2006 Range Vegetation Assessment in the Upper Snake River Plain, Idaho

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ABSTRACT

Vegetation data was collected at randomly located sample points between June 5 and September 1, 2006 (n=100 in the USDI BLM Big Desert Region, n=233 in the Hitching Post pasture of the United States Sheep Experiment Station, and n=145 in the ISU O'Neal Ecological Reserve). Data was collected describing the 1) percent cover of grasses and shrubs, 2) dominant weed and shrub species, 3) fuel load, 4) sagebrush age, 5) GAP land cover class, 6) presence of microbial crust, 7) litter type, 8) forage availability, and 9) photo points. Sample points were stratified by fire, grazing, and total rest treatments. The three study areas had variations in the ground cover perhaps due to the different treatments.

KEYWORDS: vegetation, sampling, GIS, remote sensing, GPS

INTRODUCTION

Many factors influence land cover changes. Wildfire has been, and will always be, a primary source of broad scale land cover change. After a wildfire occurs a change in both plant community composition and plant structure results. In a completely unaltered system, there are plants and shrubs that establish themselves very quickly. In some systems, native plants are in competition with non-native vegetation that is more aggressive. The increase of non-native vegetation can directly result in the reduction of livestock and wildlife carrying capacities. Fire frequency may also increase. An example of non-native vegetation that out competes native vegetation and increases fire frequency is cheatgrass (*Bromus tectorum*). The approximate location of the three study areas are shown below (Figure 1).

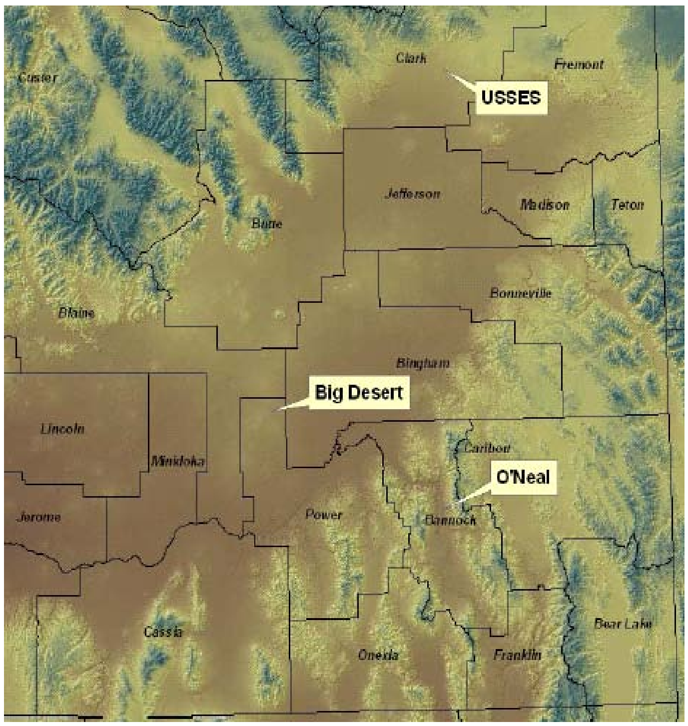

Figure 1. Southeastern Idaho and this study's Area of Concern.

We assessed research in all possible areas; fire, no fire, grazing and no grazing. After comparing various traits in each of these areas we can create generalizations and these generalizations can then shed light on relationships between these variables and may aid range managers in making decisions about prescribed fire and grazing management.

METHODS

Sample points were randomly generated across the study area. Each point met the following criteria;

1) >70 meters from an edge (road, trail, or fence line)
2) <750 meters from a road.

The sample points were stratified by treatment: 1) fire (within the past 10 years) 2) grazing and 3) rest (Table 1). The treatments differed at each study area. The Big Desert covered a much larger geographical location than the other two areas and had a mix of only grazing and fire treatments. The Hitching Post pasture at the USSES had a prescribed burn in September 2005. Most of the points (75%)

there were within the fire boundary. The sample points at the O'Neal Ecological Reserve were evenly distributed among three grazing treatment types: total rest, rest rotation, and high intensity/short duration.

Table 1. Treatment summary for each study area.

	Treatment					
Study Area	**Fire**	**Grazing**	**Fire and Grazing**	**Rest**	**Rest and Fire**	**Sum**
Big Desert	0	51	46	0	3	100
USSES	0	0	0	57	176	233
O'Neal	0	96	0	50	0	146
Sum	0	147	46	107	179	479

The location of each point was recorded using a Trimble GeoXT GPS receiver (+/-0.9 m with a 95% CI) using native latitude-longitude (WGS 84)(Serr et al., 2006)Points were occupied until a minimum of 60 positions were acquired and WAAS was used whenever available. All points were post-process differentially corrected using Idaho State University's GPS community base station. The sample points were then projected into Idaho Transverse Mercator NAD 83 using Trimble's Pathfinder office for datum transformation and ESRI's ArcGIS for projection (Gneiting, et al., 2005).

