**Abstract**

*Layman*

Sagebrush ecosystems

*Technical*

**Methods**

*Study area*

The study area is located in Beef Basin, which is in San Juan County, Utah. It is in the Monticello District of the Bureau of Land Management (BLM), and located on the Colorado Plateau. . Beef Basin is an area characterized by flat plains of deep sandy soil covered in grass, and interspersed and surrounded by shallow rocky outcrops. The PRISM 30 year normal average climate has an average winter precipitation of 20.5mm, average winter maximum temperature of 5.4˚C, and average winter minimum temperature of -7.7˚C. Summer precipitation of 28.4mm, maximum temperature of 30.2˚C, minimum temperature of 13.2˚C.

(1981-2010 PRISM data, Daly et al. 2008).

Daly, C., M. Halbleib, J. I. Smith, W. P. Gibson, M. K. Doggett, G. H. Taylor, J. Curtis,

and P. P. Pasteris. 2008. Physiographically sensitive mapping of climatological

temperature and precipitation across the conterminous United States. International

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USDA, NRCS. 2015. The PLANTS Database ([http://plants.usda.gov](http://plants.usda.gov/), 19 October 2015). National Plant Data Team, Greensboro, NC 27401-4901 USA.

This study focused primarily on North Plain and South Plain which are the two southernmost plains in the basin, but a larger view of the whole basin was also conducted using data collected by and in collaboration with the United States Geological Survey (USGS).

*Sampling design*

Plots were selected using ArcGIS to randomly sample across North Plain and South Plain based on the three dominant soil types (Begay, the Ignacio/Leanto complex, and Mido) and 4 vegetation classes which were assigned based on September 2011 NDVI values. Line-point-intercept (LPI), shrub density, and soils data were collected from each site. Sagebrush leaf samples were collected from each site that had sufficient sagebrush from which to collect a viable sample. Five 30-m transects spaced 7-m apart were positioned parallel to the hillslope contour, with the center transect centered 2-m above the soil pit. In the absence of a discernible slope, transects were oriented on an east-west axis with the center transect offset to the north. LPI was collected on all five transects beginning at 0.5-m and collected every half meter thereafter to the 30-m point, resulting in 60 points per line and 300 points per plot. Shrub density was collected in a 2-m belt, 1-m on either side of lines 1, 3, and 5. Each shrub was tallied and placed in one of five height classes: <15cm (Juvenile), <15cm (Mature), 15-50cm, >50-100cm, and >100cm. A soil pit (shovel or auger) was located at the center of each plot, and was dug or augered to the depth of bedrock or up to 2-m in depth. Sagebrush leaf samples collected were the interior winter persistent leaves, and not the exterior early ephemeral leaves. They were collected twice, once in 2013, and once in 2014. The 2013 leaves were collected and weighed at night between midnight and 5:30 a.m. Samples were kept on ice wile transferred to the lab, and leaf area was measured within 12 hours of collection. They were then dried and measured again. The 2014 leaves….