

RECOVERY OF FISH HABITAT ALONG THE PLOUDRE RIVER FOLLOWING THE 2021 BLACK HOLLOW DEBRIS FLOW LARIMER COUNTY, COLORADO

PROJECT INTRODUCTION

On July 20, 2021, the Cameron Peak Fire burn area encountered immense rainfall leading to a flash flood warning by the National Weather Service. Several drainages in the Poudre Canyon experienced flooding and debris flows, with the Black Hollow debris flow being the largest. It deposited high volumes of sediment and ash into the Cache la Poudre River that caused a widespread fish kill extending approximately 50 miles downstream. Large amounts of sediment accumulated in the Poudre River and are still present. This study will map and quantify the deposition at fish monitoring sites to determine the drivers responsible for sediment retention and create 2D hydraulic models to determine flows necessary to remobilize the sediment. Working under my mentor this “five-year-long study will examine the level of community and habitat destruction, compared to recent and historical information and will measure the recovery and resilience of fish populations and habitat in the watershed.”

Figure 1. Black Hollow



INTERNSHIP GOALS

- Identify and map fire-derived fine sediment deposits on the Poudre River between Kinikinik and Interstate 25.
- Strengthen my knowledge of sediment collection and grain-size analyses.
- Conduct topographic surveys using state-of-the-art equipment.
- Build on professional development by means of interdisciplinary development, interactions with faculty, extension mentors, and stakeholders.

HOW DOES THIS APPLY TO YOUR EDUCATION

Previous work experience has shown me that research cannot be conducted based on one career field, and often collaboration with others is needed to create an understanding of how ecosystems function. From this research conducted, I can gain a thorough understanding of how debris flows and excess fine sediment impact fish habitat, spawning, and their populations. Through this internship, I will gain experience and knowledge of management strategies that mitigate the detrimental effects of fine sediment accumulation and learn about habitat restoration to maintain the survival and health of fish and their habitat.

WHAT YOU DID

- **Sediment Collection & Processing** – I collected random sediment samples from deposition sites. and sieved them to determine grain-size distribution.
- **Sediment Mapping** – I aided in ground-based surveys to map fire-derived sediment deposits at study sites throughout the Cache La Poudre River. We collected lengths, widths, and depths of each deposit to calculate aerial extent and volume.
- **Bank Measurements** – I aided in measuring bank length and bankfull full width using a real time kinematic (RTK) GPS.
- **Data Collection** – I transcribed data collected in the field as well as laboratory data during sediment processing.
- **GIS** – Mapped points of sedimentation.

Figure 2. Sediment Collection



WHAT YOU LEARNED

During my internship, I learned about fluvial geomorphology by understanding channel morphology, gradient, sediment transportation, and deposition. Having little field experience in this discipline, it was great to get hands-on experience in sediment collection and processing and ground-based surveys to map deposition areas. Understanding how deposition happens was a large part of what I learned. Several characteristics like discharge, sediment size, velocity, gradient, channel width/depth, and river morphology were discussed to understand better where deposition would likely settle.

I used specialized instruments and techniques to map deposition and bank full widths when conducting topographic surveys, giving my mentor and I a detailed representation of the river channel as well as areas of deposition. With the knowledge and techniques gained from my internship, I can apply these practical applications to future fisheries employment as they provide valuable information on velocity, substrate, and channel morphology. Allowing for assessment of how these characteristics may impact fish.

Figure 3. Sediment Mapping



NEXT STEPS

Data collected during my internship will be used by Aaron Katz to assess the Poudre River fine sediment retention and for hydraulic modelling of fine sediment mobilization.