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University of Montana Crew Lead – Annual Grass Monitoring

Soren Cooley
Western Washington University

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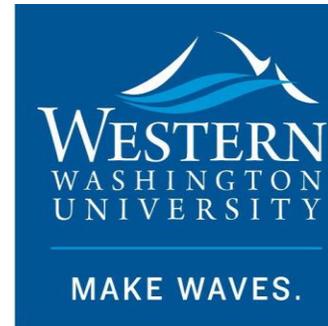
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COLLEGE OF THE ENVIRONMENT



Internship Title: Crew Lead – Annual Grass Monitoring

Organization Worked For:

The University of Montana – O'Connor Center for the Rocky Mountain West

Student Name: Soren Cooley

Internship Dates: May 28, 2024, to August 20, 2024

Faculty Advisor Name: Dr. Aquila Flower

Department: Environmental Studies

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STUDENT SIGNATURE: _____

A handwritten signature in black ink, appearing to read "Soren W. Cooley", is written over a horizontal line.

DATE: August 20, 2024

My role at the University of Montana – O’Connor Center for the Rocky Mountain West was to effectively lead a crew while collecting data on annual grasses in western Montana’s National Forests. These National forests include the Bitterroot National Forest, Lolo National Forest, and the Beaverhead-Deerlodge National Forest, roughly 7 million acres altogether. The purpose of this work is to give the Forest Service in western Montana a comprehensive idea of where and which invasive annual grass species are in these National Forests. The four main annual grass species we were concerned with were *Bromus Tectorum* (Cheatgrass) , *Bromus Arvensis* (Field Brome), *Ventenata dubia*, and *Taeniatherum caput-medusae* (Medusahead). We found, mapped, and collected samples of these grasses to aid the Forest Service’s goal of having comprehensive monitoring data of each species.

The O’Connor Center for the Rocky Mountain West is a public education and outreach program from the University of Montana’s Missoula location. The center has range all across the Rocky Mountain West. The O’Connor Center is a proficient and leading resource for stakeholders and key decision-makers across the Rocky Mountain West. Informing important parties and agencies with quality data and analysis on a spectrum of environmental change, social, and cultural issues. The O’Connor Center is an influential part of public land management in the



Rocky Mountain West. This internship was associated with the Forest Service in Missoula and surrounding areas as well. We worked with stakeholders within the Forest Service to efficiently map these four annual grass species. This included communicating and working together with

these individuals while mapping and gaining access to remote areas. This data collected was primarily to monitor the specific range of *Bromus Tectorum* and *Bromus Arvensis*. These two species are known to be very prevalent in these areas. Just how much control these species had was unclear. *Ventenata dubia* and *Taeniatherum caput-medusae*'s range is unclear as far as the Forest Service is concerned. The end goal of this data would be a more active approach to try to mitigate its effects before their populations become out of control.

From this internship I had specific goals or outcomes that I intended to gain from this experience. My first goal was to learn the specific protocols of recording geographic information systems (GIS) data while in the field. Previous to this experience I had experience analyzing and working with data from the field. However, I had limited experience within the actual data collection realm. The second goal I had for this internship was to become much more proficient with ArcGIS's Field Maps. This application is a front runner in GIS data



collection, so I think it is an extremely valuable tool to have in my GIS 'toolbelt'. As part of strengthening my comfortability with ArcGIS field maps, I intended to learn the specific protocols revolving around the entry of GIS data. I had a deep curiosity of how the data is collected that I had been using for years before. I had questions such as, What was the method of collection? How difficult was the process of getting the data? Could this this data be

imperfect? I sought out an experience to hopefully answer these questions. Another goal I had was to strengthen my communication and collaboration skills while working with multiple stakeholders. In the case of this internship, it was the O'Connor Center members, and Forest Service personnel. Another major goal that I had was to gain experience identifying and

sampling grasses and plants in general while in the field. I had not had much experience before this internship regarding plant identification more specifically annual grass identification. I was also not as proficient as I would like to be at collecting quality samples. This internship required me to bring back specimens to the O'Connor Center for species verification and documentation. I feel that this is an integral part of any kind of research which made me very excited to hone my skill set around these two important pieces of field work. Another goal was to work outside in beautiful part of the state and experience a true field season. I have always loved camping and hiking in this area, and I was thrilled at the opportunity to work within it.

