PROJECT TITLE: Multi-scale assessment of the effect of livestock grazing on remotely sensed burn severity under wildfire conditions.

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ACCOMPLISHMENTS: In 2010, funding was secured to conduct a research project that examined if livestock grazing affects burn severity in sagebrush steppe. In North America, the range and quality of sagebrush habitat has been declining. Large, severe wildfires burning in hot, dry, and windy conditions, exacerbated by invasive species, are among the greatest contributing factors to this decline. Livestock grazing has been proposed as one management option to reduce fire hazard and decrease burn severity across sagebrush steppe. Remotely-sensed burn severity indices have proven useful tools to assess ecological effects of wildfire on forest vegetation, but little research has been conducted in rangelands. We tested the effectiveness of remotely-sensed burn severity indices including dNDVI, RdNBR, and dNBR in detecting changes in vegetation canopy cover on the Murphy Wildland Fire Complex in southern Idaho, a 263,862 ha fire that burned in 2007. Field data of vegetation cover collected by the Bureau of Land Management in 2006 were compared to field data collected in 2009 and a regression analysis indicated that remotely-sensed burn severity indices of RdNBR (Adjusted R-squared = 42%) and dNBR (R-squared = 57%) were the most useful at detecting fire-induced changes in vegetation cover on rangelands. Further, we tested the effect of livestock grazing on burn severity using randomly selected plots in grazed and ungrazed pastures on the Murphy Wildland Fire Complex using ArcGIS overlay analysis across three spatial scales. A three-way Analysis of Variance indicated that while burn severity was lower in grasslands than shrub steppe ($p<0.10$), there were no differences in burn severity between the three scales ($p>0.10$). However, grazing reduced RdNBR and dNBR burn severity indices ($p<0.10$), and a significant interaction between vegetation type and grazing status indicated that the effect of grazing was different in shrub and grassland vegetation types ($p<0.10$). A paired t-test in shrub steppe cover types and perennial grass cover types further investigated the interaction, and results indicate livestock grazing reduced burn severity indices of RdNBR and

Figure 1. Sagebrush landscape post-fire.

dNBR in shrub steppe ($p<0.10$), but not in grasslands ($p>0.10$). While livestock grazing can be used as a tool for land managers to reduce burn severity on shrub steppe rangelands in southern Idaho, livestock grazing is not appropriate to use in all cover types and management goals should always be taken into consideration.

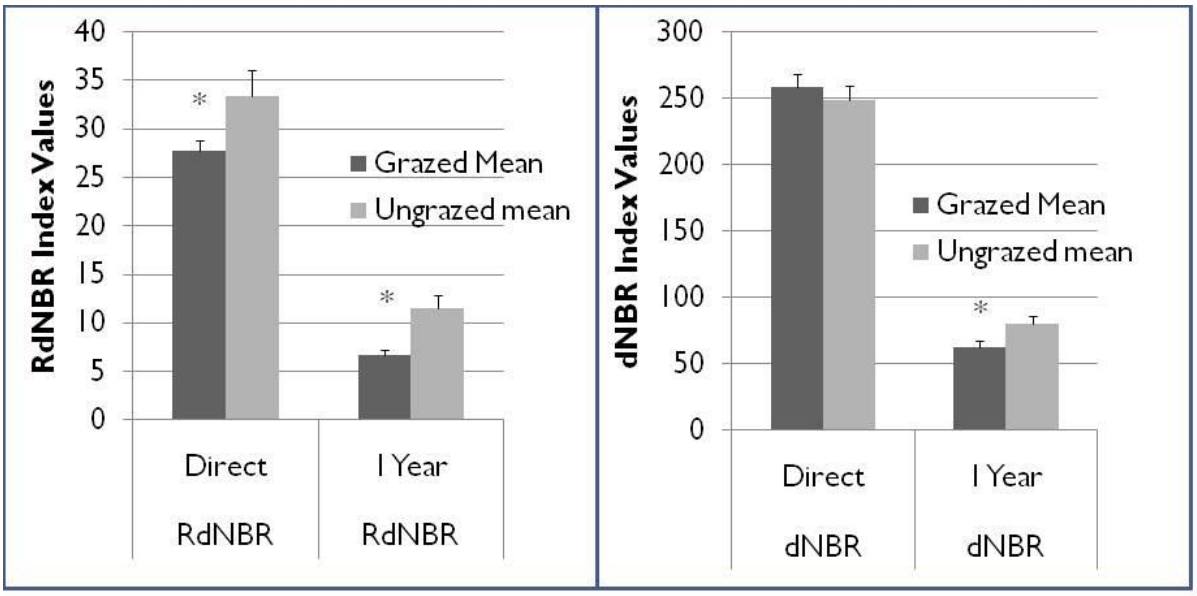

Figure 2. Burn severity estimated via the remotely sensed burn severity indices RdNBR and dNBR in grazed and ungrazed pastures directly and one year after fire in sagebrush steppe. Burn severity was significantly lower (indicated by *) in shrublands directly after the fire using the RdNBR index and one year after the fire using both the RdNBR and the dNBR index.

PUBLICATION:

Morris A.R. 2010. Multi-scale assessment of the effect of livestock grazing on remotely sensed burn severity under wildfire conditions. Master's Thesis May 2010, Department of Rangeland Ecology and Management, University of Idaho, Moscow, Idaho, USA

Morris A.R., E.K. Strand, K.L. Launchbaugh, C. Hoffman. *In prep*. Multi-scale assessment of the effect of livestock grazing on remotely sensed burn severity under wildfire conditions. *Rangeland Ecology and Management*.