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Subject: Greaterville Allotment Rangeland Monitoring Analysis

To: District Ranger, NEPA Interdisciplinary Team, Permittee

### Introduction

In the fall of 2009, Rangeland Management Specialists from the Nogales Ranger District read seven long-term vegetation and soil monitoring transects on the Greaterville Allotment. The purpose of long term monitoring is to assess vegetation and soil condition and trend. The transects were initially established in 1969 according to the Parker three step method and reread in 1995 using the dry weight rank method. The measurement parameters collected in 2009 were plant frequency, dry weight rank, ground cover, fetch distance, and soil condition indicators.

All the monitoring transects on the Greaterville Allotment are in the Natural Resources Conservation Service (NRCS) Southeast Arizona Basin and Range Major Land Resource Area (MLRA) 41-1 in the 16-20 inch precipitation zone (PZ). The closest weather stations are located on the Santa Rita Experimental Range (SRER) only a few miles west of the Greaterville Allotment. The SRER includes both MLRA 41-3, in the 12-16 inch precipitation zone, and MLRA 41-1 in the 16-20 PZ. The precipitation data shown below represent the average of 24-29 rain gages<sup>1</sup>. Average annual precipitation for the twelve years from 1997 through 2008 was 13.4 inches. Average summer (July – September) precipitation for the twelve years was 7.5 inches. Summer precipitation for 2009 was 5.37 inches.

### Precipitation (Inches)

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Annual	13.7	17.4	13.9	18.5	12.9	10.9	10.8	10.6	11.1	12.1	12.8	15.9	TBD
Summer	5.6	8.4	11.3	5.6	5.8	5.5	6.8	5.8	7.4	9.7	8.5	11.3	5.4

### Methods

- Dry weight rank and pace frequency estimate plant species composition and provide data for the NRCS Ecological Site Guide similarity index. The similarity index ranks vegetation community status based on a presumed climax native plant community. Calculations were done in accordance with the Interagency Technical Reference *Sampling Vegetation Attributes* #1734-4.
- Fetch is measured as the distance from a point to the base of the nearest perennial plant. Average fetch distance for a site and the asymmetry value (the ratio maximum-median)/(median-minimum) are measures of vegetation distribution. Sites with shorter average fetch values and evenly distributed rather than clumped vegetation patterns are expected to have lower erosion rates due to less surface area exposed to wind and water flow. The asymmetry value cannot be used to compare sites; rather it is used to compare change over time within a given site.
- Ground cover readings were taken at 100 points along the transect (300 in 2009). Ground cover categories are: bare soil, basal vegetation, litter, cryptogam, fine gravel (¼” – ¾”), coarse gravel (¾” – 3”), cobble (>3”), and bedrock.
- The Soil Condition Rating Guide (adapted for the Coronado National Forest) is based on NRCS rangeland health concepts. It ranks hydrologic function (soil surface texture, structure, and compaction), site stability (sheet, rill or gully erosion, pedestaling, soil deposition, and the



presence of an A horizon), and nutrient cycling (plant functional groups, species, litter, and root distribution). Satisfactory is the highest rating and means the site is stable and fully functional.

## Results

Monitoring cluster C1 is located in Greaterville Pasture (T. 19 S., R. 15 E., Section 24; 12R 0522983, 3514220, NAD 83). The ecological site is Loamy Upland. In 1969, 1995 and 2009 the site was rated in good vegetation condition. Sideoats grama is the dominant perennial grass. Soil condition in 1969 was rated good, and in 2009 it was satisfactory in all categories. Grass production in 2009 was estimated at 1000 pounds per acre.

Cluster 2 is located in Mine Pasture (T. 19 S., R. 15 E., Section 24; 12R 0521449; 3514147, NAD 83). The ecological site is also Loamy Upland. Vegetation condition was good in 1969 and excellent in 1995 and 2009, and sideoats grama is the dominant perennial grass. Soil condition in 1969 was rated excellent, and in 2009 it was satisfactory in all categories. Grass production in 2009 was estimate at 900 pounds per acre.