Ground Cover Estimation

Visual estimates were made of percent cover for the following; bare ground, litter and duff, grass, shrub, and dominant weed. Cover was classified into one of 9 classes (1. None, 2. 1-5%, 3. 6-15%, 4. 16-25%, 5. 26-35%, 6. 36-50%, 7. 51-75%, 8. 76-95%, and 9. >95%).

Observations were assessed by viewing the vegetation perpendicular to the earth's surface as technicians walked each site. This was done to emulate what a "satellite sees". In other words the vegetation was viewed from nadir (90 degree angle) as much as possible.

Fuel Load Estimation

Based upon field vegetation training techniques provided by the BLM office in Shoshone Idaho, fuel load was estimated at each sample point. Visual observations of an area equivalent to a Spot pixel, (10 mpp or approximately 100 m^2), centered over the sample point were used to estimate fuel load (Table 2).

Table 2. Fuel Load Classes and associated tonnage of fuels.

Fuel Load Class	(Tons/Acre)
1	0.74
2	1.00
3	2.00
4	4.00
5	>6.0

Note: These categories were derived from Anderson (1982).

Forage Measurement

Available forage was measured using a plastic coated cable hoop 93 inches in circumference, or 0.44 m^2. The hoop was randomly tossed into each of four quadrants (NW, NE, SE, and SW) centered over the sample point. All vegetation within the hoop that was considered adequate forage for cattle, sheep, and wild ungulates was clipped and weighed (+/-1g) using a Pesola scale tared to the weight of an ordinary paper bag. All grass species were considered forage. The measurements were then used to estimate forage amount in AUM's, pounds per acre, and kilograms per hectare (Sheley et al. 1995). Forage measurements were not made at the USSES.

Microbiotic Crust Presence

Microbiotic crusts (Johnston 1997) are formed by living organisms and their by-products, creating a surface crust of soil particles bound together by organic materials. The presence of microbiotic crust was evaluated at each sample point and recorded as either present or absent. Any trace of a microbiotic crust was defined as "presence".

GAP Analysis

Land cover was described using a list of vegetation cover types from the GAP project (Jennings 1997). The GAP vegetation description that most closely described the sample point was selected and recorded.

Litter Type

Litter was defined as any biotic material that is no longer living. Litter decomposes and creates nutrients for new growth. For the litter to decompose it needs to be in contact with the soil in order for the microbes in the soil to break down the dead substance. If the litter is suspended in the air it turns a gray color and takes an immense amount of time to decompose through chemical oxidation. If it is on the ground it is a brownish color and decomposes biologically at a much faster rate. The type of litter present was recorded by color: either gray (oxidizing) or brown litter (decaying).

Big Sagebrush (Artemisia tridentata spp.) Age Estimation

Maximum stem diameter of Big sagebrush plants was measured using calipers (+/-1cm) to approximate the age of each plant (Perryman and Olson 2000) A maximum of four samples were taken at each sample point, one within each quadrant (NW, NE, SE, and SW). The sagebrush plant nearest the plot center within each quadrant was measured using calipers (+/-1cm) and converted to millimeters. The age of each big sagebrush plant was then estimated using the following equation (AGE = 6.1003 + 0.5769 [diameter in mm]). Sage measurements were not taken at the USSES.

Photo Points

Digital photos were taken in each of 4 cardinal directions (N, E, S, and W) from the sample point.

RESULTS

Percent Cover Bare Ground, Grass, and Microbiotic Crust

Fifteen percent of all 2006 field samples (n = 479) had >50% exposed bare ground. The dominant weed --if any were present-- was usually cheatgrass. At the USSES the dominant weed was "other" (usually Canada Thistle (Cirsium arvense) at eighty-six percent of the sample points. Cheatgrass was present at

60% of all points sampled. Twenty percent of the sample points had >5% cheatgrass cover. Sixty percent of the samples had <16% grass cover. All the sample points at the O'Neal Reserve had <16% grass cover. Microbiotic crust was present at 184 of the 478 points sampled.

Big Sagebrush Age Estimation

The mean age of sagebrush plants was 24.27 years (n = 181). The minimum age was 10 yrs and the maximum age was 55 yrs (Figure 2).

