

*Group Four Project at Arcade Creek*

# Habitat Assessment

## **What is Habitat Assessment?**

Habitat Assessment takes measurements in the creek to measure erosion and water flow through the creek. The study also performs vegetation mapping of the banks with the help of a Botany liaison; this provides information about tree density and plant/tree species at the creek. Analysis of the vegetation mapping information can then determine the creek's suitability as habitat for various animal species.

## **So What Do We Do In This Study?**

As a Habitat Assessment group member, you will be going out with your group to one of the six sites and taking measurements at each of ten transects. Following is a more detailed description of the procedure and the measurements & observations you will have to make.

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## **BASIC INFO**

### **Samplings:**

A Sampling is a complete set of all of your data during a time frame. Habitat takes two samplings a year: Fall and Spring, which effectively correspond with first and second semester.

### **Sites and Transects:**

There are six sites for the Group 4 study at Arcade Creek (A-F). Each site is broken down into ten transects. A transect is a 10-meter stretch of creek. You will have to fill out a set of data forms at each of these transects.

Each transect is marked by a labeled washer nailed to a tree or other landmark on each side of the bank, and hopefully a piece of brightly colored flagging. The transect upstream of the marker is the # on the washer. The 11<sup>th</sup> marker **IS NOT** a transect –it marks the end of transect 10.

The "transect line" is the imaginary line extending from the markers across the channel and to the surrounding bank area. (Therefore, it is perpendicular to water flow.) This line is the beginning of the transect. Each transect extends approximately ten meters upstream from the transect line, and transect lines should be about fifteen meters apart.

However at many sites the transects may not be marked this well, or at all. If your group has trouble finding any of its transects, ask the Long Mapping team to go out and help you find and mark your transects. Let your senior managers know if you have any problems.

### **Upstream, Downstream, Left and Right Banks:**

Upstream and downstream refer to the direction of the creek's flow. Downstream (generally west) is the direction the current flows in, while upstream (generally east) is the direction facing the current flow. When referring to the banks, left and right always refer to your perspective when facing downstream.

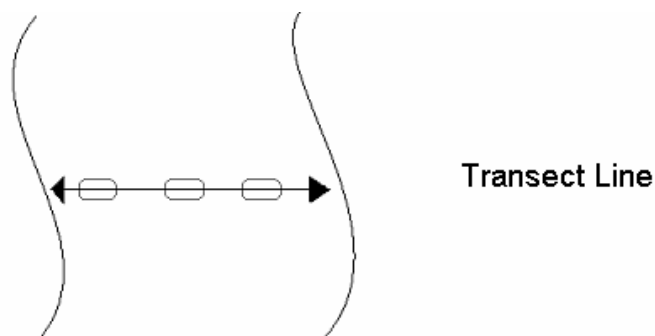
If there is no easily visible current at your site, remember that the transect numbers increase as you move upstream and decrease as you move downstream.

### **Locations and Thalwegs:**

At many points on the in-creek data sheet, you are asked to take data from three different locations. The locations need to be on your transect line, and should be measured in meters from the left bank. Your first consideration in choosing locations is determining whether there is a thalweg.

A thalweg is an area of the creek that is significantly deeper than the rest of the creek. If a thalweg exists on your transect line, it is automatically one of your three locations, and you should choose two other sensible locations at which to take the measurements. They should (as much as possible) be halfway between the thalweg and the banks.

If there is no thalweg, then determine locations by dividing your channel width into four even parts so that you have 3 in-stream locations, like so:



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## **EQUIPMENT**

(All that STUFF seniors force you to drag to the creek)

### **Waders:**

Rubber suits that go up to your chest. They come in different sizes, and many of them have holes. Wear socks when taking in-creek measurements, as while damp or wet socks aren't great, bare feet in waders suck.

There are also knee-high rubber boots, which are more comfortable than waders, but are only useful for shallower sites, as some locations are deep enough to render them useless.

