

An assessment of in-stream restorative structures on tertiary streams in the Annapolis Valley, Nova Scotia

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In Nova Scotia, many second and third order, high gradient tributaries have been the focus of restoration and enhancement efforts. Most community groups are interested in re-establishing Brook Trout (*Salvelinus fontinalis*) and Atlantic Salmon (*Salmo salar*) populations. In our evaluation of both enhanced and unaltered tributaries we have found that a lack of understanding of watersheds as physical systems has, in some cases, led to ineffectual restoration and enhancement efforts.

In this study, Elderkin Brook and the South Annapolis River were evaluated. Both of these rivers are located in the Annapolis Valley, Nova Scotia. Their headwaters originate on the South Mountain (elev. 260 m) and eventually drain into the Bay of Fundy. Both streams can be divided into three distinct reaches along their length: (1) an upper, ungraded, bedrock dominated reach consisting mainly of water falls and rapids, (2) a middle, ungraded reach with a bedrock bottom covered by a thin gravel veneer, and (3) a lower, graded, alluvial dominated reach. Analysis of the natural distribution of in-stream features (e.g., spacing of pools and runs) has

determined that their frequency is not consistent and is determined by a variety of physical conditions unique to each site.

Habitat enhancement efforts on Elderkin Brook and the South Annapolis River have focussed on the application of restoration and enhancement techniques developed using low gradient, graded rivers as models. These models do not apply to the streams examined in this study and, as such, the in-stream structures that have been introduced have been largely ineffectual. For example, some digger logs are placed so they focus flow into tributaries while others focus flow into bedrock banks.

In our opinion, debris jams are the most effective in-stream structures for enhancing habitat in second order, high gradient streams. These debris jams (e.g., large root balls, log jams, and even large rocks) occur naturally but can also be constructed and create long lived pools at naturally stressed locations. We conclude that, to be effective, restoration and enhancement protocol must be flexible and must include a rigorous evaluation of natural in-stream processes at each site.