

RS432/RS532 Rangeland Monitoring and Measurements
Production Field Trip: Eagle's Nest Open Space

Objectives for Production Field Trip:

1. Gain experience with production measures
 - a. Sample total herbaceous production using the comparative yield method
 - b. Sample composition by weight using the dry-weight-rank method
2. Observe possible biases and sources of error in each method used.

Background:

Eagle's Nest Open Space is an open space area managed by Travis Rollins of Larimer County Parks and Open Space program. Eagle's Nest is located in the Laramie Foothills, southwest of Livermore off the Red Feather Lakes Road, and covers 770 acres. The Open Space includes spectacular rock outcrops, rugged terrain and rolling foothill topography, and varies from approximately 5,640 to 6,350 feet elevation, the highest point on the property being Eagle's Nest Rock at 6,352 feet. Prior to acquisition by Larimer County, the land that now comprises Eagle's Nest Open Space was grazed by cattle (Larimer County 2002). The Open Space Program continues to lease the grazing in Eagle's Nest to a private individual because maintaining livestock grazing is important for vegetation management at the site and to promote sustainable working landscapes in the area (Larimer County 2002). The Eagle's Nest Open Space Management Plan emphasizes the importance of monitoring both plant communities and animal populations to determine whether livestock and recreation are having adverse effects on natural resource values (Larimer County 2002).

Eagle's Nest is divided into 4 pastures: North (100 acres), North Middle (280 acres), South Middle (160 acres), and South (180 acres) Pastures. These pastures are comprised of at least 7 different ecological sites, including Loamy Foothills and Loamy Slopes, which are the dominant ecological sites where most grazing occurs. We will be sampling permanent transects in the **North Middle Pasture**. The overall objective of our work will be to assess production, and range condition based on similarity of the plant community to the historic climax plant community (HCPC) identified in the Loamy Foothills Ecological Site Description (NRCS 2013).

- In 2015, there were 22 cow-calf pairs, 1 non-lactating cow, and 1 bull grazing North Middle Pasture from October 8 to October 31. From October 31 to November 21, 2015, there were 3 cow-calf pairs and 1 non-lactating cow.
- In 2016, 21 cow-calf pairs, 4 heifers, and 1 bull were on the North Middle Pasture on September 12.
- In 2017, the grazing lessee changed for the first time in at least 5 years to more of a growing season use. On July 24, 2017, 63 heifers were put on the North Middle Pasture where they grazed until August 31, 2017.

During our next Field Trip to Eagle's Nest (Sept 28), we will collect information on utilization levels and patterns of grazing use in the North Middle Pasture. By the end of our second field trip, we will combine information from both field trips to compare different methods of estimating grazing capacity.

References

Larimer County. 2002. Resource Management Plan for Eagle's Nest Open Space. Larimer County Open Space Program. 42 pages.

Natural Resources Conservation Service. 2013. Loamy Foothill 14-19 PZ Ecological Site Description. US Department of Agriculture, Natural Resources Conservation Service.

Procedure:

1. Get in teams as assigned (will be same teams for Utilization Field Trip).
 - a. There will be **2 teams** working as a **group** on each transect (because there are 6 teams and only 3 transects).
 - b. Each team will employ 2 methods in quadrats along a transect: comparative yield (production) and dry-weight-rank (forage composition).

2. With your group, find the transect end points (marked with rock cairns and rebar).

3. Layout a 50-m transect between the marked transect endpoints (Fig. 1; Table 1).

4. Select reference quadrats near the transect to use for the Comparative Yield Method.

As a **group** (all 8 students),

- a. Identify a representative quadrat that you would **rank as a 1** (lowest non-zero biomass).
 - Place pin flags at the inside corners of the quadrat before picking it up.
- b. Next, identify a quadrat that you would **rank as a 5** (highest biomass).
 - By visual estimation, the quadrat ranked as a 5 should be roughly 5 times that of the quadrat ranked as a 1. Mark the quadrat with pin flags.
- c. Once you've successfully identified potential representative quadrats for ranks 1 and 5, identify a quadrat that appears to be halfway between 1 and 5 and can be **ranked as a 3**. Mark with pin flags.
- d. Use the same logic to find and mark representative **quadrats of ranks 2 and 4**.
 - For example, biomass in the reference quadrat of rank 2 should be approximately halfway between ranks 1 and 3.
- e. Identify a second set of reference quadrats that approximate production levels similar to those in the above-identified ranks 1 through 5 reference quadrats.
 - You should now have 2 sets of nearly identical reference plots.
- f. Clip and weigh all biomass from one set of reference quadrats (one quadrat each of ranks 1 through 5). Record the weights on the 'Reference quad calibration' portion of the datasheet.
 - The relationship between ranks and biomass should form a straight-ish line.
 - **If the relationship is not ~linear**, then begin Step 4 over.
 - If the relationship is roughly linear,
 - a. Keep the clipped biomass in separate bags labeled with the group number, transect number, rank, and wet weight.
 - b. The remaining set of marked plots will serve as reference to calibrate your eye as you sample along the transect.

