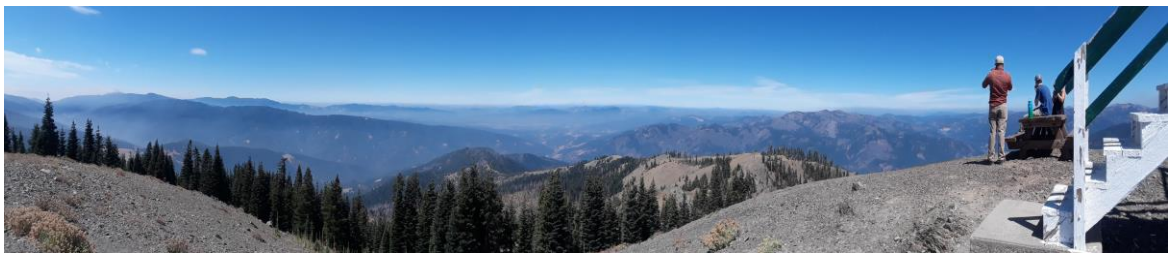
SALT PROJECT

MENDOCINO NATIONAL FOREST



Outlook at Anthony's Peak during the wildfire (2018)

Sateur Ham | CSU, Sacramento | Summer 2018
John Kelley, District Hydrologist | U.S Forest Services

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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 would like to thank them for giving the opportunity to experience and become part of this project. I would like to express my sincere gratitude to my advisor, John Kelley, district hydrologist for giving me an opportunity to work with him and providing me with immense amount of knowledge more than I expect to obtain from the internship and ability to complete this report. I would also like to thank the U.S forest service staff and the watershed resource and policy initiatives (WRPI) for providing a welcoming atmosphere and their efforts in providing an achievable opportunity in opening new doors.

EXECUTIVE SUMMARY

This project fulfills the Agricultural Act of 2014 (section 8204), known as the 2014 Farm Bill Title VI of the Healthy Forest Restoration Act (HFRA) of 2003. The bill allows the USDA to carry out their vital mission (as stated below this section) to address insect and disease threats and forest health on National Forest System lands by expediting their project by categorically excluding from excessive documentation and assessment. This project also fulfills the Mendocino Forest Plan and direction 1991 Northwest Forest Plan.

U.S. FOREST SERVICE'S MISSION STATEMENT

The mission of the USDA Forest Service is "to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations."

Motto: Caring for the Land and Serving People

MOTTO: CARING FOR THE LAND AND SERVING PEOPLE

The phrase, "Caring for the Land and Serving People," captures the Forest Service mission. As set forth in law, the mission is to achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people: It includes:

- *Advocating a conservation ethic in promoting the health, productivity, diversity, and beauty of forests and associated lands.*
- *Listening to people and responding to their diverse needs in making decisions.*
- *Protecting and managing the National Forests and Grasslands so they best demonstrate the sustainable multiple-use management concept.*

- *Providing technical and financial assistance to State and private forest landowners, encouraging them to practice good stewardship and quality land management in meeting their specific objectives.*
- *Providing technical and financial assistance to cities and communities to improve their natural environment by planting trees and caring for their forests.*
- *Providing international technical assistance and scientific exchanges to sustain and enhance global resources and to encourage quality land management.*
- *Helping States and communities to wisely use the forests to promote rural economic development and a quality rural environment.*
- *Developing and providing scientific and technical knowledge aimed at improving our capability to protect, manage, and use forests and rangelands.*
- *Providing work, training, and education to the unemployed, underemployed, elderly, youth, and disadvantaged in pursuit of our mission.*

PROJECT OBJECTIVES

U.S. FOREST SERVICE PROJECT OBJECTIVE

The U.S forest service purpose for project is to improve the forest health conditions in the Salt Creek area with the focus on insect and disease infestation while promoting the need for resiliency of the future forest health. The objectives for this project is to increase the amount of healthy tree stands within the project area, promote genetic diversity, increase the amount of growth of trees. With a healthy forest there is a possibility for greater resiliency and rebound from natural disturbances such as insect and disease and by stressors such as wind and fire in effects of climate change. The current condition of the trees in the forest are dense and competing for limited resources. The proposed action agrees to promoting forest health, improving forest road conditions and improving watershed conditions. The timber sales would decrease the high density of trees to promote stronger and healthier stands based on specified criteria obtained through scientific knowledge and expertise in forest management.

STUDENT OBJECTIVE

To establish a sufficient and adequate information on the health of the forest, as well as, the health of the whole ecosystem—many specialists (biologist, archeologist, et cetera.) work in collaboration to formulate an overall assessment in forest management. Working under the supervision of the district hydrologist, John Kelley, I will be surveying and assessing the hydrological portion of this proposed project alongside a group of other hydrology interns in looking at stream channel morphology, sediment regime, and water

quality within the project's watershed. Our objective is to collect data in order for the district hydrologist to understand the stream conditions and road interaction. This data will help understand road management and hydrological considerations regarding this proposed timber project. To achieve our goals, we will incorporate various protocols and surveys to make our assessments.

