

THE EFFECTS OF HIGH-FUNGAL LIQUID COMPOST ON RANGELAND ECOSYSTEMS (TRINCHERA RANCH, COSTILLA COUNTY)

PROJECT INTRODUCTION

This internship was hosted by the Trinchera Blanca Ranch, where sound stewardship and management efforts are utilized to improve wildlife habitat, forest- and watershed health, and where some of the most complete and diverse wildlife habitats in Colorado can be found. Trinchera is the largest Ranch in Colorado, standing at 172 000 Acres, located in the San Luis Valley, in the Costilla county. The owner authorized conservation easements to the United States Fish and Wildlife Service and Colorado Open Lands to protect the ranch in perpetuity, and one of the ranch's main goals today is to contribute to research in the industries they are involved in, as well as to set an example to local land-owners concerning sustainable and responsible environmental policy. **My main objective over this Summer as a CSU Extension intern was to conduct a study into the effects of a high-fungal liquid compost, which was produced by a local farmer in the San Luis Valley through the extraction of a variety of different fungal species from solid compost, and who has had tremendous success with it, on the diversity of plant species in dryland pastures.** This research was aimed at equally benefitting CSU Extension's efforts to help farmers and ranchers in the area, as well as the environmental team at Trinchera, where they aim to follow data driven management practices. For extra insight and perspective into the environmental philosophies and programs implemented by Trinchera, concerning other equally important aspects of running a conservation-focused ranch, I also spent some time working with other managers in charge of areas such as forestry, fisheries, irrigation, livestock, hospitality and also education and outreach, for a well-rounded experience and deeply-grounded understanding too.

INTERNSHIP GOALS

- Experiment and evaluate how high-fungal compost affects rangeland ecosystems, with specific reference to the diversity of flora.
- Gain first-hand insight into the management, logistics, and dynamics that keep the biggest ranch in Colorado functioning, by assisting a vast variety of professionals with their duties.
- Gain valuable job-experience through assisting with a range of ranch tasks that may be of interest, in areas such as irrigation, livestock, forestry, fisheries, hospitality, mechanics and exposure to the corporate decision-making process.

HOW DOES THIS APPLY TO YOUR EDUCATION

With my major being in Ecological Restoration, and my future goals of having my own farming and ranching undertaking, this internship has absolutely been of tremendous value to me both personally and professionally. Gaining practical experience in managing cattle herds, grazing plans, plant and animal identification, mapping, irrigation, engineering and mechanics, wildfire mitigation, predator control, habitat restoration, data collection and so much more, have all helped me to build a more holistic and equally realistic perspective on what exactly goes into running a ranch of this size. I have also seen just how important the scientific method is in gathering information to make more informed management decisions, for the long-term welfare of both the nature and the people involved in an enterprise of this stature, and it definitely gave me a much better appreciation as to the importance of certain courses in the remainder of my studies.

WHAT YOU DID

Considering that this internship was a dual-intent opportunity for me as a student to be introduced to the world of scientific research, as well as gain experience in the practical aspects of a ranching operation, I'll start with the planning and preparations that I did, with the help of my mentors and fellow interns, to carry out our declared experiment. **We chose a piece of rangeland pasture that was largely dominated by Smooth Brome grass, divided it into 64 one square-meter plots, and added preparations of different concentrations of liquid-compost to each, with the ultimate goal of seeing how this high-fungal compost would impact the diversity in this mono-culture environment, and whether factors like trace minerals and moisture content would significantly impact the results.** We also aimed to determine how feasible it would be for this liquid-compost to be used by land-owners on a larger scale to improve livestock and ecosystem health, considering factors like finances, transport, production of substance, and the labor and knowledge needed to prepare and administer treatments. I also helped with collecting various different types of data and readings from the ranch, which will be used to easily spot changing trends in annual rainfall, fish and wildlife populations, forage recovery rates, stream levels, as well as fire risks due to lower moisture contents in plants. In terms of hands-on experience that this internship has provided me with, I would hate to even start listing the things I've gotten to do, as I'll never do that list justice by finishing it, but for the sake of perspective; I helped to do maintenance on agricultural equipment, program irrigation-sprinklers, attend brandings, prepare food for guests, harvest crops, move cattle, build beaver-dam analogs, undergo fire training, thin out forests, and so much more! One particularly interesting outing was taking stream-flow measurements on El Poso Creek, to visually represent and keep track of the underwater conditions, of which I have attached the final results in table-form for interest.