Cluster 3 is in Deering Springs South Pasture (T. 19 S., R. 16 E., Section 7; 12R 0523576; 3517423, NAD 83) on a Sandy Loam Upland ecological site with a mix of mid and short native perennial grass species. Vegetation condition was good in 1969, fair in 1995, and good in 2009. Soil was rated high fair in 1969 and satisfactory in all categories in 2009. Production was approximately 600 pounds per acre.

Cluster 4 in Mountain Pasture (T. 19 S., R. 15 E., Section 14; 12R 0521438, 3515680, NAD 83) is a Loamy Hills ecological site with sideoats grama, plains lovegrass and other mid and short native grasses. Rated good in 1969 and excellent in 1995, Lehmann lovegrass currently makes up 28 percent of the species composition, reducing the similarity index and the condition rating to good. Soil condition was good in 1969 and satisfactory in 2009.

Paced transect P1 is located in Bull Pasture (T. 19 S., R. 16 E., Section 18). The ecological site is Limy Slopes. This transect was not read in 2009. In 1969 and 1995, vegetation condition was rated good, and soil condition was rated good in 1969.

Paced transect P2 is located in Mine Pasture (T. 19 S., R. 15 E., Section 23; 12R 0522031, 3518530, NAD 83) on a Granitic Hills ecological site. Rated in good vegetation and soil condition in 1969, not read in 1995, by 2009 transect P2 had 75% Lehmann lovegrass composition, reducing the vegetation similarity index to fair. Soil condition was satisfactory in all categories.

Paced transect P3 is located in Deering Springs North Pasture (T. 19 S., R. 16 E., Section 1; 12R 0522964, 3517552, NAD 83). The ecological site is Loamy Upland. Dominated by sideoats grama, vegetation condition was good in 1969 and 1995 and excellent in 2009. Soil condition was good in 1969 and satisfactory in 2009.

Paced transect P4 (Deering Springs North Pasture, T. 19 S., R. 16 E., Section 7) is a Loamy Hills ecological site. This transect was not read in 2009, but was in good vegetation and soil condition in 1969 and excellent vegetation condition in 1995.

In 2009 a new transect T1 was established in Deering Springs North Pasture (T. 19 S., R. 16 E., Section 7; 12R 0523860; 3517970, NAD 83). It is a Sandy Loam Upland ecological site on a bottom/swale landscape position that is dominated by sideoats grama and cane beardgrass. Vegetation condition based on the similarity index was excellent and soil condition was satisfactory. Production was estimated at 1600 pounds per acre.

Summary

The table below summarizes the condition and trend monitoring data for nine transects on the Greaterville Allotment.

***Condition and Trend***

<b>Transect</b>	<b>1969</b>		<b>1995</b>		<b>2009</b>	
	<b>Veg</b>	<b>Soil</b>	<b>Veg</b>	<b>Soil</b>	<b>Veg</b>	<b>Soil</b>
C1	Good→	Good →	Good		Good	Satis
C2	Good ↑	Excel →	Excel		Excel	Satis
C3	Good ↑	High Fair ↑	Fair		Good	Satis
C4	Good ↑	Good ↑	Excel		Good	Satis
P1	Good→	Good →	Good			
P2	Good ↑	Good ↑			Fair	Satis
P3	Good ↑	Good ↑	Good		Excel	Satis
P4	Good→	Good →	Excel			
T1					Excel	Satis

Both vegetation and soil condition on the Greaterville Allotment are stable or have improved since monitoring transects were initially established in 1969. In spite of the ten-plus year drought, vegetation on the Greaterville Allotment is currently in good to excellent condition. Soil condition on all the monitoring sites is satisfactory, the highest category according to the NRCS Soil Condition Rating Guide. This indicates that hydrologic function, soil and site stability, and nutrient cycling are intact on these sites.

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<sup>1</sup> Data sets were provided by the Santa Rita Experimental Range Digital Database. Funding for the digitization of these data was provided by USDA Forest Service Rocky Mountain Research Station and the University of Arizona.