Teddy Loof
Charlie Blumenstein Stewardship Internship Final Report
Carpenter Ranch Preserve, Hayden, Colorado
Summer 2021

The 2021 Charlie Bluemstein Stewardship Internship returned in-person to the Nature Conservancy's (TNC) Carpenter Ranch after a year hiatus due to the ongoing Covid-19 pandemic. Carpenter Ranch is located on the Yampa River just outside of Hayden, Colorado where it encompasses nearly 1,000 acres of grazing land and a globally rare box-elder, red-osier dogwood, and narrowleaf cottonwood riparian forest community. This unique ecological community structure is only found on the Yampa and White Rivers in Colorado and is threatened by overgrazing, invasive species such as tamarisk, and diminishing flow rates and flooding frequency because of climate change. The riparian forests on Carpenter act as a wildlife dispersal corridor and provide critical habitat for various regionally rare bird species. In a world where the cumulative effects of human land use and climate change are vastly altering natural spaces, conservation initiatives are becoming increasingly important.

Carpenter Ranch has a rich history rooted in traditions in western Colorado. It started as a series of homesteads that were acquired by J.B Dawson in 1903 where the majority of land was used to graze cattle. In 1926, Ferrington Carpenter, a Princeton and Harvard Law School graduate, and former ranch hand took over the ranch. He continued to raise cattle until he died in 1986. The Carpenter family-maintained ownership of the ranch until 1996, when TNC acquired the land. TNC continues to work with local ranchers to graze the pastures and focuses on conserving the riparian habitat on the ranch along with two other preserves in the Hayden area. TNC still sustains a strong relationship with the Carpenter family, and I had the honor of developing a relationship with Ferry's granddaughter, Bel.

A significant reason that TNC acquired Carpenter Ranch, other than the presence of the red-osier dogwood, narrowleaf cottonwood, and box elder community, is the proximity to the Yampa River, which is one of the last unmanaged rivers in the western United States. In addition, Carpenter Ranch has first water rights on the Yampa, making the river an extremely valuable resource for TNC from both an agricultural and research standpoint. Understanding the dynamics of how waterflow might be altered do to the effects of climate change and an increase in demand of water as droughts occur more frequently are vital for protecting riparian ecotypes.

I worked with Matt Ross, the Carpenter Ranch Conservation Manager, and two other interns from the University of Redlands on daily tasks including yard and trail maintenance, removal of old fences and agricultural structures, clearing fallen trees, and fixing up the historic ranch house. Once a week we oversaw student groups from the Rocky Mountain Conservation Corps, who assisted with maintenance and conservation efforts. I was also able to contribute to TNC's effort to provide ranchers and farmers accessible information on native species conservation by writing species fact sheets for an app that TNC is developing.

I was also tasked with building benches and given the opportunity to transport and install them at TNC's Medano-Zapata Ranch Preserve bordering the Great Sand Dunes National Park. While at Medano-Zapata we were provided the opportunity to speak with the National Park Service about their unique conservation challenges and relationships with the Bureau of Land Management, TNC, and other landowners that enabled the creation of the park and ensures its success.

When I was on the Ranch, Anya Byers, a land and water conservation manager at TNC, allowed us to shadow her while negotiating conservation easement terms with a landowner in Hayden. Conservation easements are an effective tool for protecting ecologically valuable areas

from development and human use while simultaneously keeping land in private ownership, providing tax incentives, and maintaining economic benefits to the local community. TNC has brokered a number of conservation easements in the Yampa River watershed that have protected wildlife, habitat, and open space while simultaneously benefitting private landowners. This work alone has shown that ranching and conservation interests are compatible. Experiencing this kind of work has taught me that at the end of the day, the interests of the agricultural and conservation communities are aligned and collaboration is necessary to protect ecologically important land.

Throughout the summer I worked on an individual research project where I modeled the riparian forest system based on different water flow and flooding regimes projected under varying degrees of drought severity from climate change. I focused on narrowleaf cottonwood, red-osier dogwood, box elder, and pacific willow, which make up a majority of riparian community structure. I found that as drought frequency increased so did the abundance of red-osier dogwood and mesoriparian meadow. However, the floodplain was still dominated by narrowleaf cottonwood and box elder. Under more severe drought conditions, all of the species included decreased in abundance. The largest decreases were seen by pacific willow and mesoriparian meadow. The abundance of red-osier dogwood decreased to a lesser degree, and both tree species remained at relatively stable levels despite a slight decrease in abundance under more extreme conditions. My results were somewhat promising, as the riparian system was shown to be rather resilient to the impacts of climate change and potentially could provide refugia to wildlife as drought and reduced flow rates on the Yampa River worsen. In total, it was incredibly rewarding to use the skills I learned in classes to a research project that could be used for management strategies in the future.