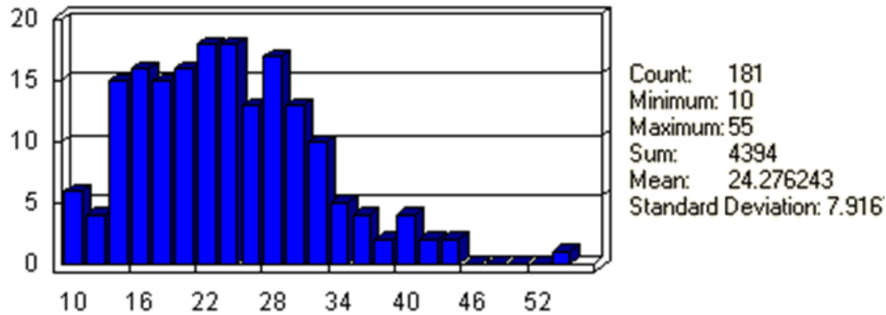

Figure 2. Sagebrush age distribution as sampled during the 2006 field season.

Forage Measurements

Using AUM Analyzer software (Sheley, Saunders, Henry 1995), forage amount and available Animal Units were calculated for the Big Desert and O'Neal sample points. Mean forage available was 226.8 kg/ha. The minimum forage available was 6 kg/ha and the maximum forage available was 1666 kg/ha.

"Microbial crust is formed by living organisms and their by-products, creating a surface crust of soil particles bound together by organic materials" (Johnston 1997). These are common in very poor rangelands and they are sometimes one of the last things left alive. They can retain water very well even against an osmotic pull. In 2005, fifty-six of 305 (18.4%) sample points had microbial crust present, while in 2006 184 of 478 (38.5%)sample points had microbial crust present.

CONCLUSIONS

The differences between the three study areas were interesting. Figures 3-6 are histograms of ground cover estimates for the three study areas and the 2005 data (2005 includes the Big Desert and the O'Neal Reserve). The Big Desert had less bare ground than the other two areas. This area may have benefited from two good rain years, resulting in the lower bare ground. There may have also been some observational bias. The histograms for the USSES and the O'Neal areas match their respective 2005 histograms better than does the Big Desert. These differences may have been caused by different treatments in each of the areas. The Big Desert has a variety of treatments over a large area, the Hitching Post pasture at the USSES burned in 2005 and the O'Neal Study area currently has three different grazing treatments being applied: total rest, rest rotation, and high intensity short duration grazing. The high intensity short duration pasture had very little grass and higher amounts of litter due to the intensity of grazing and little recover time before the vegetation data was collected. O'Neal data was also collected later in the season (August 7, 2006 to September 1, 2006)

One factor affecting ground cover at the USSES was the presence of a large amount of forbs, primarily lupine. Lupine species are known to flourish after a fire. Ninety six of 233 points had forb coverage between 16-25 percent. The fire also affected the grass and shrub cover as there were lower percent shrub and higher percent grass recorded than at the other two study areas. This may be due to the fact that this site is a higher elevation site with a slightly higher moisture regime and a different grazing history.