PROJECT APPROACH

We were also taught to use the AvenzaMap app on our personal devices to obtain current GPS location while on airplane mode throughout our project to get around the forest without the need for internet access.

PFANKUCH SURVEYS

Pfankuch surveys are used in streams to do a general assessment of stream stability of a specified reach determined by the percentage of slope differences based on the Rosgen Stream Classification (figure 1). In a Pfankuch survey, there is a need for additional training to elaborate on the ratings of different assessments which I personally feel is necessary to provide adequate ratings. In contrast, Pfankuch surveys is generally used and can be utilized by those with limited knowledge in hydrology to generate usable stream stability data.

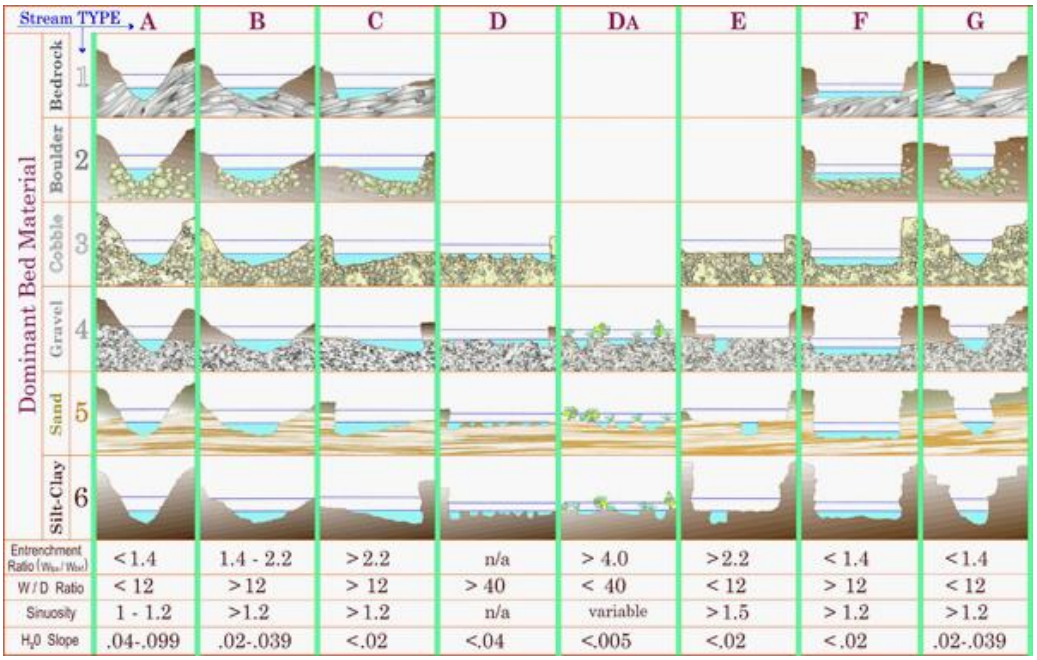

Figure 1. Rosgen Stream Classification Method

For the Pfankuch survey, we used a GPS unit to note the location of the stream from the start to end of the stream reach, determined by using a clinometer as explained in figure 1. We also used the clinometer to read the slope of the stream bank and a measuring tape to measure the bank width and depth ratio to determine the rating based on the Pfankuch rating form (figure 2). Pfankuch surveys is an ocular process providing a general overview to determine and distinguish what would be considered as mass wasting, debris jam potential, amount of vegetative protection, rock content, bank cutting, deposition, and if there are any aquatic species utilizing this stream. Using the Pfankuch form, we can calculate the cumulative scores based on the category to determine the potential stability of stream.

