Range Vegetation Assessment in the Big Desert, Upper Snake River Plain, Idaho 2005

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ABSTRACT

Vegetation data was collected at 305 randomly located sample points between June 1 and July 15, 2005 (206 in the USDI BLM Big Desert Region and 99 in the O'Neal Study area located 3 miles north of McCammon, Idaho). We collected data describing percent cover of grasses and shrubs, dominant weed and shrub species, fuel load, sagebrush age, GAP vegetation class, presence of microbial crust, litter type, forage availability, and photo points. Sample points were stratified by fire, grazing, and rest treatments. A high amount of cheatgrass was found as well as a high amount of bare ground. However, in 2005 forage availability increased from previous years, probably due to increased rainfall.

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 Big Desert study area is approximately 71 km northwest of Pocatello and the center of the study area is approximately 113º 4' 18.68" W and 43º 14' 27.88" N. (Figure 1)

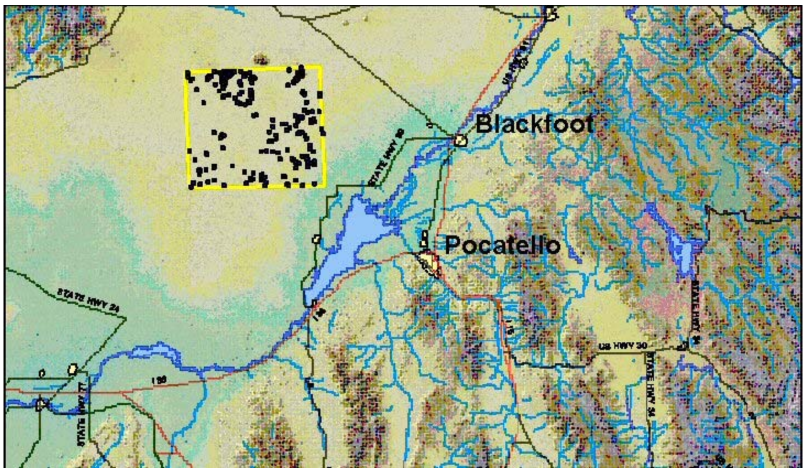

Figure 1. Southeastern Idaho and this study's Area of Concern (bounded in yellow rectangle) .

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

Two hundred twenty-five 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. In 2005 50 points were created in each of these strata. Twenty-five addition points were generated within the boundaries of the 2001 burn area. The location of each point was recorded using a Trimble GeoXT GPS receiver (+/-1m with a 95% CI) using native latitude-longitude (WGS 84)(Serr et al., 2005)Points were occupied until a minimum of 120 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.

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 nine 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 while viewing the ground perpendicular to its surfce 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 Landsat pixel, (28.5mpp or approximately 812 m^2), centered over the sample point were used to estimate fuel load (table 1).

Table 1. Fuel Load Classes and associated tonnage of fuels.

Fuel Load Classes (Tons/Acre)	
1	0.74
2	1.00
3	2.00
4	4.00
5	>6.00

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 (except cheatgrass (*Bromus tectorum*)) were considered forage. The measurements were then used to estimate forage amount in AUM's, pounds per acre, and kilograms per hectare (Sheley, Saunders, Henry 1995)

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
Vegetation 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, 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]).

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
Fifty-six percent of all 2005 field samples (n = 305) had >50% exposed bare ground. The dominant weed --if any were present-- was always cheatgrass. Cheatgrass was present at 71% of points sampled. Thirty percent of the sample points had >5% cheatgrass cover. Eighty-six percent of the samples had <16% grass cover. Microbiotic crust was present at 56 of the 305 points sampled.

Big Sagebrush Age Estimation
The mean age of sagebrush plants was 39.76 yrs (n = 215). The minimum age was 9 yrs and the maximum age was 121 yrs (Figure 2). Twenty-seven sample points fell within the boundary of the 2001 fire. Nineteen of those had no sagebrush plants growing. Of the eight points that had sagebrush present 2 had an average age > 65 and 6 had an average age ≤ 20.

