CHAPTER 1

INTRODUCTION

Sagebrush ecosystems are important habitat for mule deer, greater sage grouse, and many other charismatic fauna. They are also important rangeland for the western livestock industry, and considered by many to be vital recreation areas and an icon of the American west. However, these ecosystems are also in decline. Sagebrush ecosystems once covered approximately 150 million acres (Thompson, 2007). Now natural and anthropogenic threats degrade this iconic ecosystem and regionally imperil over 350 species of associated plants and animals (Thompson, 2007).

Growing concern has led to studies on the dynamics of sagebrush ecosystems and their obligate species, mostly in the Great Basin. However, little is known about how sagebrush responds on the Colorado Plateau, which has drier and monsoonal climatic conditions as well as different soils and vegetation. This is problematic because there is little to suggest that restoration successes in well studied areas will be successful on the Colorado Plateau.

In the late 1980’s sagebrush in and around Beef Basin, Utah, began declining rapidly, with areas seeing 70% to 100% die off, and a transition to grasslands. Unfortunately, one of the grasses taking over the basin is cheatgrass (Bromus *tectorum*), which is problematic for sagebrush restoration for a number of reasons (Carling, 2012). Cheatgrass dominated stands burn far more frequently than sagebrush communities (Thompson, 2007). This makes it incredibly difficult for sagebrush to successfully establish and mature (Thompson, 2007). Another problem with cheatgrass is its tendency to take over an area, particularly following a fire or other disturbance, and form a monoculture or near monoculture which effectively excludes the establishment of other species and inhibits restoration to a previous ecological state (Wisdom and Chambers 2009, Miller et all., 2008).

In Beef Basin, the lower elevation plains aren’t the only place sagebrush habitat is being encroached upon. The pinion and juniper woodlands that characterize the rocky basin slopes have become thicker and thicker. This is closing off the upper canopy and allowing these trees to outcompete understory species, including sagebrush, for key resources (Carling, J. 2012). This results in a severe decrease in understory species, and becomes a fire hazard which could then potentially be replaced by cheatgrass (Miller et all., 2000, 2005).

Beef Basin is considered crucial habitat for both mule deer and elk during the winter and spring (Carling, 2012). Mule deer in particular utilize South Plain in Beef Basin (Carling, 2012). They have seen population decreases, even as the sagebrush continues to decline (Carling, 2012). In 1956 a road was built to provide greater access to Beef Basin for hunters to curtail the (then explosive) deer population. According to local rancher Heidi Redd there were roughly 6,000 deer using the basins in and around the 60’s, and about 2,000 deer in the 90’s. Now only about 200 deer and 200 elk are using the area (Heidi Redd, personal communication, 6/5/2014).

Beef Basin is also used as rangeland for cattle from winter to early spring. Historically, the entire southeastern portion of Utah saw only small cattle herds prior to the 1880’s, but during the boom in the cattle market in the late 1800’s cattle use skyrocketed. From Arches National Park down to the city of Bluff and encompassing the LaSal Mountains, Canyonlands National Park, Beef Basin, and the Abajo (Blue) Mountains it is estimated that there were more than one hundred thousand head of cattle using the area (Denis, 2012). During the winter and spring, herds in the Abajo Mountains were usually moved down into what is now Beef Basin and Canyonlands National Park. In 1879 the Abajos alone had 2,000 head of cattle, by 1880 there were 15,000, and by 1885 10,000 head of cattle were in the mountains (Sheire, 1972). By the mid 1890’s the cattle market had crashed, and southeastern Utah was suffering from an overstocked, overgrazed range which resulted in the exodus of big cattle companies, leaving only small ranchers and herds (Denis, 2012). In 1936 the BLM required grazing permits and only allowed 500 head of cattle in Beef Basin (Sheire, 1972). In 2016 Beef Basin was allotted 200 head of cattle for five months, which translates into 1000 animal month units (AUM’s). Their diet consists primarily of needle-and-thread grass (*Hesperostipa comata*).

Add more here about….Grazing pressure on shrubs and grasses. Janis – historically grassland soils. Little ice age?

The objective of this study is to determine which soil characteristics are associated with the presence of sagebrush on the landscape in order to ascertain where restoration efforts will potentially succeed. Further, in areas where sagebrush still exists it is important to know the range of sagebrush health.

**Literature Cited**

Carling, J., Giffen, C., Grench, L., Leaver, B., Plemons, P., & Scott, M. (2012). Beef Basin/Dark Canyon Platearu Sagebrush Restoration. Environmental Assessment UT-Y020-2011-0047-EA. Monticello Field Office.

Denis, C. L. (2012). Departure of the Late Nineteenth Century Cattle Companies from Southeastern Utah: A Reassessment. Utah Historical Quarterly, 180(4), 354–373.

Miller, R. F., Bates, J. D., Svejcar, T. J., Pierson, F. B., & Eddleman, L. E. (2005). Biology, Ecology, and Management of Western Juniper. *Oregon State University, Technical Bulletin 152*, (June).

Miller, R. F., Svejcar, T. J., & Rose, J. A. (2000). Impacts of Western Juniper on Plan Community Composition and Structure.Pdf. *Journal of Range Management*, *53*, 574–585

Miller, Richard F.; Tausch, Robin J.; McArthur, E. Durant; Johnson, Dustin D.; Sanderson, Stewart C. 2008. Age structure and expansion of pinon-juniper woodlands: a regional perspective in the Intermountain West. Res. Pap. RMRS-RP-69. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 15 p..

Sheire, J. (1972). *Historic Resource Study: Cattle Raising in the Canyons*. *Elusive Documents. Paper 25*. Denver Service Center. Retrieved from <http://digitalcommons.usu.edu/elusive_docs/25>

Thompson, J. (2007). Sagebrush in western North America: habitats and species in jeopardy. *PNW Science Findings*, (91), 1–6. Retrieved from <http://www.fs.fed.us/pnw/>

Wisdom, M. J., & Chambers, J. C. (2009). A landscape approach for ecologically based management of great basin shrublands. *Restoration Ecology*, *17*(5), 740–749. <http://doi.org/10.1111/j.1526-100X.2009.00591.x>