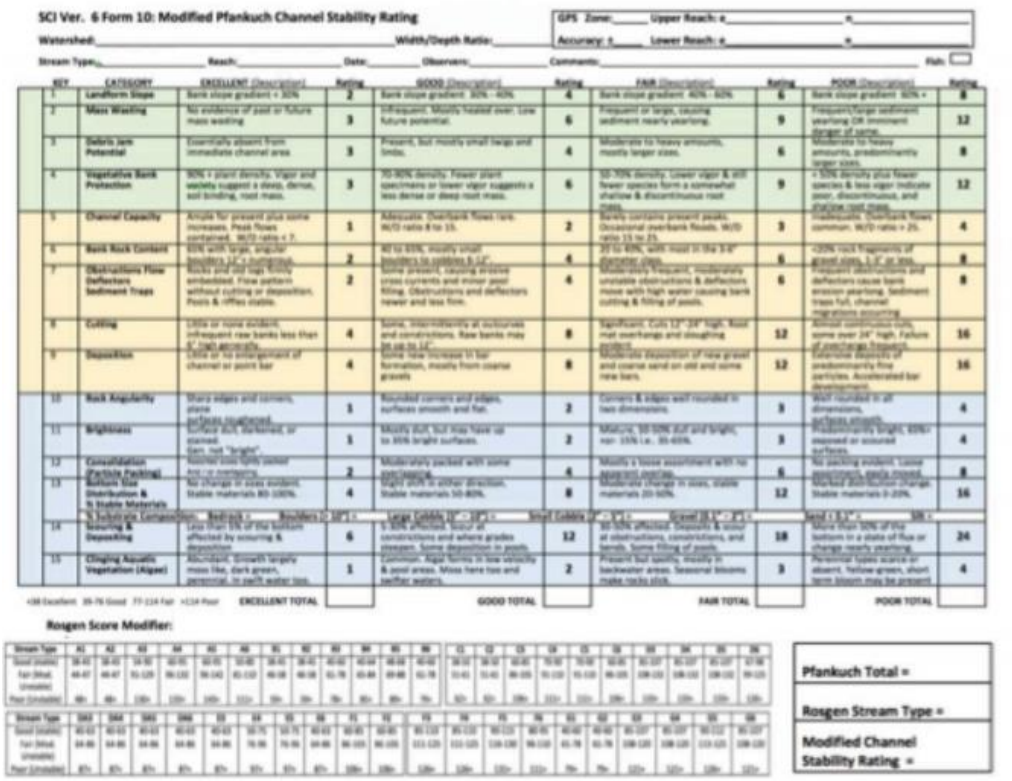

Figure 2. Example of Modified Pfankuch Channel Stability Rating used in assessing the stability of streams

STREAM CONDITION INVENTORY (SCI)

Stream condition inventory (SCI) assess the stream condition and understand the morphology to determine the changes in the coming years or to look at historical features. To understand the morphology, we prepare the overall reach using a transect tape (figure 3) to determine the length of the stream.

Figure 3. District Hydrologist in the Mendocino National Forest walking alongside the transect tape after establishing a beginning of reach. 2018

We measured the elevation using a laser leveler and an extendable measuring stick to construct a longitudinal profile of the stream. We were also trained to observe the different types of stream flow characteristics within a given reach to distinguish pool, riffles, run, and glide. The district hydrologist will then use this data to draw a

computerized profile of the stream. In a pebble count, we had to determine the total measurement of a given reach and dividing it by the number of stream flow characteristics to calculate the amount of pebble count should be taken in a given area totaling it up to 100 counts of pebble per reach. To do a pebble count, we needed a small ruler to count the middle-size portion of the pebbles (in mm) and another person keeping note of each pebble count. We also did stream shade surveys using a device called Pathfinders to calculate the total percentage of the amount of shade covering the stream. I, along with two other interns, rotate job tasks so that we all had an opportunity to learn and try out different methods and equipment used in this assessment.

CULVERT SURVEY

Most of our fieldwork was culvert surveys and it was to assess road condition and streamflow interaction. In the culvert survey, we were trained to use a Trimble equipment to take survey of each location that needed to be assess. The Trimble device is one of the important equipment belonging to the forest services because it contains a data dictionary that is useful and convenient for volunteers to take adequate surveys of each data points without the use of a paper copy (more likely to have error in the data). The Trimble device is also useful because of its high precision and accuracy of the data point taken using the global positioning satellite (GPS). In a culvert survey, our supervisor wanted to understand water flow interaction with roads and streams. If a culvert is compromised (damaged or blocked), there are safety issues that can be related to it such as road erosions, road cuts, and even mass wasting. In the Trimble equipment, we were able to keep note of the description of the culvert, road assessment, and the amount of

water flow in a given culvert using a measuring wheel. There are many roads that were also unmaintained that needed to be address which are due to a washout (figure 4) or buried culvert (figure 5). The impact it can have could lead to instability of streams or no water passages for aquatic species to migrate. For humans, it can be dangerous to for off-road drivers when there is instability in roads due to a buried culvert.