Production Field Trip: Eagle's Nest Open Space

5. Each team will sample 25 quadrats (0.10-m^2) spaced every 2 m along the transect.
 - a. The **even-numbered team** will sample on the **left side** of the transect from a random starting point between 0 – 100 cm.
 - b. The **odd-numbered team** will sample on the **right side** of the transect from a different random starting point between 0 – 100 cm.
6. As a team, observe the vegetation in each quadrat and record the following:
 - a. Comparative yield: Assign a rank from 0 – 5 that best aligns with the biomass represented in reference quadrats. Record on the datasheet as a tally.
 - Half-ranks may be assigned (e.g. 0.5, 1.5, 2.5, 3.5, or 4.5)
 - b. Dry-weight rank: Identify and rank the three most productive species (estimated dry-weight basis) in the quadrat. Record the species accordingly on the datasheet.
 - Ranks correspond to 1=70%, 2=20%, and 3=10% of dry-weight biomass in the quadrat.
 - If there are fewer than 3 species in the quadrat or if a single species is much more dominant than the others in a quad, you may assign a species to more than one rank. For example, assigning PASM to both ranks 1 and 2 would indicate that it represents 90% of the biomass.
7. Next, both teams should work **as a group** to find 2 - 4 additional sets of reference quadrats (i.e., repeat Step 4). These samples will be used to calibrate ranks on a dry-weight basis.
 - a. Clip biomass from all reference quadrats.
 - Place biomass from each frame in separate and labeled paper bags. Record the wet weights for each sample on the bag and on the data sheet.
 - There should be a total of 15 - 25 bags for each transect area (5 ranks per reference set, 3 - 5 sets of reference plots).
8. Students (1 – 2) from **each group** will need to sign-up for a time to weigh these bags on **Monday, September 24**.
9. One student from **each team** will need to enter their data into the Data Entry Template (available on Canvas) and email it to Jayne by **9AM on Tuesday, September 25**.