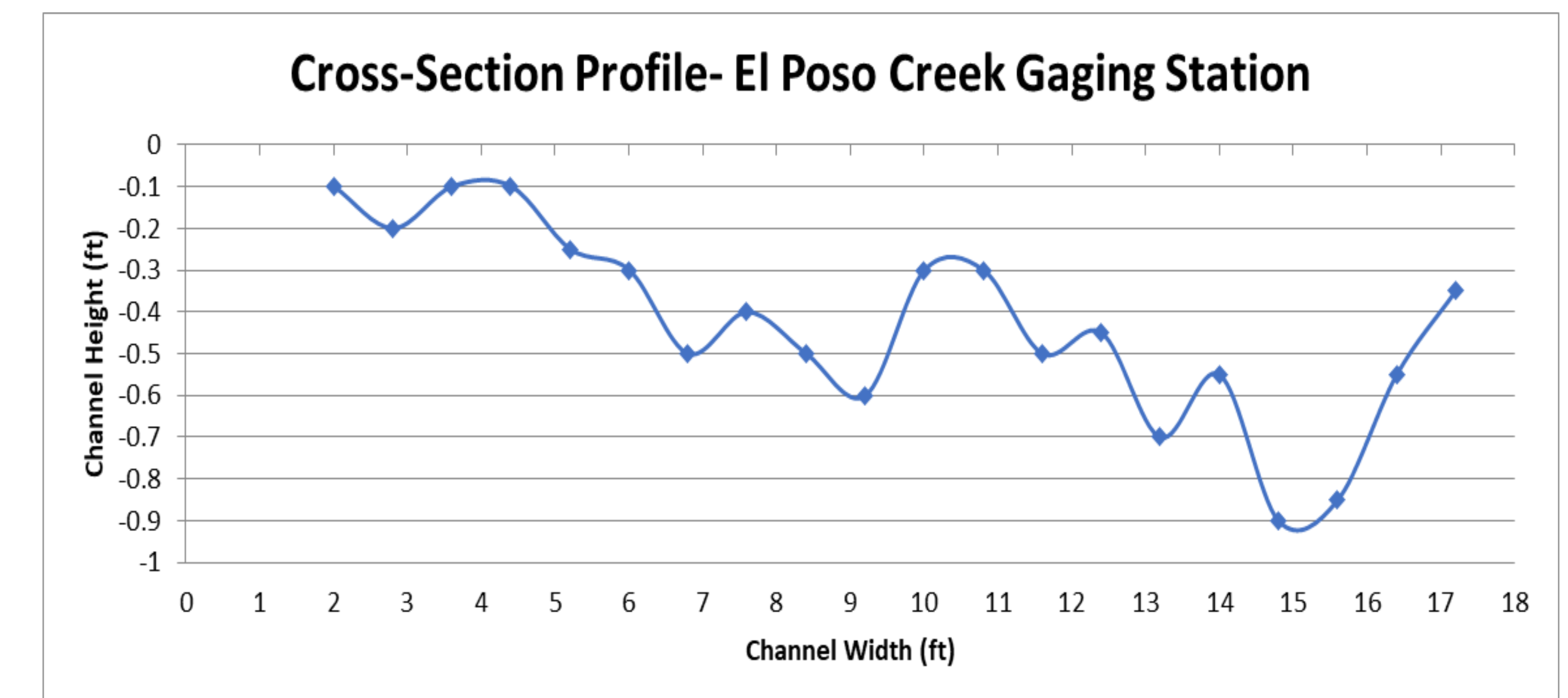
Mt. Blanca and Mt. Lindsey, as seen from the Trinchera Ranch



Intern: Henning Krüger

Mentors: Aaron Swallow, Anthony Vorster, Annie Overlin, Dr. Bill Romme

TABLE SHOWING THE EL POSO CREEK FLOW DATA



WHAT YOU LEARNED

I am exceedingly pleased to say that not only did Trinchera help me to determine how much I personally enjoy scientific research, and to what extent I wish to aim to balance the theory in my area of expertise with the practical application thereof, but through the opportunities that this ranch has given me, I have learned a significant amount about myself and what my strengths and weaknesses are in a team dynamic of this enormous magnitude and diversion, that combines both professional and vocational expertise, team-players and lone-wolves, differing political and moral beliefs, as well as ordinary everyday citizens with differing past-stories and future-dreams. I left Trinchera with one key take-away that I'll be sure to treasure: even if you don't learn how to do something, you can still learn how not to do it. Point-being; there always is something to be learned from everyone.

NEXT STEPS

As far as the study goes, this experiment of ours has only just scratched the surface of what the possible benefits of high-fungal liquid compost are. Further questions to be answered in follow-up studies could pertain to how exactly this compost can save ranchers money in the long term, by increasing floral diversity, and resultingly producing bigger, healthier animals and crops, faster. There is certainly also plenty of room for research on the long-term impacts that this compost has on soil and ecosystem health, as well as the possible drawbacks or undesirable consequences it might have on other animals, plants, or natural elements, over time. In the Fall of 2023, we will sample and reanalyze the presence and welfare of the soil microbial community, and compare it to the pre-experiment samples.

On a personal level, my next steps would be to put all of the different, tricks, philosophies, skills, and advice that I've picked up, to use wherever I can throughout the rest of my studies, or in whatever career-route I choose to follow thereafter, to ensure that I don't forget a single thing that I've learned through this incredible internship opportunity. While I still have many questions for myself, just like any good scientist should have for their own experiments, I am at the very least certain of one thing, that being that I am obliged to make a difference in this world through nature, as Trinchera, with the help of CSU, has made a difference in me.