A typical day for me would consist of waking up early to plan the day ahead for my partner and me. I would analyze the areas we were given as a pointer to go look for our target species. I would specifically look for southern facing slopes with some kind of disturbance in the area. This could be a road, a grazing allotment, trail, etc. During this experience we found that the highest likelihood for finding one or many of these target species was in disturbed areas. Essentially anywhere the seeds could have been introduced by any means. These could be 4x4's, trucks, wild animals, cattle, sheep, Etc.



Once I had a plan for the day we would typically make coffee, breakfast, and pack a lunch at the campsite we stayed at. Most days there was a drive on either two-track trails or dirt roads to get us fairly close to a sampling area. I would try to drive us as close as possible, however, the road condition or access was most times difficult. Once we were finished in the

truck we would load up our day packs with plenty of water, lunch, field gear, and our iPad's. Some days were mellow with short hikes, while most days we would hike upwards of ten miles. While we hike we are constantly looking for signs of mainly Cheatgrass and Field Brome. These two species were by far the most prevalent, Cheatgrass in particular. Once we inevitably found a population of the target grasses, we would use an iPad to map the population as accurately as possible. This is a fairly difficult thing to do in certain situations depending on the topography of the location. If we were on steep slopes in a canyon-like setting, we found that our GPS units were off by an unacceptable distance. This is when we would have to rely on our navigational skills and use topographic basemaps to determine as accurately as possible the



location and dimensions of the population. When entering characteristics of the grass population the Forest Service required a very specific and unique code or 'name' for each polygon (representing each grass population). The pieces that make up this code were the region, National Forest, Forest Service district, the USDA – National Resources Conservation Service (NRCS) designated species code, a characteristic site code, and the population number. In practice, this may look like:

011603_BRTE_ME_1086

In this made up scenario, this would be a population of *Bromus Tectorum* (BRTE) within region one, within Lolo National Forest, and within the Missoula district. This population would reside in a meadow, and it would be population number 1086. These unique codes for each population are critical when GIS analysis is being executed.

This unique code is one of three required attributes when creating a population polygon. The other two are the species code repeated and the date in which collected. Optional observations were also available. This is where the collaboration between the Forest Service and the O'Connor Center shines through. In the training I attended with the Forest Service it was stated that if we were inclined to collect more comprehensive data we are able to leave comments and pictures of the specific population. This extra step in the data collection process was encouraged however not required. Depending on the population and infestation severity, these comments and pictures were very useful. Part of the methodology that we found useful while mapping was using these optional attributes. Take for example if there was a meadow with many distinctly distributed populations of a species, but majority covered in a species, we were able to describe this in detail within these optional attributes. This only aided in the Forest Service's knowledge of what the severity of infestations were in these National Forest's.

Once we completed a polygon we would continue hiking and look for the next population of grass. This lasted for a ten hour workday. When we were finished I would find us a spike camp or as we got used to saying a 'cowboy camp', somewhere on public land. A typical hitch lasted eight days and we would take a six day break between. Throughout the summer we got much more efficient and in a lot better physical shape. This meant that we were able to visit more places that could potentially harbor these invasive annual grasses.