Waders are only needed for in-stream measurements

### **Meter Tape:**

Meter tapes are used to measure distances, and in some cases the circumference of a tree (to later calculate diameter). If your measuring tape is not in meters, be sure to notate that on your data.

We have reeled meter tapes that will be long enough for your purposes. These are useful, but if you own one, a smaller box tape measure can be more convenient for measuring short distances.

**Clinometer:**

This is a small, rectangular instrument that has a compass and angle measure on one side. It measures angles when it's tilted, both on the circular display on the flat side and when you look through the peephole on the skinny side. We use it to measure azimuth and bank angle. Be EXTREMELY careful with them, as each one costs *at least* \$180.

**Stadia Rod:**

The stadia rod is a five-meter (~16ft) tall device, which luckily for us, collapses to a nigh-portable size. We use it to measure water depth, bank height and bank angle.

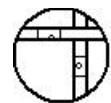
**Densiometer:**

There are two types of densiometers.

Wood-box densiometers consist of a circular, slightly concave piece of reflective material with a grid on it in a wooden box. In the corner there's a little bead and a circle. To use, balance the bead in the middle of the circle, then record the number of squares reflecting foliage.



PVC densiometers are crafted from PVC piping and concave mirrors. There are two tubes with bubbles when looking down the sight. To use, align the bubbles between the lines, then estimate the %age foliage coverage.



(view while using)

**Caliper:**

This is used to measure the diameter of the trees in each transect. Extend the arms of the caliper and adjust it to the size of the tree's trunk at 1.5 meters (4.9 feet) off the ground. Only trees with a diameter greater than 3.8cm (1.7 inches) (that's a circumference of 11.9cm or 4.7inches) or greater at 1.5 meters off the ground need to be measured. The trees can be fairly large, especially the heritage oak. Smaller trees are counted as bushes.

**Compass:**

Used to determine the cardinal directions and degrees in between. If you have a clinometre with a working built-in compass, you don't need to take a compass with you.

**Disposable Camera:**

Used to take photographs during mapping and in-stream measurements. For mapping, 4 photos are taken, 1 in each cardinal direction. "In-stream photos" are taken from underneath/as close as underneath as possible to a transect marker down the transect line (so as to face left-stream or right-stream), and an additional photograph is taken facing downstream and upstream. These photographs should be emailed (if digital) or given (if film) to a Habitat Assessment manager.

**%age Transparencies:**

These are pieces of overhead transparencies with lines dividing the paper into halves, fourths, and eighths. They're used to measure %age coverage of herbaceous and woody material.

**Laser Pointers (optional):** They can make some measurements easier and more accurate. Do not play around with these, and be very careful not to shine them in other people's faces. See CONTINGENCIES under the mapping section for use.

**Twine (optional):** For use measuring high banks. At present there is no standardized type, this could range from string to nylon cords to rope. The only consideration is that bungee-jumping cord or similar nylon material may stretch when taut, causing inaccurate readings, and twine or weak string may snap if you must weight the line to get it through vegetation. See use under CONTINGENCIES.

**Polarized Sunglasses (optional):** If you have a pair, they should cut through glare on the water/stirred up silt, and let you see the creek bottom easier.

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**EXPLANATIONS OF ITEMS APPEARING ON DATA SHEETS**

In ALL CASES, if you cannot take a piece of data, note why. BE SPECIFIC: if something is unsafe to measure, say why. This is far preferable to simply leaving it blank, and falsifying data is NEVER permitted.

Cover Sheet:

**Season:** Indicate which sampling your data is from; i.e. "Fall" or "Spring"

**Year:** The year you're taking the data.

**Site:** The site at which you're taking the data.

**Nearest Landmark:** The address of the nearest landmark to your site (i.e. American River College).

Headers: (do this section in pen)

**Site:** Indicate which site you are at. (A, B, C, D, or F.)

**Date:** The date you're taking data; month, day, AND YEAR. ex. "Jan 19, 2008." Circle whether this is the Fall or Spring sampling, as well.

