

Hydrogeological analysis of the watersheds of two tributaries of the Cornwallis River, Nova Scotia: implications for stream restoration and enhancement

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The Cornwallis River watershed has been under increasing pressure due to agricultural, commercial, urban and residential exploitation and is presently the subject of water quality, landuse and river restoration studies. In the summer and fall of 1997 the watershed was subject to a severe drought. These naturally stressed conditions provided the opportunity to monitor and study the mechanics of ground and surface water storage and transfer within two tributary brooks of the Cornwallis River. Data on the hydrogeological, geomorphological, geochemical and environmental characteristics were gathered over a two-month period. Elderkin Brook is a relatively high gradient (30m/km), largely ungraded river that has a watershed of 3 km². It originates on the South Mountain, a regional highland (max. elev. 272 m) dominated by granitic and metamorphic rocks and empties into the Cornwallis River at sea

level. Surficial sediment cover is generally thin and consists primarily of clay-rich till. Fishwick Brook is a low gradient (4.6 m/km) graded meandering river that has a watershed of 8 km². It originates within the Cornwallis River valley and is underlain by variable amounts of postglacial outwash, kame and aeolian sediment and clay till.

Data from Elderkin Brook indicated that during drought mean river discharge (0.01m³/sec) and stage were well below normal levels but appeared to stabilize as the drought lengthened. Discharge data indicated that reaction to discrete input events was swift and short lived. Water temperature was highly variable and correlated closely with air temperature fluctuations. pH data indicated that regional strata buffered acidic rainwater (pH 4.7). Data from Fishwick Brook indicated that although mean river discharge (.023 m³/sec) was reduced, stage

was closer to normal levels. Discharge data indicated that reaction to input events was swift but relatively prolonged. Overall, it was found that in Fishwick Brook water quality, rather than quantity, was most affected by the drought conditions; the opposite was true for Elderkin Brook.

These data indicate that each tributary must incorporate unique restoration and enhancement programs if these programs are to be successful.