Upon completion of this internship, I not only surpassed my goals that I had set for the experience, I gained so much additional experience that is incredibly valuable. I learned exact

protocol that is involved with collecting and recording GIS data in a true field setting. Learning the unique codes that I described was difficult at first. With practice I was able to very efficiently figure out the codes and was able to decrease the total time I spent typing in codes, increasing my productivity. This was in part because I was becoming very proficient with ArcGIS's Field Maps. I learned a shortcut that allowed me to find the first six digits of the unique code using GPS entirely within Arc GIS Field Maps. I shared this trick with my crew, and we all became much more efficient while recording data. This internship truly helped me



answer the burning questions I had about data collection regarding specific GIS data. I had no prior expectations of what data collection would look like in this role. However, I came to learn that some data collection methods could be hiking around western Montana's

National Forests. This is obviously an amazing experience, but it was hard at the same time. Hiking decently far distances in mid-summer in Montana can be difficult. We had days that were setting record temperatures. It was not easy by any means. While crawling up mountains I had a new appreciation for data that is collected in remote places. In my experience it takes a lot of work to get to that area. I answered the question for myself as to the fact that not all data is perfect. As much as I would have liked to map every population with extreme precision, that is simply not possible. In the case of poor GPS, the exact extent of the population was by no means perfect. However, we tried our best to get it as close as possible, but it wasn't 100% accurate. I will admit that I was guilty of blindly trusting data that I worked with in GIS classes previous to this internship. This was an eye opening experience that I am grateful to have learned.

The communication aspect of this internship was also very monumental in my experience. Collaborating with Forest Service personnel and gaining access to areas closed to the public took serious coordination. This was something I thought I was already proficient in, but I learned there is always room for improvement. We rarely had cellphone service, and it was challenging coordinating a time that worked for everyone to meet to make the goal of the project happen. All in all, I learned how to coordinate more effectively within a team, and I believe I helped bring the O'Connor Center and the Forest Service stakeholders closer together to reach a common goal in this project.

An important part of this project was to sample the species of grass we were interested in mapping. If anyone questioned what we mapped we could prove it to be the species we declared each population as with a sample from each plot. I will admit my grass identification and sampling knowledge was lacking. I did a lot of research on the various characteristics that are diagnostic of each species. However, when I was in the field I felt lost about differentiating minute details for each species. These details truly mattered in declaring one species different from another. This is when I learned how to use a dichotomous key to differentiate subtle differences between species of the same genus. This was another skill that took a lot of practice. However, after this experience I feel proficient in using the dichotomous key to identify with conviction various annual grass species. Collecting samples and using a sample press was very interesting to me. I remember as a kid pressing wildflowers in big books. Collecting the grass samples was



similar, yet more precise. I would dig up a specimen and knock out all the dirt from the roots. Then ensure that the inflorescence of each specimen was as intact as possible. Then take blotting paper in combination with newspaper and press each sample with a paper note recording the species, location, and other comments about the specimen. This would get pressed with other specimens inside a plant press that would later be delivered to the O'Connor Center. I took great care to ensure that I was collecting valuable specimens that could aid in our credibility as a data collection team.

My last personal goal was to enjoy the beautiful area that I was working in. This was the easiest part of the internship. The area I was working in is incredibly beautiful making this goal very easy to achieve. I was able to bring my camera with me and capture some truly beautiful landscapes. Hiking off trails and into some fairly deep backcountry places I was fortunate enough to run into a lot of wildlife. Which brings me to another learning lesson. A major theme



this summer for me was grizzly bears. I was slightly nervous about it knowing I would be in their territory. Encountering black bears in Washington is a more manageable situation in my opinion. Being around a grizzly in the back country simply feels different. I am grateful for seeing upwards of twelve bears this summer. However, being alone in various situations I had to rethink my approach, and how I carry myself in these situations.

I had experience being around grizzlies before this and knew how to act. I was constantly refining my approach this summer. I would carry two bottles of bear spray with me wherever I

was however I know that it is not a definite solution if something were to go wrong. This is where I switched my mindset and I did everything I could to prevent an encounter, but with enough time in these places it is inevitable to have an encounter. I am coming out of this experience with better skills when it comes to encountering bears, which is something I did not anticipate going into this summer. This is something that I feel is very valuable moving forward in life. I have to mention that these were all safe encounters, and I mostly ran into bears during my personal trips while I was not working.