**Transect:** Indicate which transect you're at. Should never be 11!

**Recent Weather:** List the date it last rained and the inches of rainfall on that day. If you don't know inches, just leave that off. The Habitat Manager should keep an accurate tally on the creek forum or a separate website during sampling periods.

**People:** List the names of people at the creek taking data on the date specified above.

### Transect Measurements:

**Azimuth:** A measurement of the curve of the creek. Standing in the center of the transect line, point the clinometer (or compass) at the lonely person standing at the center of the previous transect line. You should record both a degree and a direction such as "240 SW." Not applicable at transect 1.

**Distance From Last Transect:** The distance in meters between the last transect line and the current transect line. (Remember: the transect line is the line between 2 transect markers, and is perpendicular to creek flow.) Stretch the tape measure between two people standing at the center of the channel on each transect line. Not applicable at transect 1.

**Channel Width:** The distance from one wetted edge to the other. Wetted edge= the point where water and bank meet. Consider bars to be part of the bank, and consider islands to be non-extant. (Thus this measurement is perpendicular to creek flow.)

**Densimeter / Percent Foliage Cover:** For wood-box densimeters, face the indicated direction, hold the box out in front of you at arms length, and tilt it until the bead is in the circle. Once the bead is in the circle, the box is level; then count the number of squares shaded by foliage and record it.

For PVC densimeters, look through the horizontal part. (Top of the "T" shape.) You'll see a mirror reflecting foliage above you and two tubes with bubbles. Jiggle the densimeter to align the bubbles between the lines, then estimate %age foliage cover.

**Riffle/Run/Pool Measurements:** Count the riffles, runs, and pools in the transect, write down the number of each in the appropriate spot.

A **riffle** resembles a stretch of rapids, where the channel narrows and water velocity significantly increases. Often the substrate will be grabble or small rocks, due to the higher velocity scouring away sand/silt/mud.

A **run** is a stretch of water that can either be slow or fast-flowing; the word 'glide' is also appropriate. Essentially water that isn't a pool or a riffle.

A **pool** is usually slower-flowing than the rest of the creek, and is deeper than runs or riffles. Thalwegs can be pools, but are not always pools. (You can have a thalweg in a run or riffle that's not a pool, for example.)

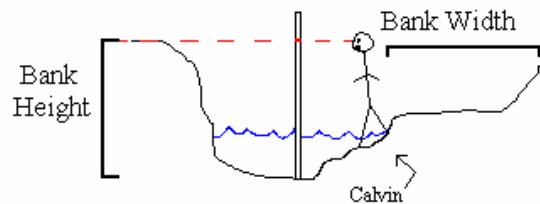
### Location Measurements:

**Location Distance from Left Banks:** The blank next to "Location #" on the datasheet should have the distance in meters from the left wetted bank to the location.

**Thalweg:** An area in the creek that is much deeper than the rest. If there's one on your transect line, use it as a location.

**Depth:** Use the stadia rod to measure the distance in meters from the creek bottom to the water's surface.

**Velocity:** Place a floating object (twig, leaf, paper) on the surface of the water and count the seconds it takes to travel the distance of one meter. Then, record velocity in meters per second. DO NOT record in seconds/meter.



Bank Measurements

**Bank Height:** Place the stadia rod in the center of the channel and have a person stand by/on one bank. They then read off the measurement level to the *top* of the bank opposite them. (This helps eliminate parallax.) Repeat for other bank.

**Bank Width:** Using a measuring tape or a stadia rod, lay the measuring medium horizontal to the top of the bank's edge furthest from the creek, and stretch it out until it is over the creek channel's wetted edge. (It'd be in much the same position as the line labeled bank width in the diagram above)

Normally, **DO NOT** simply lay the stadia rod against the bank and record that distance. If, however, you cannot take the bank width measurement properly, you may take the measurement this way, provided you note you have done so. Together with bank angle/height/this replacement measurement, bank width can be calculated using trigonometry by the data analysts.

