Floodplain reconnection stream restoration increases water and nutrient retention

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Extensive floodplain reconnection stream restoration has been completed in rural Western Pennsylvania as a stream and wetland mitigation bank primarily for impacts of the shale gas industry. Prior to restoration, while the streams were of moderate quality and typical for the region, they showed signs of legacy land uses. Stream channels were incised and flowed along one lateral edge of the valley and showed evidence of head cutting and erosion. Restoration regraded and reconstructed both the channel and the floodplain, creating a broad, wetland floodplain with a shallow, sinuous stream channel flowing through it. The stream channels allow for inundation of the floodplain and their gradient is designed to avoid erosion except in large storm events. Restoration and reference streams were selected in three size classes – primary headwaters, headwaters and wading streams. Reference streams represent high quality regional streams. Three years of monitoring data suggest that the restoration projects improve water retention, sediment retention, and nutrient retention on the sites. There is a significant reduction in hydrologic response to precipitation post restoration, significantly higher sediment nutrient concentrations in restored versus reference streams, and significantly lower solids concentrations in restored versus reference streams. Since restoration affects site soils, carbon was evaluated. TOC varied by season and site, but not by restoration status and large woody debris was not significantly different between sites or restoration status. Variability between sites suggests the approaches that would be most effective for future applications of this restoration method. Monitoring has suggested that water level, periods of wetland inundation, perennial nature of flow, and solids analyses could act as parameters for measuring successful restoration.
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