

Assessing Changes to Streamflow from Dam-Regulation at Hog Park Creek in the Southern Rocky Mountains

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Abstract. Following the big boom of dam construction in the 1950s, downstream effects of dam-regulation were observed most notably as geomorphic and ecologic. The downstream environmental effects sparked researchers to address the overarching question of how dam-regulation affects streamflow. By answering this question, researchers have used the knowledge for developing models to predict flow regime alteration with the goal of enhancing dam operation and ultimately providing downstream environmental benefits. The primary methods to assess dam-induced flow alterations involve process- and statistical- based approaches. Both methods need a ‘natural’ flow time series to enable comparison to the dam-regulated flow. A process-based approach employs the hydrologic model, USGS Precipitation – Runoff Modeling System (PRMS), which simulates natural flow to compare to the dam-regulated flow. In place of calibrating and evaluating the simulated natural flow when no record exists, a regionalization technique based on spatial proximity allows transferring calibrated parameters from an adjacent, reference basin. To aid in quantifying the attributes of flow alteration, a statistical-based approach, Indicators of Hydrologic Alteration (IHA), calculates 32 ecologically-important streamflow attributes of the modeled natural and observed dam-regulated time series. Collectively, hydrologic modeling using PRMS provides daily flow at the same temporal scale and the IHA enhances the subsequent quantification of attributes of dam-induced flow alteration. This presentation covers the IHA results from modeling daily natural flow at the Hog Park sub-basin by using 21 calibrated parameters transferred from the Encampment River sub-basin.