

Botany Protocol 2015-2016

Introduction:

Plants are scientifically classified as *autotrophs*, organisms capable of synthesizing their own food from inorganic substances, using light or chemical energy. Autotrophs are the basis of all food webs. Thus, monitoring the health of the autotrophs in any ecosystem is important to our understanding, not only of the plants, but also of the biological aspects of the ecosystem as a whole. The Botanical Survey, or the Botany study of the Arcade Creek Project, is a crucial part of monitoring both the annual and perennial vegetation at the Arcade Creek. Collecting, identifying, drawing, and comparing year to year samples of various plants are all part of the cumulative process that is carried out in order to determine the states and welfare of the plants, and the creek as a whole. The goals for this year includes: tracking the progression of invasive species to assure accurate eradication, and upgrading the herbarium.

After examining plants between seasonal collections throughout the years, it becomes apparent that the creek is in a declining condition if an abundance of invasive plant species become frequent. Botany then uses its connections to the creek's Restoration group in order to exert efforts to control the invasive species through different procedures. Our expertise is also needed in assisting the Habitat group with the identification of plants in order for them to assess any change. It is important to keep in mind that this is because one of the Arcade Creek Project's main objectives is to monitor and improve the health of the Arcade Creek.

1. Preparation

a. Materials:

1. Writing utensil
2. Field sheet (one per study present)
3. Trash bag
- ii. For Plant Sampling:
 1. Gloves
 2. A pair of scissors/shears
 3. Camera
 4. Plant press
 5. Newspaper
 6. Gridded background paper
- iii. For Invasive Mapping:
 1. Clipboard
 2. Invasive mapping sheets (bring enough to map all species at your site)

b. Safety:

- i. Be sure to wear appropriate clothing, including long pants and close-toed shoes.
- ii. Never go to the creek with less than four people. Not all four people on an outing need to be in the Botany study. However, you need four people in botany if you choose to take invasive mapping data.
- iii. If someone gets injured, have one person stay with the injured person, while two go to get help.

- iv. If you see a homeless or any suspicious person, call the sheriff and leave the creek immediately. Notify the botany managers of the incident once you are safe. If you see evidence of the presence of a homeless person but you do not actually see anyone, it is okay to stay at the creek.
- v. If you ever feel unsafe at the creek, leave immediately. Notify the botany managers of the situation once you are safe.
- vi. **If you see any trash at the creek, please pick it up and throw it away in your trash bag.**

2. Location

a. Sites:

- i. Plant samples and data should be taken from all sites A through G by the various groups assigned to each site. Having plants and data from each and every one of these sites will allow for closer observations of each designated section of the creek.

b. Location Within Sites:

- i. Plants should be taken from a variety of locations within each site. They should not only be from different transects, but also from various proximities to the creek itself.

3. Timing

a. Seasons:

- i. Plant samples should be collected throughout the year in marked seasonal intervals. There should be collections from autumn, late autumn, early spring, and late spring; each of these collections should also have specific dates.

4. Plant Sampling

a. Collecting Plant Samples:

*Note: make sure you are wearing gloves and check for thorns and other sharp parts of the plant before taking samples; remember, safety is our first concern!

- i. While walking along the creek, select a plant sample from your surrounding area. Choose plants that you do not recognize or that are needed in the herbarium.
 - NOTE: before selecting plant to be a sample, be sure that there are others of this same plant growing nearby. **Do NOT remove a single plant in an area.**
- ii. Hold the gridded paper behind the plant, and take a photograph of the bark, shape of tree and other aspects (as much of the plant as possible for later identification)
- iii. Remove the plant. Try to remove the roots of the plant, if possible. If not, use your shears to cut a sample of the plant showing as many parts (leaves, flowers, thorns, berries etc.) as possible.
- iv. Repeat steps i-iv in different locations throughout the creek. Be sure to only collect one sample of each plant. Collect about 10-15 samples, or as many as appropriate.

b. Pressing Plants

- i. After collecting samples, but before leaving the creek press your samples.

