

## **ASSESSMENT OF GEOMORPHIC CHANGE IN HEADWATERS PRAIRIE STREAMS AND ITS RELATIONSHIP TO SUSPENDED SEDIMENT LEVELS**

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*Abstract:* Turbidity impairment is widespread in streams of the prairie pothole region of Minnesota. In order to understand the role of channel alteration in elevated suspended sediment levels, we investigated geomorphic characteristics of existing and historic channels. Headwaters streams have been highly altered by conversion to agriculture and construction of public drainage systems in the early 1900s. In recent decades they have been impacted by increased flow from intensified private subsurface drainage installation. To assess adjustments in channel form we measured stream geomorphic characteristics from in headwaters streams of the Blue Earth Basin, within the prairie pothole region of southwestern Minnesota. We measured historic geomorphic variables using pre-settlement land survey notes, historic aerial photos and oxbow surveys to assess channel adjustments over time. Sediment transport was modeled using RiverMorph to quantify impacts of channel alteration on sediment transport and deposition. Most headwater streams that weren't eliminated by drainage and grading were channelized. Historic 1<sup>st</sup> order sloughs had higher width-depth ratio than current streams and were less entrenched. Streams actively maintained as public ditches have reduced sediment transport capacity from overwidening, creating sediment depositional areas. Unchannelized 2<sup>nd</sup> and 3<sup>rd</sup> order streams were generally entrenched from increased streamflow, reducing floodplain connectivity and enhancing sediment transport efficiency. These changes have negatively impacted stream biota leading to widespread biological impairment. Restoration of headwater prairie streams will require stabilization of the hydrologic regime through increased native plant coverage and perennial crops as well as in-stream actions. Alternative ditch design holds some promise for improvement.