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Field Assessment of Culvert Impacts on Stream Channel Morphology

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Abstract:

Culverts are an integral part of the transportation network and are rapidly becoming unavoidable additions to the stream network. When designing culverts, size, shape, material and function must be considered. As the regulations for culvert design and designs have advanced, the tools used to examine the impacts that culverts have on streams must evolve. Despite the requirement for regional channel stability assessment of bridges and culverts, often the assessments are only preliminary as a result of time and money constraints. Due to the volume and cost of culvert design and installation there is a need to increase the frequency and efficiency of channel stability assessments.

Channel stability near culverts not only poses concern for structural stability but for negative impacts to native species (including habitat loss), conveyance of sediment, and loss of stable channel morphology. Researchers, designers, regulators, and contractors can benefit from a rapid assessment tool that correlates culvert design parameters with quantitative and qualitative stream characteristics. A comprehensive, field-tested rapid culvert and channel assessment tool has been developed to relate the cause of instability of culverts with their design characteristics and observed channel stability or lack thereof. The Culvert Assessment Tool (CAT) uses small teams to characterize culvert and stream channel properties within the piedmont of North Carolina, focusing on streams and culverts in Wake County. The study captures a wide range of urban and rural watersheds and culvert and stream types. The tool combines quantitative measures such as slope and cross sectional area with qualitative parameters such as presence of excessive scour, armoring and loss of vegetation. It also identifies and rates the cause(s) of instability observed at each location.

Impact Statement:

This assessment aims to identify linkages between culvert hydraulic characteristics, channel and floodplain characteristics, and overall stream stability; in an attempt to increase stream stability associated with culverts.

Category: Watershed Assessment and Restoration
Type of Presentation: Poster Presentation