- ii. Lay 1-2 samples, with newspaper on both sides, between cardboard pieces of the press. The newspaper is important to draw moisture out of the sample. Make sure the entire sample is being pressed, and do not crowd samples if more than one is put in the same layer. Also, make sure to adjust samples to show both the front and the back sides of leaves, if possible.
- iii. Repeat step ii, filling the press with samples.
- iv. Tighten belts on the press
- v. Store the press in a cool, dry area (preferably the creek room) for about a week, or until samples are fully dried. Write the date and site from which the samples were collected on the newspaper. Place dried plants between textbooks/heavy books

c. Mounting Plants:

- i. Each individual plant sample, once pressed and dried, needs to be mounted to herbarium paper using pH neutral glue.
- ii. On the same side as the sample, glue on a label, with the date and site of the sample noted (it will be identified later).
- iii. On the backside of the sample, glue the photos taken at the creek, or internet photos (once the sample has been identified).
- iv. On the back side of the sample, glue on a sketch of the sample. Be sure the drawing has a scale to indicate how big the sample actually is in comparison to the drawing.

d. Keying Samples

- i. Samples are keyed using the *Jepson's Manual*. This is a dichotomous key of known plant species in California.
 - NOTE: Students will be given instruction on how to properly use the *Jepson's Manual*.
- ii. Once the sample has been identified, the family, genus, species, and common name should be noted on the label.
- iii. Check the accuracy of the keying before laminating samples, through internet research or by comparing the sample to others of the same genus species in the herbarium.
- iv. Laminate the sample.

e. Recording Samples

- i. Before samples are placed in the herbarium, their genus, species, and date and site must be noted in the herbarium record. This will allow for easier analysis of how samplings of plants have changed over the years at each site.
- ii. Once recorded, place samples in the herbarium according to their family, genus, and species.

5. Invasive Mapping

a. Label the Data

- i. Clearly state which indigenous species you are recording, the date/time of year, and which site you collected your data.

b. Marking the Data

- i. Find the area between transect marker 1 and transect marker 2.
- ii. Choose one invasive species to map, and have each member of the group estimate the percent of the quadrat covered by that invasive species. Record this number on the invasive mapping sheet.
- iii. Take an average of all percent coverage estimates and record on the percent coverage sheet. **Percent coverage: shrubs/grasses count trees=trees
- iv. Repeat steps 2 and 3 for all invasive species within the quadrat.
- v. Repeat steps 2 – 4 for all quadrats.
- vi. Make sure the labeling begins at transect 1 and continues upstream, opposite of the direction the creek flows.

c. **Storage**

- i. Store completed data in the creek room, under your own site.

d. **Graph**

- i. Create a bar graph of the data, and compare it to previous data recorded in later years.

6. **Habitat and Restoration Outings**

a. **When**

- i. The job of coordinating outings relies on the **Senior Leaders** of your site. Leaders must talk with the Habitat leaders of the same site and coordinate a date of when they need their data.
- ii. You are required to go out with Habitat at least once a semester. Be on call if they need you.
- iii. You are not required to go out on a certain number of restoration outings; however, you must be willing if they need you.

b. **How**

- i. Habitat will simply point to species and ask you to identify it. Your job is to know your plants to accurately identify the species.
- ii. If you are unsure of the species, do not panic and **do not act like you do**. It is all right if you do not know all the species of plants. Simply follow the procedure and collect a sample to key with the *Jepson's Manual* back at the Creek Room.

c. **Helpful Resources**

- i. calflora.org - Gives information and coverage of plants (based on sightings of certain plants) in California. It also has a function allowing you to plot out areas from which it will bring up sightings of different plants in that area from its database.
- ii. cal-ipc.org - Detailed inventory on **invasives** within California. Look for their plant inventory.
- iii. discoverlife.org - A little bit harder to use than the other sources, but works as a powerful search engine for different plants if you're having difficulty identifying them. Is missing some plants so don't rely too heavily on this resource.

*A note on seeding thistles/stinkwort/similar plant species- Have a garbage bag next to the plant you are pulling and pull the seeding plant directly into the bag to minimize seed spread.