**Bank Angle:** Lay the stadia rod against the bank, and place the clinometer on the rod to obtain an angle reading.

**Bank Shape:** Choose from "concave," "convex," or "linear." Also sketch the shape of the bank in the margins.

**Bank Substrates:** This data cannot be accurately obtained by Habitat Assessment at this time. Hopefully this data can be obtained from Sediment in Fall 2008 and onwards.

**Woody Vegetation:** The percentage of the bank covered by wood-like plants: vines, trees, shrubs, bushes, etc. Use the transparencies: stand on the transect line at the wetted channel edge opposite the bank you're measuring, hold the transparency out at arm's length, and record the squares through which you can see woody vegetation. (FYI, each square is 6.25% coverage.)

**Herbaceous Vegetation:** The approximate percentage of the bank which is covered by herby plants: grasses, flowers, weeds, etc. Again, use transparencies.

NOTE: Herby & Woody do NOT have to total 100%. If some of the bank is exposed mud/dirt, that can count as its own unstated percentage. (for example, 10% herby, 50% woody, 40% exposed bank)

### Bar/Island Measurements

**Map Number:** Number any bars/islands sequentially.

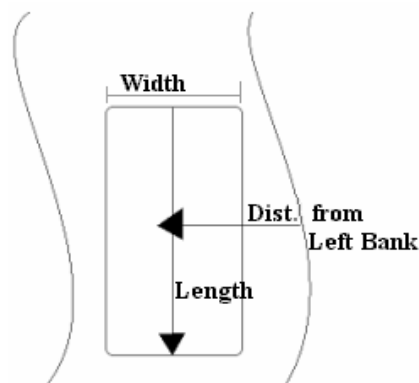
**Bar:** An exposed area of sediment which is connected to the bank at some point. These are *generally* sandy & without trees or long-existent vegetation.

**Island:** Exposed area of sediment which is NOT connected to the bank. Generally has vegetation upon it.

**Distance from Left Bank:** Distance from the center of the bar/island to the left bank of the creek.

**Length:** The distance from one end of the bar/island to the other in an upstream-downstream direction.

**Width:** The distance from one end of the bar/island to the other in a left-stream to right-stream direction.



**Bank Angle:** Use the clinometer's side angle measure to record the slope of the bank of the bar/island. If it's too tall to just use the clinometer, lay down the stadia rod and place the clinometer on top to obtain an accurate reading.

**Substrates:** Same as above.

**% Woody Vegetation:** The approximate percentage of the bank which is covered by wood-like plants: vines, trees, shrubs, bushes, etc.

**% Herbaceous Vegetation:** The approximate percentage of the bank which is covered by herby plants: grasses, flowers, weeds, etc.

### Mapping Measurements

**Plant #:** Write the number of the tree/bush-patch/grass-patch. This begins with “#1” being the closest plant to 0 degrees, and sequential numbers are assigned going clockwise.

**Bush, Plant:** Circle one according to whichever the Botany person signifies.

**Diameter:** If you have calipers, use them. Otherwise record the circumference and note that you recorded circumference instead of diameter.

**Species:** The Botany person should supply this. If they don't know, they take samples, so they should be able to tell us later. See the Botany-Habitat cooperation protocol for details on sampling.



**Tree Crown Width:** Crown width is a distance measure of a tree's foliage. For our purposes it must be recorded for North, South, East, and West. To measure East, stretch the tape measure from the tree trunk to the easternmost point under the tree's foliage.

**Distance:** The distance from the plot's centerpoint to the center of the tree/bush/grass.

**Degrees:** The degree measure from north (North = 0 degrees) of the tree/bush/grass.

**Phenotype:** Describe the bush/grass's appearance. The botany liaison should provide this if they are present, as they will know which details are important.

