Working Towards Sustaining the Natural Ecological Balance on the Modoc National Forest

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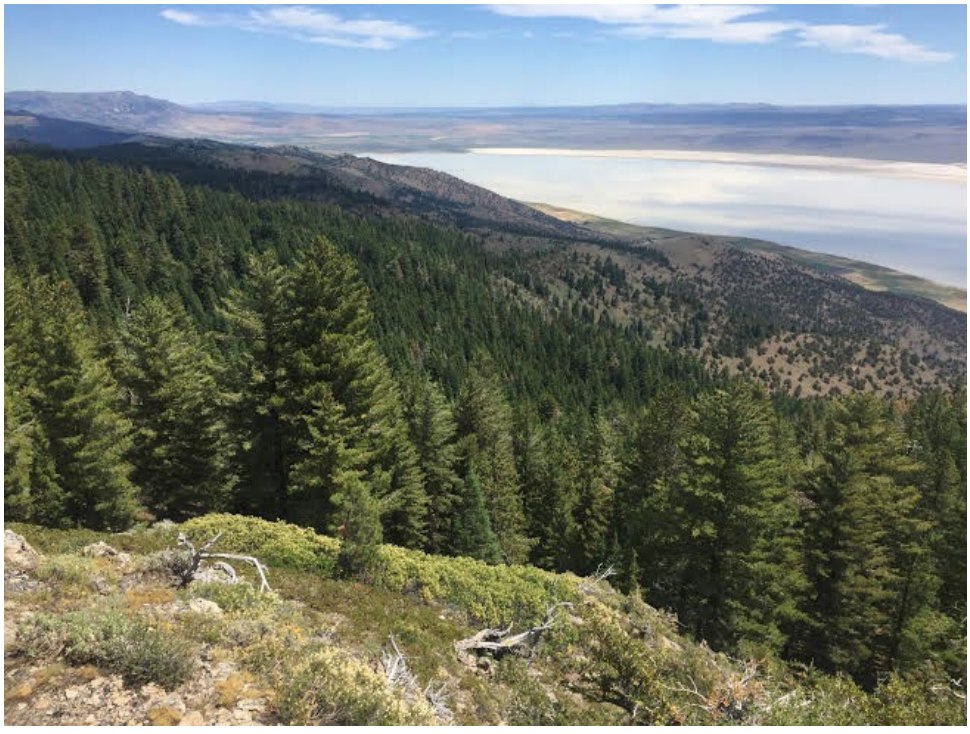

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Acknowledgements

This project was supported by Hispanic-Serving Institution's Education Program Grant no. 2015-38422-24058 from the USDA National Institute of Food and Agriculture. I'd like to begin by thanking the Water Resource Institute for providing this incredible opportunity to gain professional experience. With a program like this, diverse students like myself gain experience that will last a lifetime. Secondly, I am very grateful for my advisor, Susan Marshall, who motivated me to apply and step out of my comfort zone. I'd also like to give a special thanks to the entire Modoc Forest Service who were all very kind and open to discuss any of their projects and answered any questions that I had. Additionally, both of my supervisors, Greg Moon and Heidi Guenther were extraordinary people whom I got to learn so much from. Since the first day, we had a warm welcome from Greg. He took his time to introduce us to all of the employees, give us an introduction on the forest and even took us to see the wild horses, mines, and lakes. With his kind and caring manner, I felt very welcomed and I am very grateful for the guidance. Finally, Heidi Guenther, who was my botany supervisor this summer, gave us a great learning experience by leading and teaching us how to be a botanist in the field. With her expertise and knowledge, I was constantly learning new things every day. I will always be thankful for her passion, care, and support she showed us.

Introduction and Summary

In the farthest northeastern corner of California lies a true gem, the Modoc National Forest (Forest). With unique mountain ranges and beautiful lakes, it remains a remote forest holding an abundance of diverse plants and wildlife. From my time spent here, I studied and learned about the biodiversity on this public landscape.