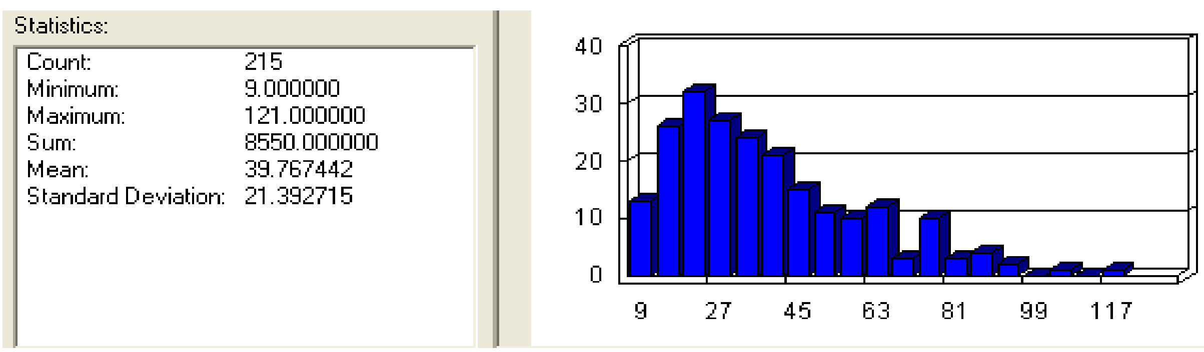

Figure 2. Age distribution of Big Sagebrush in the study area 2005

Forage Measurements
Using AUM Analyzer software (Sheley, Saunders, Henry 1995), forage amount and available Animal Units were calculated for all sample points. Mean forage available was 488.12kg/ha. The minimum forage available was 23 kg/ha and the maximum forage available was 4147 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 2004 only four sample points recorded microbial crust presence, while in 2005 fifty-six of 305 sample points had microbial crust present.

CONCLUSIONS
The available forage present on the range in 2005 varied from what was found in previous years. The calculated pounds per acre and Kilograms per hectare, in sampled areas almost doubled from 2004 to 2005. In 2005 there was a higher amount of precipitation during the month of May than in 2004, which allowed the vegetation to have more moisture available during the peak of the growth cycle (May and early June). Bare ground exposure

estimates varied in 2005, appearing to be lower than either of the two previous years. Variations occurred in all five cover types from 2004 to 2005 as illustrated below (figure 3). Variation in percent shrub cover from 2004 to 2005 is probably attributable to the fact that a higher proportion of samples were taken in areas that had burned in the last 10 years in 2005 than in 2004. Recently burned areas (having burned within the last 10 years) are less likely to have developed high shrub cover. Variations in forage, percent bare ground, percent grass, and percent cheat grass may be due to a greater amount of spring moisture during the last two years (Table 2).

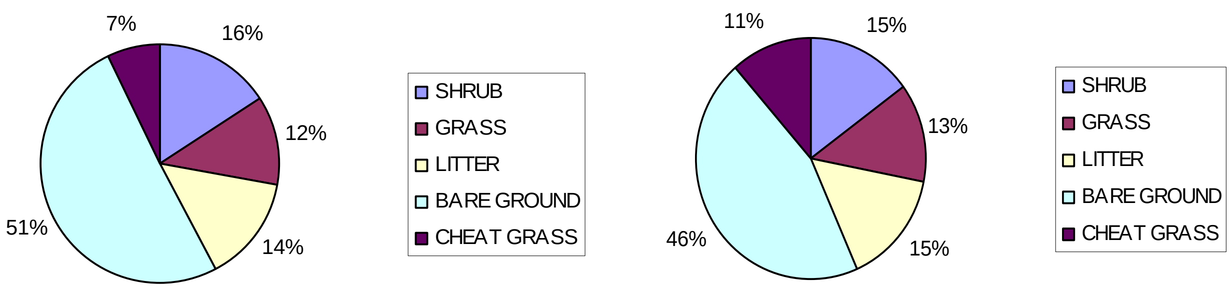

Figure 3.Variations from 2004 (left) and 2005 (right) in the mean percent cover of five cover types observed in the field.

Table 2. Recent annual precipitation (inches)

Month	2003	2004	2005
May	0.53	1.91	2.75
June	0.14	0.56	0.47
July	0.00	1.09	0.14

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