Looking back on this experience I am incredibly grateful for the opportunity to have worked this position. I learned more than I could have expected. This experience has opened my eyes to ecological practices that involve GIS. I am very eager to enter the job market and hopefully pursue a field position. I am coming out of this internship a better student, a more experienced team member and team leader, a stronger employee, overall, a better person. I have nothing but good things to say about the crew members I was fortunate enough to work with this summer. We had an amazing time exploring, learning, and working really hard in extremely beautiful places. This holds true for the people who I worked with at the O'Connor Center. I am truly grateful to both Kory Kolis and Kay Hajek who offered me the opportunity to work on this project. To anyone who is considering working on this project or any other project related to the O'Connor Center I would **highly** recommend it. Between gaining incredibly valuable research experience to exploring and working in some of the most beautiful landscapes I can imagine it is an amazing opportunity.

The following pages are from a daily log that I kept while working this internship.

June 22, 2024

Today it was very hard to wake up because I was tired from our big hike yesterday. I finally got up and made my coffee in the warm sun. I slept with out a rain fly on my tent and fell a sleep watching the stars. I made my eggs + bacon for breakfast to get ready for another big hike today. We drove a long dirt road up to Burdette Creek T.H. I made a lunch to bring for the day then packed up the truck. All 4 of us left the trail head and I led everyone up to the start of the trail. Burdette Creek Trail starts with a steep climb right out of the gate. You come up to a small summit then drop down the other side on an equally steep slope. Once down you drop into Burdette Creek's valley. It was some what of a Box Valley. The trail continued up the valley following the creek for roughly 6 miles. On our way up the valley we were all hiking hard and in good spirits. That is until Blake found a tick crawling in his ear. Up to this point, we only saw some *B. Tectorum* at the trail head. The trail crossed Burdette Creek multiple times near the start of the valley. It then took a high line away from the creek heading through what looked like old avalanche debris. It was beautiful country walking through young ~~Ponderosa~~ Ponderosa.

We soon came to a very thick section of willows that looked to me like prime moose country..... Leading I was very cautious about the ticks and made sure to make plenty of noise. At one point I heard a crashing through the willows and we all stopped dead in our tracks. We stopped and listened for a couple minutes. It had to be a moose. It had the sound of a very large animal crashing through the woods... they just sound different. After our little break we kept hiking and eventually found our way up to the end of this trail. I stopped about a tenth of a mile before the trail actually ended. There was a hillside that looked like it could be good *B. Tectorum* habitat so I decided to climb it. Everyone else decided to go the other way so I ~~was~~ set out for this Mtn. alone. The base was a scree field roughly 100 ft. in elevation gain. I checked the metrics on Field Maps before I went off trail and the climb looked to be about 700 ft in a little under $\frac{1}{2}$ mile in horizontal distance. I actually couldn't see the summit because it seemed that the Mtn. beached out. I used my compass and figured that my Azimuth should be roughly 173° . I scrambled up the scree field and eventually about halfway up, I found some

B. tectorum. This was a steep hike but I felt surprisingly good. I made it up to the top in decent time and decided to have lunch on a Ponderosa limb stretching out down slope ~~and~~ reaching out to the valley floor. I ate lunch, then pulled out my camera to take pics of the valley. This felt so rewarding. I was very excited to be alone on top of this mtn. Looking over the valley I saw a HUGE bull moose drinking out of Burdette Creek. This was such a special moment for me. I was awestruck by the natural beauty of this place. It was tough getting there but I marked it down on my Oht. I have to make it back up there some day to have lunch in the same spot... Maybe even see another moose. That night we had a camp fire after we jumped in the creek and I grilled up some steaks I had marinating since the morning. It feels like ~~we~~ we are living the Montana dream right now!!
😊