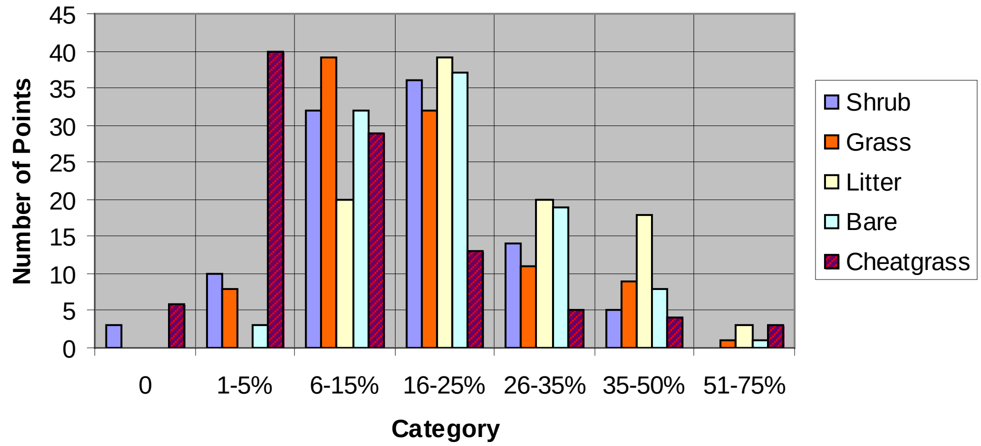

Figure 3. 2006 Big Desert Ground Cover

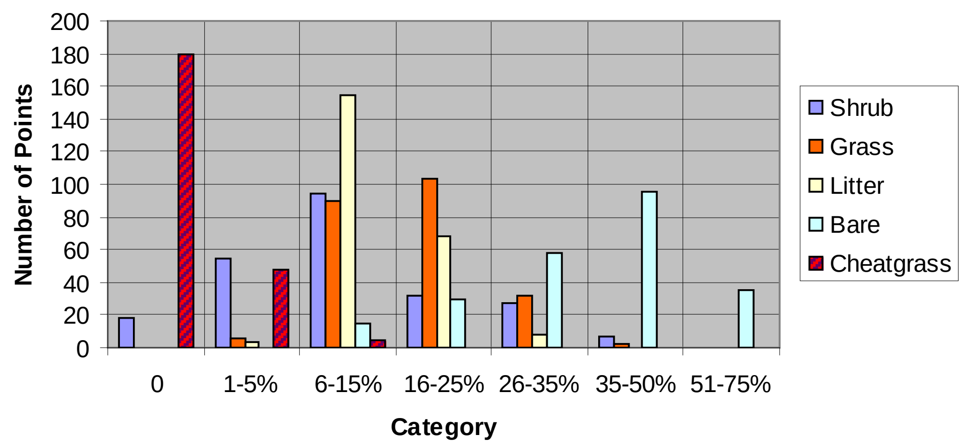

Figure 4. 2006 USSES Ground Cover

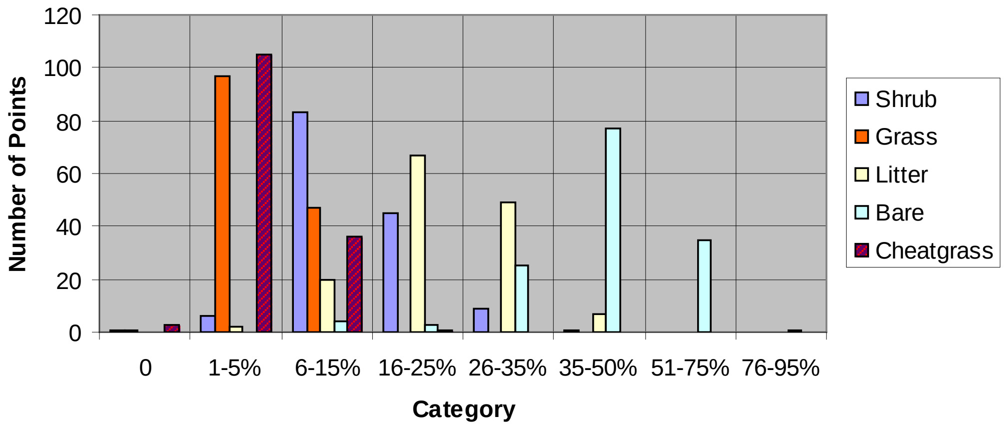

Figure 5. 2006 O'Neal Reserve Ground Cover

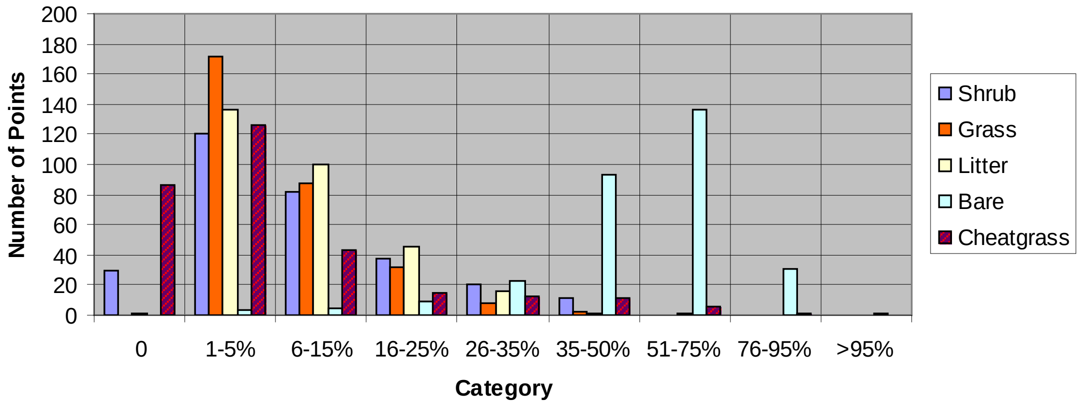

Figure 6. 2005 Ground Cover across all study sites.

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