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## **MAPPING PROTOCOL – a.k.a. doodling**

### **What you need:**

- meter tape
- 9 small metal flags
- degree-measure compass (Use clinometer's, or borrow Long Mapping compass.)
- calipers (if available)
- Disposable Camera

Botany Liaison

Tree ID cards (if available)

**Contingency items:**

Laser Pointer (if available)

String/twine of some sort (For high banks)

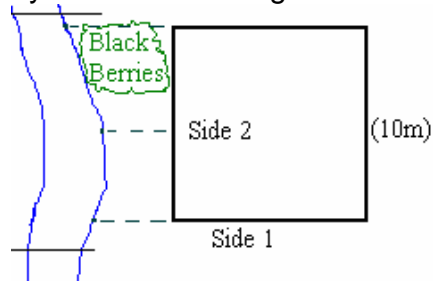
Cheap, heavy, durable item (for high banks)

Sharpie (For high banks)

**HOW TO MAP:**

**Setup:**

1. Ensure the header for your datasheets are fully filled out.
2. Mark mapped bank - left or right. You should map the same banks that were mapped last year.
3. If you have a GPS device, record the GPS cords of plot center.
4. Measure out a 10x10 meter quadrat (square). One side should be on the transect line, while a second side should be perpendicular to the first and run along the top of the wetted channel edge heading upstream towards the next transect.
5. If it's absolutely impossible to keep the line along the channel, due to steep slopes, Himalayan blackberries, or cottonwood thickets, you have two choices:
  - a. Move the quadrant away from the creek a little (see diagram below).
  - b. If a is impossible, measure the other bank. Ensure you mark the correct bank you are measuring for 1.

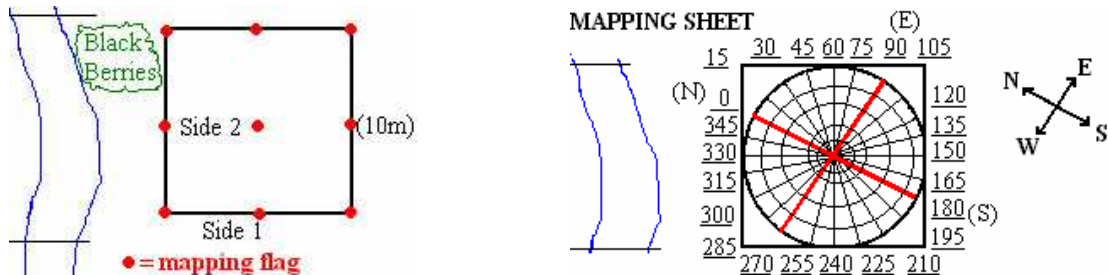


6. Place a flag into the ground at each corner. Then place a flag at the midpoint of each side and at the center of the quadrat.



7. Measure & record the distance from either the wetted channel edge, or if you possess an extremely steep bank, from that bank, to the edge of the quadrat. This distance is marked by dotted lines on the figure under 3.b.
8. Stand at plot center with a compass and locate north. Set up your mapping sheet so that it mirrors the situation at the creek, and then copy the degrees

from the compass to the blanks on the sheet. North is 0 degrees, and every radius is another 15 degrees. (Also FYI, the scale is each circular ring is 1m, and each square is 1m.) Label the four cardinal directions. See examples below.



9. The red lines on the mapping sheet above are the four cardinal directions. Each transect will likely have the degrees laid out differently upon its mapping sheet.
10. Stand at plot center and take photographs north, south, east, and west. Have a piece of paper with the site letter and transect number written upon it visible in the photograph. Aside from possibly a person with a stadia rod to provide a sense of scale, limit the number of people cluttering the photograph.

**MAPPING:**

11. Starting from north and working clockwise, choose a tree-looking thing inside the quadrant. Measure its diameter or circumference. If the diameter is greater than 10cm greater than 3.8cm diameter / 11.9cm circumference at 1.5 meters off the ground, record it as a tree. If smaller, record it as a bush.
12. Standing at plot center, measure and record the degrees-from-north of that tree under “degrees” for the tree’s or bush’s entry.
13. Measure the distance between plot center and the tree or bush. Record this under “distance” for the tree or bush’s entry.
14. Using the distance and degree measurements, draw the tree or bush (or grass patch) onto the map. Trees are circles, bushes/grasses are patches with ragged edges. Each concentric ring is 1 meter from plot center, each square on the map is 1m, and each radius of the circle is 15 degrees from those adjacent to it. A line should be drawn between plot center and trees, and labeled with the distance.
15. Number the tree/bush/grass-patch you just drew in. Numbers should start at “1” for whatever is closest to North, and increase as you travel clockwise. (If you had 4 trees, one at each cardinal direction, North would be 1, East would be 2, South would be 3, and West would be 4.) These numbers *MUST* correspond with the entries on the back side of the mapping sheet.
16. Fill in the remaining data on the back of the mapping sheet.
  - a. Your Botany liaison(s) should identify tree species. If they cannot, they will take samples to key later. Label the Ziploc bag / newspaper in press with the site letter, transect number, and tree/bush/grass identifying number. Note that samples have been taken on the species line in this instance.

