

**Colorado Mesa University – Ruth Powell Hutchins Water Center**  
**2017 Upper Colorado River Basin Water Forum: Stories from the field**

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**Presenter:** Tristan Weiss (M.Sc. Student)<sup>1</sup>

**Coauthors:** Dr. Tim Covino<sup>1,2</sup>, Dr. Ellen Wohl<sup>2</sup>, Chuck Rhoades<sup>3</sup>, Timothy Fegel<sup>3</sup>, David Clow<sup>4</sup>

<sup>1</sup> *Department of Ecosystem Science and Sustainability, Warner College of Natural Resources, CSU*

<sup>2</sup> *Department of Geosciences, Warner College of Natural Resources, CSU*

<sup>3</sup> *Rocky Mountain Research Station, United States Forest Service, Department of the Interior*

<sup>4</sup> *Colorado Water Science Center, United State Geological Survey, Department of the Interior*

**Email:** [TristanNWeiss@gmail.com](mailto:TristanNWeiss@gmail.com)

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Mountain meadows are a remarkable feature of our Rocky Mountain headwaters. Spanning both sides of the continental divide and characterizing the valleys of nearly every mountain range on Earth, river-connected wet meadows have recently become recognized as ecological nexus points in post-glacierized landscapes. Although comprising less than 25% of channel length in Rocky mountain river networks, meadows such as these can store as much as 75% of the system's fluvial and floodplain carbon, making carbon source-sink dynamics in these meadows an important consideration in discerning regional carbon storage and cycling patterns. The unique characteristics of wet meadows make them crucial locations for water, sediment, carbon and nutrient storage. Cumulatively, these meadows likely provide crucial ecosystem services at the network scale; transforming water quality, attenuating floods and maintaining baseflows, and playing an important role in global inland-water carbon dynamics.

Despite these benefits, historical and contemporary land-use practices often result in the simplification of wet meadow systems, leading to a lower water table, and reductions in storage and hydrologic buffering capacity. In this recently established NSF-funded study, we are quantifying the hydrologic-carbon relationships across a gradient of valley confinement and wetness states as a function of land-use within Rocky Mountain National Park and Forest Service public lands. In this work, we aim to disentangle the nuanced balance between water flux-storage with the production and processing of fluvial carbon. Ongoing data analysis combines intensive hydrologic monitoring and geospatial analysis with water quality assays to explore seasonal shifts in fluvial storage and ecosystem processes linked to carbon.

The abundance of wildlife in these meadows and the countless interactions with enthusiastic tourists, avid fishermen, and devoted conservationists in these meadows has demonstrated that these meadows are a valuable and cherished feature of our Coloradan landscapes. But more than that, our

preliminary findings suggest that relatively undisturbed meadows act as significant buffers of snowmelt and flood pulses, demonstrate high resilience to seasonal drying, and are more productive than their drier, disturbed counterparts. In this presentation, I will introduce my personal experience with these headwater meadows as vital ecotones, present our findings from these highly productive landscapes as regions of water storage and processing, and discuss how our ongoing monitoring efforts can aid us in becoming better stewards of these fascinating habitats.