

Dutch Creek Reconstruction, Coal Basin Mine, Redstone, CO - Geomorphic Design and Ongoing Geomorphic Development

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Abstract: In the Fall of 1998 a stream channel was constructed at a coal mine reclamation site in west-central Colorado based solely on a geomorphic design. The site is located at 8000 feet AMSL in a subalpine watershed that yields perennial streamflow primarily from snowmelt runoff. The native channel had a very coarse-grained substrate derived from infrequent debris flows. The reconstructed channel was built with native debris flow material having the same particle size distribution as the substrate of the native channel. The reconstructed channel was built to a nearly uniform 6.8 percent gradient and was approximately 1250 feet long, 40 feet wide, about 10 to 30 feet deep with a “pilot” channel that was about 14 feet wide and two feet deep. The reconstructed channel was built with virtually the same width, depth, gradient, and low sinuosity as the native channel upstream of the project site, but the upper channel’s alignment had to be unnaturally “kinked” into a tortuous path to meet gradient requirements. Two channel surveys, one conducted immediately after construction and one after the 1999 runoff season, indicated that the channel bed experienced only minor vertical adjustments and no significant change to its substrate, and step pools quickly developed during the first high flow. However, photographs taken in 2005 and 2006 reveal substantial reworking of coarse bed material and channel form in the upper reconstructed reach where its path was constructed to be unnaturally tortuous. Even so, the channel is still functioning naturally and is continuing to adjust in a controlled manner to the forces rapidly changing this landscape. This project supports the simple notion that a reconstructed stream channel can function and appear like a native stream channel if only its basic geometric elements (channel width, depth, gradient, and alignment) and substrate are restored. It also suggests that a lengthy monitoring period is needed to develop an understanding of and document a given stream channel’s “behavior.”