

Innovative methods for guiding process-based restoration: A case study from Lulu City wetland, Rocky Mountain National Park, Colorado

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Abstract. Historical analyses are recognized as essential components of functional and sustaining restoration projects. However, background data are often limited to aerial photos or stream gage records. We demonstrate alternate methods for assessing post-glacial fluvial processes in the Lulu City wetland.

In 2003, a breach in Grand Ditch initiated a debris flow in Rocky Mountain National Park that transported $\sim 36,000 \text{ m}^3$ of sediment into the Upper Colorado River. Aerial photos show several prior ditch failures and a change from a single thread, meandering channel in 1937 to the presently braided system, suggesting an altered sediment regime that has persisted for 70 years. Research was conducted in Lulu City wetland, a wide, low gradient portion of the valley where sediment deposition has occurred since deglaciation. A ground penetrating radar (GPR) survey, trenching, coring, and radiocarbon dating were used to map sediment deposits, assess aggradational rates, and quantify processes (channel, overbank, hillslope, beaver dams, peat) of fill. Results suggest 1) ~ 6 m of sediment above bedrock; 2) ditch-initiated debris flows have increased the rate of aggradation; and 3) surface deposits are similar in texture to older deposits. Restoration measures such as sediment removal, channel reconstruction, and riparian planting can be recommended by targeting key impairments to physical processes.