Not only did I get to work in the Botany Program on the Forest, I also got the opportunity to work with Archaeology, Forestry, Hydrology, and Rangeland Management Departments. In the nine weeks of my internship, I attended educational field trips, monitored streams, surveyed historical sites, and even got to help feed and herd the wild horses at the Forest's Double-Devil Horse Corrals. I would have never expected to see, learn, and experience so much. I was truly impressed.

As a member of the botany field crew, one of our main efforts in the field was to identify and map noxious weeds to determine their distribution and spread across the landscape. Noxious weeds are invasive and exotic plant species designated by each state that are known to disrupt both natural ecosystems and agricultural landscapes due to their ability to lower biodiversity, decrease forage, alter water cycling and soil nutrients, and lower the overall aesthetic value of these natural areas. These plants compete with native species and in some cases, encroach on them altogether forming monocultures and potentially permanently altering the natural composition and dynamics of ecosystems and landscapes. This summer, we learned to identify, map, and flag noxious weeds in vast areas of land use within the Forest, which were mainly timber plots and grazing allotments. These botanical surveys involved hiking anywhere from 6-10 miles a day in remote mountainous landscapes and driving through steep, rough roads. Before heading out to the field, we studied the targeted weeds and with the use of a tablet

with pre-downloaded maps of the area, we simply plotted points on Avenza Maps. Some of the noxious weeds that we identified and mapped were: Dyer's woad (*Isatis tinctoria*), Canada thistle (*Cirsium arvense*), scotch Thistle (*Onopordum acanthium*), Mediterranean sage (*Salvia aethiopis*), and spotted knapweed (*Centaurea stoebe* ssp. *micranthos*).

Project Objectives

Botany

As a member of the botany field crew, we assessed the current status of botanical resources at various locations throughout the 1.6 million acres of the Forest with special focus on areas being prepared for public land use. The two main future uses are forest health/timber sales and cattle grazing allotments. Land use on public lands such as our national forests require natural resource surveys and documentation under the National Environmental Policy Act (NEPA). In relation to botany, identifying and flagging off areas of dense noxious weed and rare plant occurrences aid in preventing the spread of weeds and protecting rare plants from anthropogenic disturbance, respectively.

Timber Sales

A primary purpose of the Forest and all other national forests in the United States is the combination of both forest health and timber production The Forest Service's motto is "Caring for the land and serving people." The Forest's timber projects and everyone who contributed to

them truly reflected this motto by not only providing jobs for people and a sustainable product in the form of timber but also using scientific research and planning to simultaneously conserve the resiliency and health of our forests by reducing fuel loads and preventing catastrophic wildfires by thinning the forest.

Archaeology

Our botany crew had the opportunity to help out the Archaeology Department with their field surveys. During these surveys, we covered approximately 300 acres for future land use projects. Since soil turns every so often, new artifacts and sites were found and recorded during our surveys. While in the field, we learned how to monitor and record damages, disturbances, and new/undocumented site locations of artifacts. Helping the archaeology crew allowed more quality ground coverage during surveys, efficient site documentation, and additional flexibility to accomplish all goals.

Although the main project this summer revolved around timber sales, it involved all of the departments. I've learned it is a team effort to efficiently accomplish all the goals here on a Forest.

Grazing

The Modoc National Forest has supported cattle and sheep grazing for over 200 years. Some of the grazing allotments on the Forest have been permitted to families for generations, and livestock grazing is an important component of the economy in the local community.

Optimizing forage for livestock, wildlife, and wild horse while also preserving these ecosystems for sustained function and use is a crucial function of forest management on the Modoc National Forest.

Wild horses have resided on the Forest for over 140 years and are currently breeding more than the land could support. The Forest is capable of holding approximately 400 wild horses in their designated 258,000-acre Devil's Garden Plateau Wild Horse Territory. However, the territory currently holds over 2,000 horses. Unfortunately, not only are the horses consuming limited amounts of vegetation and water, but they are also causing significant damage to the ecosystem, specifically riparian areas. Early in the summer, we had the chance to visit the Forest's new Double Devil Wild Horse Corrals in the Devil's Garden Ranger District and learn about the Forest's efforts to reduce the amount of wild horses in order to protect and support both the natural environments of the Forest and a sustainable number of wild horses in the territory. We learned that most of the horses that were gathered in 2018 were adopted out to individuals and families throughout the country. One observation that stood out to me was how well these horses were being cared for. Compared to the ones roaming free, these horses looked well fed and healthy. The Forest does an exceptional job working with the horses and has made a lot of progress in the last few years. Although livestock grazing has substantially decreased over its long history on the Forest, it is important to keep managing these areas to preserve its function and biodiversity.