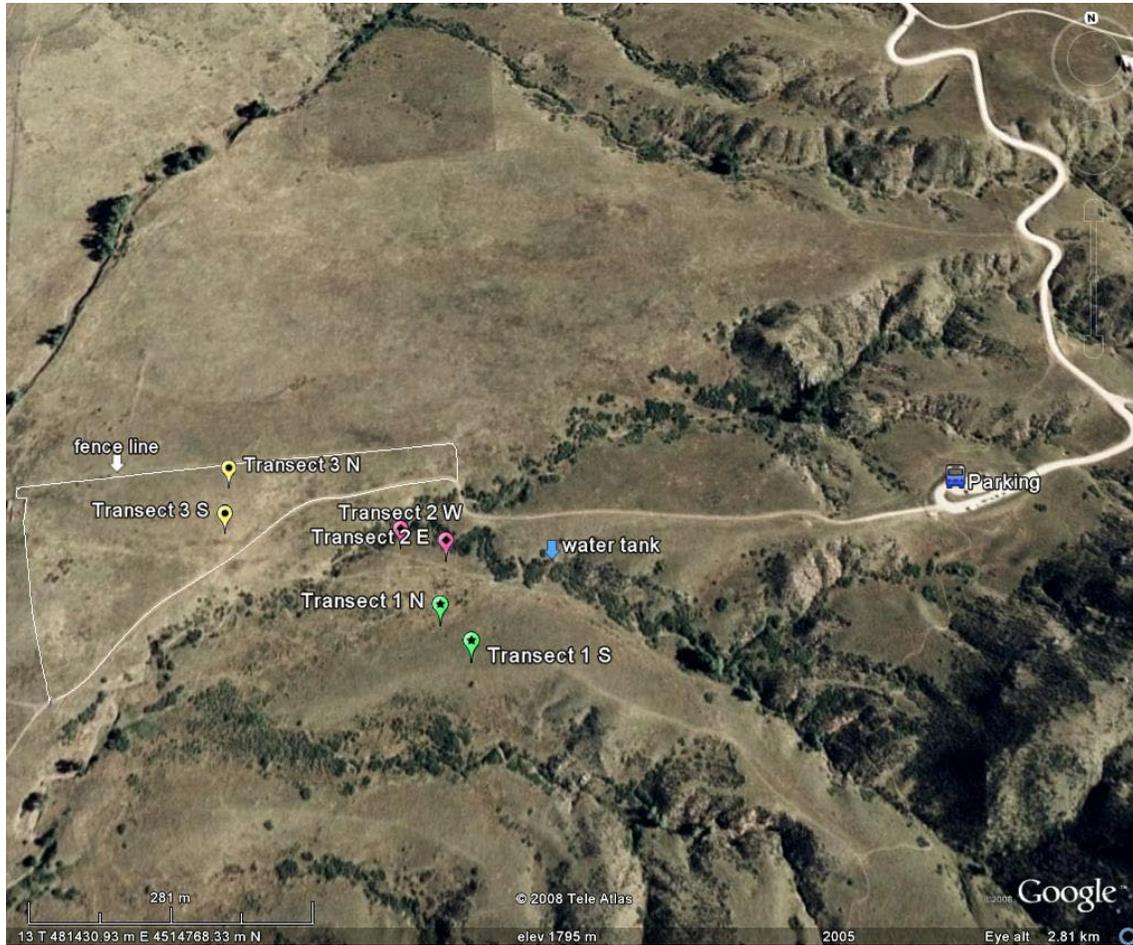


Figure 1. RS332/532 Lab 5 study area. Transect endpoints are marked in the field with pink rock cairns and re-bar. Source: Google Earth October 1, 2008.

Table 1. Beginning and ending GPS locations for each of three transects used by RS432/RS532 for sampling production at Eagle's Nest Open Space (Larimer County, Colorado).

Transect	Begin (decimal degrees)	End (decimal degrees)
1	40.782283, -105.221908	40.781937, -105.221488
2	40.783203, -105.222275	40.782922, -105.221803
3	40.783945, -105.224547	40.783416, -105.224595

Transect _____

Eagle's Nest Open Space - RS432 Production Field Trip

Date _____

Group _____

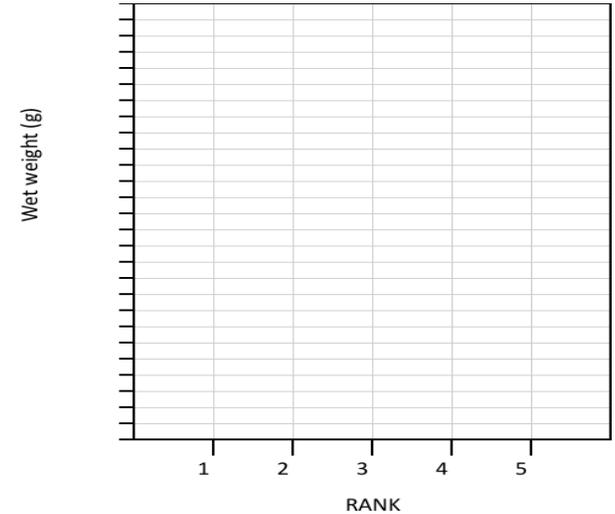
Dry-Weight Rank Method (Species Comp)

Quadrat	Species		
	Rank 1	Rank 2	Rank 3
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Comparative Yield Method (Total Production)

Rank	Tally	Count of Tally	Count x Rank
0			
0.5			
1			
1.5			
2			
2.5			
3			
3.5			
4			
4.5			
5			
Total		A 25	B
Average Rank (box B / box A)			

Sketch graph for checking approx linearity of ref quads in field



Reference Quadrat Calibration Data - Weights (g)

		Reference Rank				
		Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Set 1	Wet Weight					
	Dry Weight					
Set 2	Wet Weight					
	Dry Weight					
Set 3	Wet Weight					
	Dry Weight					
Set 4	Wet Weight					
	Dry Weight					
Set 5	Wet Weight					
	Dry Weight					

Note: Wet weights should be recorded in the field, Dry weights will be recorded in the lab