

Investigating how natural rehabilitation of an agricultural stream can affect transient storage and nitrate uptake

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Abstract. Nutrient processing is important in small, headwater streams due to high surface-to-volume ratios that favor nitrate uptake. Stream rehabilitation techniques have the potential to promote nitrate uptake and lead to reduction of downstream nitrogen pollution. We investigated Sheep Creek, a stream located in open rangeland in northern Colorado that has been influenced by cattle grazing for several decades. Sections of Sheep Creek were fenced off and exclosed from cattle grazing in the 1950s. The riparian corridors of these sections naturally regenerated and are now dense with willows. Other sections of Sheep Creek have been continually grazed. We studied four reaches along Sheep Creek. Two reaches have been exclosed from grazing, and two reaches are currently grazed. One reach in each exclosed section has similar geomorphic characteristics to match a reach in the grazed section. We chose these reaches to compare two similar stream types that have largely recovered from grazing pressure and two similar stream types that are currently grazed. We performed a detailed physical characterization of each reach, including width variability, longitudinal profiles, and cross-section surveys. We also measured bed substrate size distributions, overall bed topography, and benthic organic matter. Field injections of bromide and nitrate were used to estimate transient storage and nitrate uptake in each reach. We describe how natural revegetation of riparian corridors in a grazed watershed may influence transient storage and nitrate uptake in streams.

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