Project Outcomes

As a result of the collaboration between the various departments (e.g., Botany, Archaeology, Range, Engineering, Geology, and Timber) on the Modoc National Forest, we continued the ongoing process of surveying and documenting the conditions of the landscape in order to protect the resiliency of our forests while also allowing for public use. Identifying and mapping noxious weeds is an important component for fulfilling these goals. The data that we collected portraying the distribution and abundance of noxious weeds will be entered into a Geographic Information System (GIS) database in order to identify the spread of noxious weed and the severity of such infestations.

Conclusion

My time spent here was truly one of the best work experiences I've had. Spending time working with a team and learning a wide variety of subjects was exciting and inspiring. This was my first job in the field, and I realized that I am on the right path to where I want to be. I am grateful to the Water Resource Institute for providing this educational experience that taught me so much. From learning plants to learning to live independently in a remote town, I was really impacted by the Modoc National Forest. Before this, I had never heard of this Forest or town, but I've learned that Alturas is one of those places where you are surrounded by nature and can peacefully appreciate the beauty of a sunset. I am even more motivated to finish my studies and start working in an environment surrounded by knowledgeable people who care for the land and community.

Appendix I.

Image I. Stream running through fens or minerotrophic peatlands fed by ground water.

Image II. Pink male cones of whitebark pine (*Pinus albicaulis*) at high elevation (+7,000 feet).

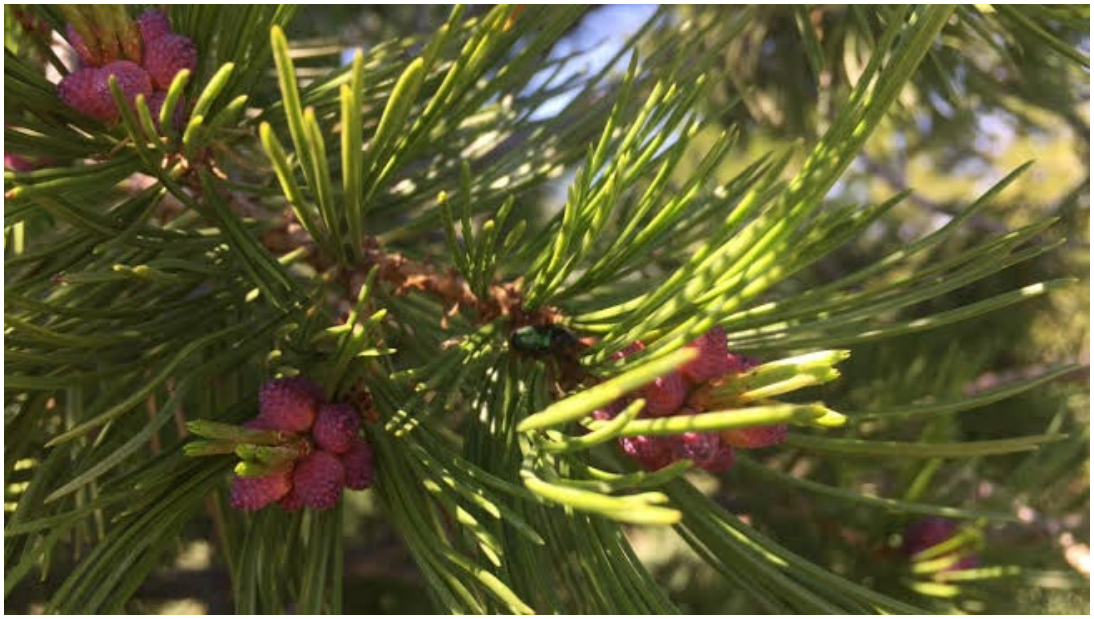

Image III. Working with archaeology; inputting Global Positioning System (GPS) points and marking the observation.