

Downstream Effects of Diversion dams on Riparian vegetation communities in the Routt National Forest, Colorado

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Abstract. The relationship between riparian vegetation and changes in fluvial processes as a response to flow diversion is not well understood. Water extraction affects the hydrologic flow regime (i.e., magnitude, duration, and frequency of flows) reducing peak and base-flows, which could negatively impact riparian vegetation. Vegetation communities are temporally and spatially variable and are strongly interrelated with alluvial landforms and hydrograph variability. This research compares riparian community characteristics on diverted and undiverted pool-riffle channels and low gradient valleys to examine changes associated with flow diversion in the Routt National Forest (RNF). The RNF is the only under-appropriated area in Colorado, making future water extraction proposals likely. Many small extraction canals siphon water from small, headwater streams in the RNF, but the site-specific or cumulative effects of these diversions on riverine ecosystems have not been investigated. Systematic investigation is necessary, however, to determine whether existing flow diversions have influenced riparian communities and, if so, which communities are most sensitive to diversions. During the summer field season of 2011, 16 sites were sampled with five channel cross sections established per site, extending into the riparian zone at distance of two times the active channel width, and vegetation was sampled using the line-point intercept method. Half of these sites were located downstream of diversion structures, and the other half were either above diversions or on streams lacking diversion structures altogether. Preliminary results suggest a shift in vegetation communities from typical riparian species composition to more upland vegetation. The relative sensitivity of these responses are different depending on valley type; low-gradient, unconfined areas are less tolerant of diversion than steeper, confined reaches. Additionally, recent beaver dams appear to have increased complexity in the channel and floodplain, and appear to buffer the effects of the diversion. The results of this study contribute to the collective understanding of mountain headwater riparian vegetation community response to changes in flow regimes and fluvial processes related directly to water extraction by diversion dams.