- b. Measure and record crown width. This is measured from the tree's trunk to the edge of the canopy, in all 4 cardinal directions.
  - c. Use the caliper to record diameter. If you do not have calipers, record the circumference instead. Note that you measured circumference for this tree instead, preferably under the "Distance: \_\_\_\_\_" spot.
17. Repeat steps 11-16 for any other trees, bushes, or grasses.

**CONTINGENCIES:**

18. If you have more trees/bushes/grasses than will fit on your datasheet, take an extra datasheet, draw a large X through the map side, fill out the header, and use the "Vegetation Mapping - Plants" side of that sheet to fill in data for additional trees/bushes/grasses.
19. If you cannot accurately measure a crown width due to the canopy edge falling within the creek, a steep slope, or a bramble thicket, CIRCLE the cardinal direction of which you are unsure, and make an educated guess. This should be written in the form X + Y, as educated guessing here involves
  - a. Measuring as much of the crown width as you can (X),
  - b. Comparing the distance left to the measured width, and estimating the remaining difference (Y) based on that mental comparison.
20. **Laser Pointers:** If you have laser pointers, you may use them for the following measurements. Notate which measurements you used laser pointers for.
  - a. Crown Width: use the laser pointer to identify which foliage is directly above you.
  - b. Depth: You may hold the laser parallel and directly above the water and use it to pinpoint the depth reading on the stadia rod. Be very careful not to drop the laser pointer in this case.
  - c. Bank Height: You may have an individual on the bank hold the laser pointer parallel to the top of the bank and use the pointer to pinpoint the reading on the stadia rod. The stadia rod should be placed in the center of the transect line.)
21. **High Banks:** If you have banks you cannot accurately measure using eyesight or a laser pointer, you may use the twine method:
  - a. Have Habitaters with twine on the top of the bank, and Habitaters in the creek bed. The bank-top Habitaters should throw part of the twine down to the creek bed people. They should take hold of the end, and hold it next to the bottom of the bank. The individuals at the top should slowly reel in any slack in the twine, until it is taut and measuring the bank height. The banktop individuals should mark the string with a sharpie, then reel the twine back up and measure the length between the mark and the end that was at the bottom of the bank. This will give the bank height.
  - b. If there is too much vegetation to throw the twine to the creekbed, you may tie an object to the end to weight the line. This object should not be heavy enough it can cause injury to people below, or that it could snap the line.

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## General Notes

Oftentimes when we map, we come very close to the edges of people's property or places of business. While it is of course okay to talk and to have fun, **be courteous**. We don't want to give the Mira Loma study a bad name, and we should be considerate anyway. And if you spot a homeless person, just finish your work and leave peacefully.

**Watch out for poison oak** – many of you haven't yet experienced the pleasure of rashes breaking out all over your body and having your eyes swollen shut... if so, you might want to keep it that way.

Because Habitat works at the creek, we have a better opportunity than most to pick up trash. **Take a trash bag and gloves to the creek each time you go out.** Priscilla of the Creek Room, or whoever is in charge of the creek, or Restoration leaders/managers can loan/provide these items to you. It'll also get you more hours!

**Do not go to the creek with less than three people.**

From your managers, best of luck, and be honest in measuring/recording data.

- Michelle Lee
- Christopher Pavia, god-emperor of Habitat