Mitigating threats to Greater sage-grouse through sagebrush-steppe habitat manipulations

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Introduction

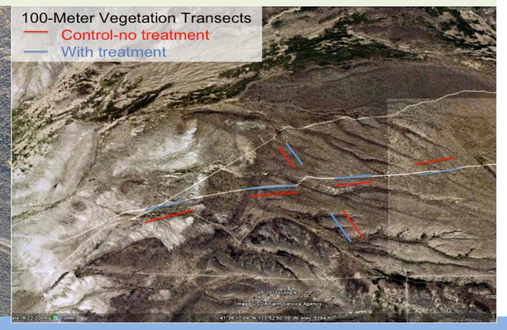
•Greater sage-grouse populations have been declining range-wide.
• Loss of sagebrush habitats.
• Change in fire regime has led to increased invasive species, increase in junipers, decrease in native avian and vegetation spp.
•Mechanical and chemical vegetation treatments can restore quality habitat and decrease pressures due to wildfire.
• Plant species, such as forage kochia that has a high protein content and remains succulent year-round, can mitigate the negative impacts associated with wildfire.

Objectives

•Determine sage-grouse habitat use patterns in response to treatment.
• Evaluate changes in vegetation due to treatment.
•Determine sage-grouse nesting and brood-rearing habitat characteristics including relationship to treatments.

Study Area and Methods

West Box Elder County, northwestern Utah. Elevation ranges from 1600-1900 meters. Matrix of sagebrush-steppe public land and private land dominated by cattle grazing and alfalfa production. Average annual precipitation ranges from 15cm to 30cm. Average summer temperature is 27°C and average winter temperature is 3°C.
Data will be collected Spring 2010-Summer 2012. Treatments that were completed late summer 2010 include: (1) mastication of trees within greenstrip (2) chain harrow greenstrip (3) spray Plateau® herbicide. Forage kochia was aerially seeded along green-strips in December 2010.
✦Catch birds with a spotlighting method and place ATS radio-transmitters on birds for relocation.
✦Each month that the birds are present on the primary study site, collect vegetation data using 20-meter perpendicular line transects from use and random sites.
✦At the end of May each year, complete 100-meter line-intercept and point-intercept transects along 6 paired plots (6 within treatment and 6 without treatment) to determine changes in vegetation. Conduct 500-meter pellet surveys and use distance sampling to determine sage-grouse use.
✦Use line-intercept and Daubenmire method to document nest and brood site vegetation characteristics.
✦Document establishment of forage kochia and chemically analyze fecal pellets for forage kochia presence.



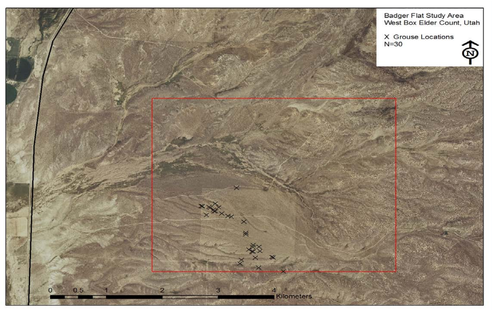


Table 1. Descriptive statistics of forage kochia presence.

Total plots with forage kochia	73
Total kochia plants within 1mx1m frame across all plots	573
Percent of plots with forage kochia	45.625
Calculated potential plants per 100m x 1m plot	358.125

Table2. Logistic regression indicates that percent shrub cover and grass height are negatively correlated with sage-grouse presence. Percent litter was positively correlated with sage-grouse presence.

Odds Ratio Estimates of 2010 and 2011 Use vs. Random Sites				
Effect	**Point Estimate**	**95% Wald Confidence Limits**		**Pr>ChiSq**
% Shrub	0.863	0.785	0.949	.0023
GrassHt	0.871	0.798	0.951	.0021
% Litter	1.048	1.003	1.095	.0376

Table 3. Logistic regression indicates that brood presence is negatively correlated with shrub height and percent rock.

Odds Ratio Estimates of 2010 and 2011 Brood Sites vs. Random Sites				
Effect	**Point Estimate**	**95% Wald Confidence Limits**		**Pr>ChiSq**
ShbHt	0.928	0.869	0.992	.0279
% Rock	0.889	0.823	0.960	.0029

Preliminary Results

• Average shrub width decreased along treatment plots compared to control from 2010 to 2011 (p-value=.0042)
• In 2010 there was no difference in percent shrub composition between treatment and control. In 2011 there was a significant decrease in percent shrub composition in treatment relative to control plots (p-value=.0055).
•There were no significant differences in shrub height and percent shrub cover between random sites and use sites in the winter of 2011.
•There were no significant differences in vegetation characteristics between the nest sites and random sites in 2010 and 2011.
•Forage kochia seedlings germinated in July and August 2011.

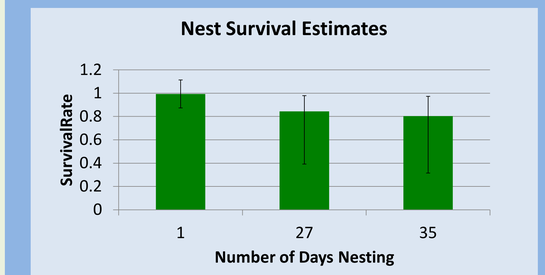


Figure 1. Daily, incubation, and full nesting survival rates with 95% confidence intervals for 2010 and 2011.

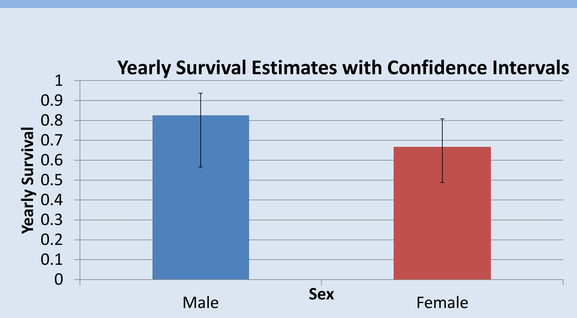


Figure 2. Survival rates based on males and females in 2010 and 2011 with 95% confidence intervals.

•Discussion

•Managers should focus on protecting brood-rearing and nesting habitat, due to the limiting factors associated with nest and brood success rates.
•The use of chemical and mechanical treatments are effective in creating fire breaks, which protect critical sagebrush obligate habitat. This particular treatment did not deter sage-grouse from breeding, nesting, or roosting in the study area.
•Under optimal conditions, forage kochia that is planted in winter can successfully establish a root system. Forage kochia is a potential alternate source of cover and forage material for sage-grouse.

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