

Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Wood Loading and Jam Characteristics Following Disturbances on the Upper Colorado River

Discipline: Natural
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Colorado State University
Student Participation: Yes
Effective Dates: 6/1/2016 – 7/31/2020
Funding Amount: \$15,203.00

Investigators and Agency Representative:

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Project Abstract: A breach in Grand Ditch in May 2003 initiated a debris flow that caused extensive damage to the Upper Colorado River and its tributaries in Rocky Mountain National Park (RMNP). The sediment mobilized by the debris flow heavily impacted channel, riparian, and wetland areas. Within the riparian corridor, the debris flow caused mortality of approximately 20,000 trees (Cordova, 2006). Many of the trees were buried in the initial deposition following the breach, are becoming exposed and transported during high discharges forming jams, or have since fallen down adjacent to the channel (Figure 1). Major channel changes occurred during snow melt runoff in 2011, the highest flow in 60 years of record (Rathburn et al., 2013) and again during snow melt in 2014. During both of these seasons, extensive morphologic changes occurred along Lulu Creek and the Colorado River as a result of excessive 2003 sediment and wood transport that eroded foot trails, blocked and destroyed or damaged footbridges, and created new log jams around which channel avulsions occurred. In addition, recent pathogen outbreaks of mountain pine beetle and spruce bud worm caused extensive park-wide forest mortality that is now beginning to peak in mid-elevation montane forests. The standing gray-phase trees along the Upper Colorado River continue to die off and become instream wood transported during high flows. A second peak die off is anticipated for spruce forest within subalpine regions.

Instream wood forming logjams induces hydraulic complexity, traps sediment and nutrients (Nakamura and Swanson, 1993) and creates important riverine habitat and biogeochemical hot spots (Battin et al., 2008). Within the Upper Colorado River, it is hypothesized that overall wood loading is relatively low compared to well-studied wood-rich streams in the region (Wohl and Beckman, 2014) because of the lack of old growth forest, the low amounts of wood recruitment, and more frequent disturbance by debris flows (Grimsley et al., 2016). An analysis of wood loads and logjam characteristics is proposed to test this hypothesis.

The main objectives of this project include 1) quantify current wood loads, jam geometry and spacing within the Lulu Creek and Upper Colorado River study area (Zones 2-4); 2) compare the wood loads, jam geometry and spacing to other well-studied sites within the region; and 3) evaluate how wood load, jam geometry and spacing changes over time. Study sites within the 2003 debris flow area with varying valley confinement, as well as unaffected reaches on the east side of the valley will be included in the baseline analysis quantifying current wood loads, jams and spacing, and tracking wood transport over time.

Keywords: Wood loading, debris flow, Upper Colorado River, Rocky Mountain National Park, Colorado State University