Calculate the Reynolds number along the stretch (for days if applicable). You can assume a constant stream temperature of 10 °C, and a kinematic viscosity of $1.31 \times 10^{-6}$ m$^2$/s. Is the Reynolds number consistent along your stretch of the stream? Why or why not? What type of flow is occurring: laminar, transitional, or turbulent?

5. Calculate the Boundary Reynolds number for as many points as possible. Is the Boundary Reynolds number consistent along your stretch of the stream? Why or why not? You can assume a constant stream temperature of 10 °C, and a kinematic viscosity of $1.31 \times 10^{-6}$ m$^2$/s. What type of flow is occurring: hydraulically smooth, transitional, or hydraulically rough?

6. Calculate the bed shear stress along the stretch for conditions observed on each day, and for bank full conditions.

7. What is the maximum size particle that could be transported under the flow conditions observed on each day and during bank full conditions? Use basal shear stress and critical shear stress values.

8. Based upon the Hjulstrom curve, what size particle would you expect to be transported by the Little Kickapoo under the conditions observed each day?

9. Continue reducing the surveying data.