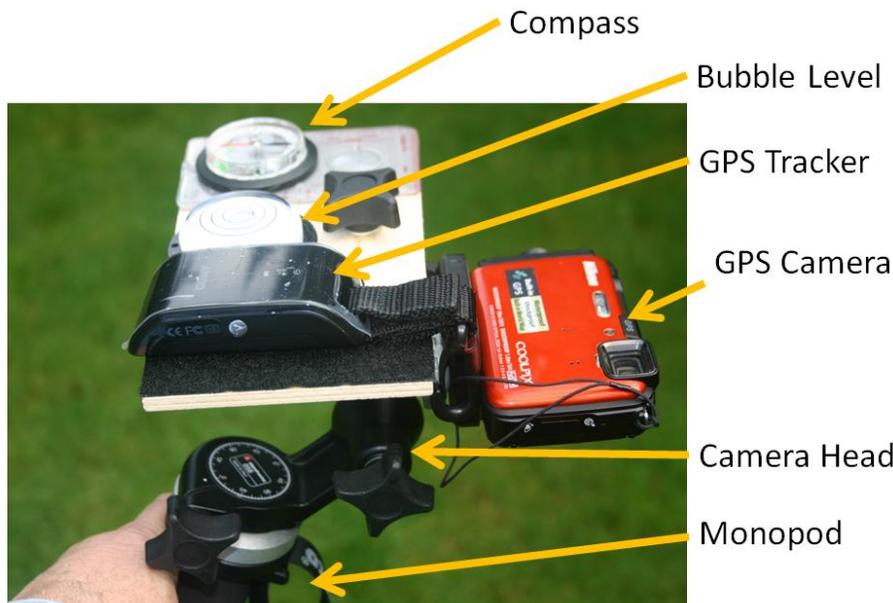


## Measuring a Plant Community with Digital Charting Lab 11

We have collected a series of photographs on a site dominated with little sage (*Artemisia arbuscula* Nutt.) in Harney County, Oregon using digital charting techniques. Each photograph was taken with a digital camera mounted on a monopod/platform (Figure 1) from a height of 1.54m looking straight downward. Each sample image was geographically registered and scaled so it could be used for analysis of vegetation and measurements could be taken from the images. The projection and datum for these images is Universal Transverse Mercator (UTM) WGS84. A set of 20 sample images has been compiled for you to analyze. Each image covers an area on the ground that is 1.75m east to west by 1.31m north to south.

### Components of the Camera Platform



**Figure 1.** An apparatus similar to this was used to capture the digital images used in this exercise.

Also included in this exercise are a series of reference images of plants identified by species. These images were taken on the same day as the sample photographs and can be used to see what each species looked like at this location. The plants in your sample quadrats are at the same phenological stage as the ones in your sample.

Because not all of you have GIS programs on your computers, we have burned grid lines every 0.25m into each photograph. These new photos were saved in a geoTIFF format because it does not compress the file and cause deterioration when saved. The geoTIFF also allows georeferencing information to be embedded with the TIFF file. These grid lines will become our “quadrats” and we will read them for several measures of vegetation. There are generally 6 quadrats across the image by 4 quadrats top to bottom for a total of 24 potential quadrats per image. Our first task is to randomly select 10 photos out of the 20 possible. You will do this

either by generating random numbers in a spreadsheet or by getting them from a random number table. We will then randomly select a random quadrat from those found in the selected image.

## Assignment

You should first acquaint yourself with the plant species found on the site by viewing the images provided by the instructor. You may have to go through them several times to be able to distinguish these plants as they are probably foreign to you. Look for color, size, leaf arrangement, last years seed heads, leaf shape, leaf margins, and other characteristics.

Our tasks today are to answer the following:

1. Randomly select 15 images out of the 30 available for analysis.
2. Select a random quadrat within each of the random images to be read for the following:
  - a. Frequency of annual grass
  - b. Frequency of perennial grasses
    - i. Frequency of deep rooted perennial grasses
    - ii. Frequency of intermediately rooted perennial grasses
    - iii. Frequency of shallowly rooted perennial grasses
  - c. Frequency of forbs (non-woody, non-grassy, vascular plants)
  - d. Frequency of shrubs
  - e. Cover class of annual grass
  - f. Cover class of perennial grasses
  - g. Cover class of deep rooted perennial grasses
  - h. Cover class of intermediately rooted perennial grasses
  - i. Cover class of shallowly rooted perennial grasses
  - j. Cover class of forbs (non-woody, non-grassy, vascular plants)
  - k. Cover class of shrubs
  - l. Density of perennial grasses:
    - i. Density of deep rooted perennial grasses
    - ii. Density of intermediately rooted perennial grasses
    - iii. Density of shallowly rooted perennial grasses
  - m. Density of forbs
  - n. Density of shrubs

Report you findings to the others in the group.

