

## **Historical Analysis and Sediment Budget Development for the North Fork of the Gunnison River, Colorado**

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**Abstract.** Sediment and channel dynamics of a 45 km reach of the North Fork of the Gunnison River in Colorado were evaluated to provide a context for channel rehabilitation efforts. The North Fork of the Gunnison is a snowmelt-driven, mountain river (elevation range 3980-1555 m) draining 2500 km<sup>2</sup> of mostly forested, steep terrain in Delta and Gunnison counties of western Colorado. Climate is semi-arid in the lower valley to alpine in the surrounding mountains with an average annual precipitation of 64 cm, ranging from 20.3 cm to 127 cm, depending on elevation. Geology in the watershed consists of three units: the highly erodible Tertiary Wasatch Formation, the underlying Mesaverde Formation, and the less resistant Cretaceous Mancos Shale unit below. Since permanent Anglo settlement in the late 19<sup>th</sup> century, primary land uses have been coal mining, agriculture, livestock grazing, gravel mining, and logging, most of which occur in the lower valley. The study reach begins at the junction of Anthracite and Muddy Creeks (1914 m) and ends below the town of Hotchkiss (1597 m). One kilometer on either side of the modern channel was field-mapped to identify the spatial extent of land use types, sediment sources and sinks. Wolman pebble counts were performed on all hillslope sources (tributaries, tributary fans, landslides, debris flows, barren cliffs) and valley bottom sinks (exposed river banks, main channel bed). Grain-size distribution results were used to analyze the statistical significance of potential controls, including geology, hillslope instability, land use, and tributary inputs. Analysis of change was performed using historical aerial photographs with remote sensing and GIS software to reconstruct the recent history of channel configuration along the studied reach. Preliminary results show that periods of instream gravel mining have strongly influenced recent channel changes, which have almost exclusively occurred in the lower valley.