Regional Reference Curves for Small and Medium Watercourses in Southern Ontario

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A critical first step in channel restoration is determining the appropriate bankfull cross-sectional area of the watercourse that is being restored. Ideally, this dimension is determined directly from channel measurements. However, bankfull indicators are often unreliable or absent in creeks that are in need of restoration. To help solve this problem, a series of regional reference curves were developed for selected hydrophysiographic regions of southern Ontario. These regions, which have similar surficial geology and mean annual precipitation, were located in Waterloo, Peel, York and Durham Regions. The curves relate bankfull cross-sectional area at riffles to watershed drainage area. Smaller creeks were used to develop the curves since the majority of restoration projects tend to be located in smaller watersheds with drainage areas under 100 km^2. Data were collected at riffles since these features hold grade and control stability throughout fluvial systems. Morphological data were collected from a total of 24 stable creeks in southern Ontario. The data revealed a strong positive correlation ($r^2 > 0.95$) between bankfull area and drainage area. The resulting curves are able to predict the bankfull cross-sectional area for impaired watercourses that lack reliable bankfull features, such as severely eroded alluvial systems, concrete-lined channels, or piped drainage. The curves can be used by stream designers, as well as regulators who are tasked with reviewing channel designs. This presentation will describe how study sites were selected, outline the process used to collect and analyze the data, and provide examples of how the resulting curves may be applied to design.