Field Trip for Raging River and Tributary
Field Information and Questions

Name_______________________________ Name______________________________

Name_______________________________ Name______________________________

Stop1: Deep Creek and Raging River

Our goal is to measure the discharge of Deep Creek and the Raging River, and to learn about **riparian** (streamside) corridors in the Cascade foothills. We will be working in English units: mostly feet and tenths of feet. At the measuring site, we will distribute CBLs and velocity meters to each group. Record your CBL #.__________

Task One: Width of Deep Creek

You will be assigned a location along Deep Creek to make a transect or traverse across the stream. Your first task is to simply measure the width of the stream on your transect, using the fiberglass tape. Stretch the tape across the stream PERPENDICULAR to the bank and measure the width of the stream. One student wades, another records the width. Do not let the tape float downstream. Anchor the tape on the other side of the stream; keep the tape OUT of the water.

Width of river along transect ______________________

What problems did you encounter, if any, in measuring the width? How accurate is your width measurement?

Task Two: Depth Profile of Deep Creek

Let a different student wade. The wader uses the stadia rod to measure the depth of the stream along your transect (not upstream or downstream). Measure a depth **every two feet** of transect. The tick marks on the rod are either 0.1 feet or 0.2 feet. **Record** distance from shore and depth of water for each location (record in the first 2 columns on the data sheet.)

What problems did you encounter in accurately measuring the depth at the different points? How accurately can you measure the depth?

Task Three: PRACTICE Velocity Measurement

Go over the instructions for using the CBL and velocity meter before you begin. One student will wade out a few feet with the velocity meter and find a good spot for measuring velocity. Two students on shore. One student will run the CBL, another student will record data and manage the cord to the velocity meter. DON'T BEND the electrical cord.

Measure the velocity at any point. Specific instructions come with the CBL. The general format is: A) program running, set up for 30 seconds of sampling at 1 per second and ready to record, B) wader positions the velocity meter and holds steady, and then C) after 15 seconds or so, start the CBL and record data. Then D) analyze your data (follow CBL instructions).

Notes to the wader:

- The propeller is fragile; don't bang it against the bottom or rocks.
- The propeller should be pointed directly upstream perpendicular to the transect.

Record your test data here (NOT on the data sheet)

Mean V: _________ Min V: __________ Max V: __________

Task Four: Measuring the Velocity of Deep Creek

Your task is to measure the velocity of the stream **at the same spots** you measured the depth when you did the depth profile. Have a new student wade into the stream holding the velocity meter.

The new wader will go **2 feet** from shore; use the tape to locate yourself. Measure the velocity 1/2 way between the surface of the stream and the bottom. Notice that the measuring stick attached to the velocity meter is taped 6 inches (0.5 feet) above the base of the velocity meter. That's so the stick won't interfere with the propeller. But don't forget that missing 0.5 feet! Remember to face upstream; don't block the flow of water.

Measure the velocity at the first station for 30 seconds. Then using the CBL's statistics package, calculate the max, min and mean velocity for that station. **Record** these values in the data sheet next to the appropriate depth.

Now move on to the next location, 2 feet further out. A third student should help manage the electrical cord, and keep it out of the water. The velocity wader can check the depth with the markings on the measuring stick. Remember, the measuring stick is 0.5 feet from the bottom. Again find the velocity statistics, and record data on the data sheet.

As the velocity student wades further out into the stream, **the student holding the CBL should stay on shore for as long as possible**. It is essential that the CBL and calculator not be immersed in stream water. Don't fall! **Take your time!!** No hurry! It is also important NOT to yank on the electronics and the electrical cord. Once the electrical cord is fully stretched out, the CBL student can also wade into the stream. **Finish recording** all velocity statistics for each spot along the transect.

Assemble on shore. List 5 uncertainties in your measurement of velocity.

Task Five : Large Woody Debris

There's a great spot for large woody debris near the measuring areas.

a. Where does large woody debris come from? In other words, how does large woody debris get into the stream at this locality?

b. How does large woody debris affect bed load sediment in the stream?

c. How does large woody debris influence salmon habitat? Positives? Negatives?

Task Six: Raging River transect

The Raging River is bigger and faster, with deeper holes and big slippery rocks. You must use **EXTREME CAUTION**.

And very important, **the CBL stays on shore at all times**; no wading with the CBL this time, just the velocity meter.

First have a wader cross the raging river and secure the tape on the far shore. Measure the river's total width:

width = ______________________

Second, walk along the transect and measure depths every 2 feet. Record on the data sheet.

Third, measure velocities for your transect only as far as the cord will stretch. **Do not take the CBL out into the river!** Record data on the data sheet.

So here's the problem: it's too risky to take the CBL out into this stream. You're missing about half the velocity measurements needed to complete your transect. What are you going to do? How are you going to solve this problem? How are you going to pick a velocity to put at a place where you can't measure it? Discuss this problem among your group and come up with a physically and mathematically sound solution. Describe your approach.

If you need more nearshore measurements to solve this problem, this is your last chance to make those measurements.

Bonus Question: Why are the boulders so large here, as opposed to Deep Creek only a couple hundred meters away?

Stop2: High Point Trailhead

We will use the restrooms here.

Stop 3: Raging River at the Gaging Station

Since 1945, United States Geological Survey **gaging station** (#12145500) has been providing discharge information for the Raging River on a daily basis. This is the only active gaging station on the Raging River.

What is the width of the Raging here? w = _______________

What is the mean depth here? d = ___________________

Using 1.5 ft/sec, calculate the discharge: Q = ___________________

I will try to bring Sat/Sun morning's discharge information so you can calibrate your eyeball.
http://waterdata.usgs.gov/wa/nwis/dv/?site_no=12145500&PARAmeter_cd=00060

There are some very large angular (not! rounded) boulders downstream from the bridge, dark brown to black, made of the rock known as **basalt**. Where did these boulders come from?

Estimate the diameter in meters for the largest basalt boulder? Use the table below to find the velocity in m/sec needed to move the largest basalt boulder.

diam	vel	diam	vel	diam	vel	diam	vel
0.0	0.0	1.2	6.9	2.4	9.8	3.6	12.0
0.2	2.8	1.4	7.5	2.6	10.2	3.8	12.3
0.4	4.0	1.6	8.0	2.8	10.5	4.0	12.6
0.6	4.9	1.8	8.5	3.0	10.9	4.2	12.9
0.8	5.6	2.0	8.9	3.2	11.3	4.4	13.2
1.0	6.3	2.2	9.3	3.4	11.6	4.6	13.5

Finally, convert velocity to ft/sec (3 ft ≈ 1 meter).

diameter (m):___________ velocity (m/s):____________ velocity (ft/sec)__________

There is a flat area to the northeast where a modernistic home is built. This might be an active flood plain: a flat area adjacent to the stream that is flooded every 2 years on average. Is this area an **active flood plain** or a **river terrace**? Choose one, and defend/explain your answer.

Stop 4: Issaquah Fish Hatchery

We will tour the hatchery and hatchery exhibits. Restrooms available.