

## Demography Protocol – demo2014

**Objective:** The goal of the Echinacea Project’s demography study is to collect information from remnant *Echinacea angustifolia* populations in order to assess the long-term fitness of individual plants, describe within- and between-year flowering patterns, and monitor the status of remnant *Echinacea* populations. While collecting demographic data, we aim to generate two independent lists of all flowering plants for each site. These lists may also include “extra” basal plants. The first list of plants will be collected using the “demo” visor form. The second list of plants will be associated with spatial data collected using a GPS unit.

### Doing demography: First Pass

1. Gather Supplies. Before traveling to a site, pack supplies and equipment for collecting demography data. These supplies include:
  - a. Visor (check batteries and replace if low!!!!)
  - b. 5 or 8m measuring tape
  - c. Aluminum plant tags
  - d. Flag bag with flags
  - e. Clipboard
  - f. Pen
  - g. GPS units and poles and/or site maps
  - h. R2D2 (if “look” files are needed)
2. Go to site and **INITIALIZE VISORS**
  - a. Select the appropriate site from the drop down menu and type “-33” into the “loc” field
3. Record demographic information and flag all flowering *Echinacea* plants and some basal plants
  - a. Find tag and check that the “loc” (tag # provided on map) and “tag” (the tag actually on the plant) are equivalent
  - b. Search carefully for old tags buried under the thatch/gravel/soil
  - c. Record the plant status (i.e. flowering, basal, etc.)
  - d. Count and record the number of rosettes, normal flowering heads, and other flowering heads (use demography codes, see demo dictionary below)
  - e. Look for other plants within 12cm and record distance and direction to any near neighbors
  - f. Flag plant!
  - g. Note: Don’t hesitate to make notes if you encounter strange situations (see “Common demo issues” section for instructions on how to handle of few of these situations) or if there is uncertainty about the identity of a plant.

4. Once finished, double-check to make sure all flowering plants are flagged (see guidelines for active searching below, active searching is a must!).
5. **TERMINATE VISORS** (make record with “-99” in “loc” field)
6. Set up GRS-1 (aka Sulu or Chekov) and shoot GPS points for each flagged plant
  - a. Make sure to enter the plant tag and number of flowering heads in the “textLocId” field using demo codes
  - b. Replace demo flag with flag of a different color to indicate that the plant has been surveyed with the GPS
7. Immediately upon return:
  - a. **SYNC VISORS!**
  - b. Charge GRS-1 battery and replace with fresh battery
8. Download GPS data and save data as .xml file

### **Doing demography: Second Pass**

1. Follow instructions for first pass but visit only designated locations. The second pass is targeted to resolve discrepancies between the two independent plant lists collected during the first pass.

### **Common demo issues:**

1. **Illegible tags:** If a tag is unreadable or very difficult to read, make a note indicating that the tag is unreadable, collect the illegible tag, and replace the old tag with a new tag. Choose “new tag” and “old tag replaced” in the “equivalentLocs” field and indicate which tag was collected in the “collectedTags” field. If any digit is illegible use a “#” in place of the digit. If a digit could be a 1 or a 7, use “[17] in place of the digit. Record demography information for plant.
2. **Multiple locations associated with a single plant (aka multiple locs):** If a plant has had its tag replaced several times, it is likely that multiple locs (previous tags) are associated with that plant. In order to keep track of all tags associated with that plant, note which locs are equivalent in the “equivalentLocs” field and change the “locStatus” field to “multiple equivalent locs.” Record demography data for plant.

3. **Multiple tags present:** If a plant has more than one tag, you should make a note in the “equivalentLocs” field to indicate which tags are equivalent, change “locstatus” to “Multiple tags,” and note which tags were collected in the “collectedTags” field. If legible, we prefer to leave the oldest tag in place and collect newer tags. Record demography data for plant.
4. **Tag present, no plant present:** Widen your search area and look carefully for dead leaves or small plants. If a plant still cannot be found, write “tag present, no plant” in the “notes” field and change the “plant status” option to “can’t find.”
5. **No tag present, plant present:** If there is uncertainty about the identity of the plant, place a new tag on the plant and indicate that it may be equivalent to a previous loc in the “notes” field (make sure to specify the previous tag!). If you are certain of the plant’s identity, place a new tag around the plant, choose the “new tag” option in the “locStatus” field, note that the old tag and the new tag are the same plant in the “equivalentLocs” field, and write “no tag present” in the “notes” field. Record demography data for plant.
6. **No tag present, no plant present:** If neither plant nor tag can be found, first try to widen your search area and look carefully for dead leaves and small plants. If neither can be found, change “plantStatus” to “can’t find,” write “no tag, no plant” in the “notes” field, and change “locStatus” to “other.”

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## Demography Dictionary

When entering demographic information in the textLocId field of the GRS-1 GPS units, use the format "tag#.code" (see examples below).

### Code interpretation

U *unattached tag*  
 B *basal plant*  
 # *number of heads*  
 M *stem(s) mowed off*  
 T *toppled head(s)*  
 D *head with some other disease/deformity*  
 S *bud didn't make it to fl for unknown reason*  
 F *head/stem broken by observer or measurer*

day *aster yellows*

Y or / *separator between tags on the same head--  
 (better to make note in memo or demo dorm)*

6.x *non-echinacea object x*

Examples:

tag#.2 *2 normal heads*  
 tag#.2M1 *2 normal heads and 1 mowed off stem*  
 tag#.M3 *3 heads mowed off*  
 tag#.1M2S3 *1 normal head, 2 mowed, and three buds*

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## Active Searching Suggestions

Searching for things is an intuitive process. Our intuition is to find things quickly and efficiently. Our intuition serves us very well in some circumstances, but not all. To census Echinacea, we must work against our intuition. Searching for Echinacea seems easy, because we can easily find some plants quickly. To find all plants is difficult and inefficient, so we must work against our intuition.

1. When you find your first plant, look behind you to find the second. (Modify and expand your search image.)
2. Be systematic and ignore what you know about the site, e.g. previous flagging, remnant extent. (You will tend to find what you are looking for.)
3. Move your body and turn your head. (Constantly make searching an active, unintuitive process)
4. Find plants that no one else will see. (Be confident, competitive, and persistent.)