In my research project I was immersed in USGS data on the Yampa River dating back to the 1920s. Historically, it was common for flooding to occur yearly at magnitudes over 15,000 cubic feet per second (CFS). In the past ten years, the highest magnitude flood that occurred was only 10,030 CFS. The reduction in annual flood frequency and magnitude has major implications for riparian systems since the reproduction of many native plant species in these ecosystems are reliant on spring flooding.

In my time at Carpenter Ranch, I experienced the impact of extended drought on the Yampa firsthand. I grew up fly fishing with my dad and my grandpa at our property in Wisconsin, and I was hoping to fish on the Yampa over the summer. Unfortunately, the temperatures of the water were way too high, and the flow rate of the river was far too low. As the summer progressed, the flow rate dropped below 200 CFS and water temperatures were as high as 80 degrees. From an ecological perspective this was extremely alarming for aquatic life, and from a human perspective, had negative impacts on the agricultural community and for recreational opportunities. Unfortunately, I didn't end up fishing the Yampa at all last summer because doing so would just add another element of stress for fish in an extremely stressful environment. In reflecting on the experience and knowledge I gained about hydrology, it's easy to get distracted and lose hope. However, I think it's important to recognize that we're not alone in this battle, and through collaboration with the outdoor recreation community, the agricultural community, and the conservation community, we still have time to work together to solve complex issues and protect the places we care about.

Collaboration also extended to the daily tasks we completed on the Ranch. Teamwork was incredibly important in ensuring that tasks were completed efficiently ranging from yard work, maintaining trails, removing old agricultural structures, removing old fences, and leading

youth groups. It was incredibly rewarding to work alongside other young, passionate individuals to protect the lands we care about and enjoy recreating on. In the process, I learned a number of valuable new skills. I was able to learn how to drive a tractor and used it to remove old irrigation equipment on Carpenter and to clear fallen trees from a trail on the Medano-Zepata Ranch near the Great Sand Dunes National Park. I was able to practice my carpentry skills by building benches as well as posts to hide trail use counters. I also learned how to use an angle grinder to cut corrugated metal to fix the siding and roof on one of the feeder shacks in the pasture.

One of the most memorable impressions of Carpenter Ranch was the sense of history and timelessness the property had. Working on the ranch felt like stepping back to an era where time was measured by the amount of daylight rather than the more linear and structured sense of time that I was used to. It was freeing and gratifying to work in a space where the landscape and history were intricately intertwined.

It was striking how a working ranch where cattle have grazed for close to the past 120 years can now be used to conserve a rare plant community and serve to teach people about the importance of riparian ecosystems. Before this past summer, I firmly believed that traditional agriculture and conservation were mutually exclusive. However, this internship taught me that this isn't necessarily the case. Communication between conservationists and the agricultural community is definitely possible and is absolutely necessary to preserve and rehabilitate integral natural spaces. This is especially necessary in the current status quo where climate change, water usage, and human development are threatening not only biological diversity but also those who are reliant on their land for their livelihood.

Upon reflection, my experience at Carpenter Ranch this past summer was extremely positive, and I came away from it with a newfound respect and connection with the land and with

the southwest. From a conservation perspective, I've gained insight into the complex challenges the region is experiencing– extended periods of drought, climate change, and land use constraints– which will only worsen with time. Meaningful change can only come from collective engagement and collaboration on the issues we care about. Perhaps the biggest take away I had from the summer was from learning about and engaging in water conservation issues. It's an area of conservation that I want to focus on in the future by taking more courses at CC on water rights law, and the history and hydrology of water in the western U.S. While it is an immensely complex issue, it is also crucial to protecting natural systems and ensuring that agriculture can be sustainable in the long term.

I want to thank the Blumenstein Family and the Charlie Blumenstein Internship Steering Committee for providing me this opportunity to work with TNC and learn more about the conservation initiatives they are striving towards. I am incredibly grateful to have been able to spend the summer at Carpenter Ranch. It is an amazing property that has deep roots in the history of western Colorado and is situated on one of the last unmanaged rivers in the west. I want to thank Matt Ross for guiding and teaching me numerous skills that I wouldn't have otherwise learned or practiced. Matt was incredibly accommodating and approachable and helped make the experience more rewarding and enjoyable. Anya Byers included me in various conversations on strategic initiatives at TNC and offered valuable career advice. Lastly, I would like to thank Jennifer Wellman, who gave me advice and recommendations on my individual research project.