

Assessing Dam-Induced Flow Alterations and Channel Enlargement at Hog Park Creek in the Southern Rocky Mountains

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Abstract. Since dam enlargement in the 1980s, the augmented Hog Park Creek continues to enlarge from below the dam to its confluence with the Encampment River. The culmination of over 30 years of continued channel enlargement sparked this research to address the overarching question of how dam operations affect flows and the resulting downstream channel changes. A USGS process-based hydrologic model, the Precipitation – Runoff Modeling System (PRMS), allowed comparing the observed ‘dam-regulated’ flows to the simulated ‘natural’ flows at a daily time step from 1995 to 2015. Because flow data prior to dam construction do not exist, a regionalization technique based on watershed spatial proximity was used to transfer 21 calibrated parameters from an Encampment River model to the Hog Park Creek model. The statistical-based Indicators of Hydrologic Alteration (IHA) method was used to quantify attributes of flow alteration between the simulated ‘natural’ and observed ‘dam-regulated’ time series. Additionally, a USACE HEC-RAS model simulated channel hydraulics at Hog Park Creek and an un-regulated tributary to examine channel changes from 2006 to 2015. This research attempts to bridge the gap in understanding between dam-induced flow alterations and the resulting downstream channel enlargement at Hog Park Creek. In the future, these methods, data, and analyses can be used to support adaptive management such as through the modification of dam operations.