Figure 4. One of the hydrology intern is used as scale to capture the overall size of the culvert washout on the road. The intern is at the very bottom [center]of the washout. 2018

Figure 5. A buried culvert can potentially compromise a fully functional stream or cause road erosion during heavy rainfall. 2018l

PROJECT OUTCOMES

A typical project required through the categorical exclusion (CE) generally takes approximately a year to complete in comparison to other regulatory processes. Due to the complexity and interaction of working collaboratively among other specialists, the district hydrologist must work with the civil culturalist and road management simultaneously to complete his objectives. In turn, the fish biologist, wild biologist, and other experts can

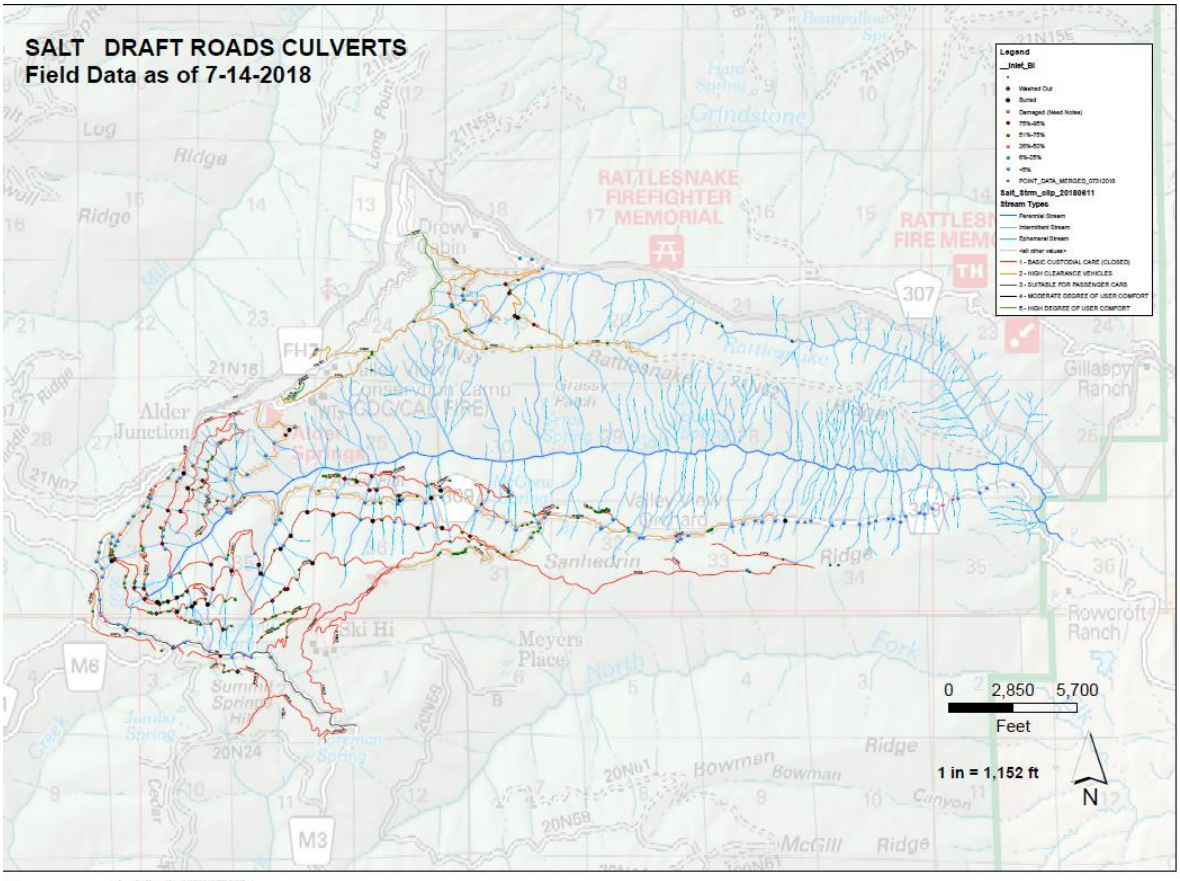

Figure 6. Draft copy of ArcMap generated field data of the watershed (project area). 2018

proceed based on the issues encountered by the district hydrologist's assessment. Though, the project on behalf of the district hydrologist is complete (figure 6), the end product of the project will not be fully available until the third-quarter of 2019.

CONCLUSION

Throughout the eight-week internship, there was always something new that I learned aside from the fieldwork I was doing. I learned first-hand experience on the process of data collection and data entry, as well as, helping input data into ArcMap. I learned the names of the different tree species, encountered and observed different types species inhabiting the forest, accurately read a map, and learn how to assess and mitigate different issues or conflicts (how to deal with encountering water pipe in relation to illegal marijuana growers, safety issues, heat exhaustion, injuries, and road-related issues). In my personal experience, at-first, it was like a complete culture shock for me. My first expectation of the Mendocino Forest is like that of a typical heavily managed national park. It is not. I had to learn how to drive on sketchy, unmanaged and narrow roads; hiked up and down game trails or bear trails instead of normal man-made steps; and there were no portable restroom areas.

My overall experience throughout the internship was an exciting learning experience. As the internship reaches its course, I can say I had overcome several challenges out in the field, experienced the work environment and challenges within the agency. I believe I am mentally and physically stronger than I was the first day on the job! This internship is great for those who are looking to challenge themselves physically and mentally.

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