## Thought Questions

1. Would our results be the same if we had used a 0.5m by 0.5m quadrat?
2. What is the appropriate sized quadrat for measuring the little sage shrubs?
3. How many quadrats would you have to sample to have 90% confidence that your values for perennial grass density were within 10% of the mean of the population on this site.

## 400 Random Numbers Between 1 and 30

24	4	7	30	27	26	8	29	20	22
18	2	14	11	30	30	2	12	2	17
6	9	19	21	10	15	13	29	7	22
24	9	21	6	16	20	22	28	6	7
23	14	7	13	2	16	2	20	27	22
13	29	30	17	1	16	6	20	20	19
27	25	24	5	3	29	21	25	15	3
7	23	18	26	4	7	11	29	19	6
15	24	2	17	24	14	16	18	8	30
9	16	17	1	10	3	24	23	10	4
25	13	17	13	17	23	4	5	12	11
19	3	14	23	24	13	24	6	21	27
25	15	11	22	18	1	11	4	1	15
13	30	29	25	23	11	20	1	15	7
21	10	12	14	9	21	15	3	12	2
27	13	13	20	24	15	19	7	23	23
15	25	24	18	10	6	17	13	10	19
11	12	4	7	9	2	1	18	15	8
30	21	20	15	29	12	9	28	3	4
17	3	16	10	24	8	22	26	8	18
20	1	28	14	26	6	22	9	7	4
14	20	27	6	3	3	9	6	12	2
4	15	17	12	22	15	23	28	9	16
1	8	15	15	9	30	21	2	29	9
22	19	6	12	5	8	11	29	7	8
3	27	8	13	9	11	27	22	24	19
10	5	15	29	9	5	25	4	19	13
18	16	16	20	15	5	28	10	19	9
7	13	24	12	4	3	14	8	5	12
25	21	9	7	10	9	6	18	28	20
21	14	9	26	24	16	4	7	9	7
14	26	14	26	30	12	2	6	20	23
2	24	4	15	27	29	23	29	19	11
17	12	17	4	21	13	8	28	1	24
11	25	13	26	22	13	11	4	23	23
9	18	8	12	19	3	5	14	20	19
9	19	3	7	1	3	17	2	24	26
11	15	5	12	3	28	18	26	25	4
20	23	10	15	7	5	16	26	1	13
20	15	11	14	26	16	19	26	19	2

400 Random Numbers Between 1 and 6

5	5	6	6	4	1	5	2	3	4
5	5	1	5	6	3	1	5	5	1
3	3	1	1	4	5	2	1	3	4
1	4	3	4	3	3	2	5	3	4
3	4	2	6	5	1	1	2	6	4
1	6	2	2	1	6	3	5	5	6
4	5	2	5	5	5	5	3	2	3
6	1	1	5	4	2	1	2	4	3
6	2	3	2	2	5	5	6	3	6
3	2	6	5	1	3	2	4	5	4
4	6	5	4	5	5	4	1	5	4
3	5	3	4	1	2	2	5	4	3
6	1	2	5	4	3	1	5	2	4
3	4	1	3	2	3	1	2	5	4
3	6	1	4	3	3	6	6	5	5
5	2	3	2	1	6	6	6	1	3
4	1	5	5	4	3	4	1	3	1
5	5	6	6	5	6	4	6	1	3
1	5	1	1	4	6	3	2	1	2
2	5	2	1	2	5	1	5	6	3
2	4	2	5	6	4	5	5	3	2
1	6	6	1	2	3	2	6	6	4
6	2	1	5	5	6	5	2	1	3
6	2	4	5	2	2	2	1	2	2
6	2	5	2	2	4	1	5	6	1
2	5	2	5	5	4	1	1	3	5
4	5	6	2	1	6	2	3	6	5
1	5	6	2	6	2	5	5	5	5
3	5	2	5	4	1	4	2	3	6
1	2	6	1	3	3	6	5	6	3
6	3	5	2	1	4	3	3	6	1
1	6	1	1	1	5	3	4	2	3
4	3	2	1	1	2	6	2	3	1
1	6	2	3	5	1	1	2	5	6
4	4	5	5	4	5	4	5	6	3
6	4	1	4	6	4	2	6	1	1
3	4	4	2	1	3	4	2	6	2
6	5	5	3	1	1	2	5	1	3
3	2	2	6	3	3	2	1	6	1
1	1	6	1	4	2	5	3	3	5



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Data Form