detect significant changes in baseflow in catchments containing 1.5 - 60.3% impervious cover (Meyer, 2005). Confounding factors may include point sources and leaky underground pipes transporting sewage, stormwater and drinking water (Lerner, 2002), and inherent differences in physiographic regions (Brandes *et al.*, 2005). Although our trends were the same for both catchment-scale and reach-scale estimates of baseflow, the two methods resulted in very different estimates (Figure 5b). Differences are likely due to scaling up of floodplain-level hydraulic conductivity and hydraulic gradient estimates that differ from catchment hydraulic conductivity and hydraulic gradient. In addition, hydrograph separations may over-estimate baseflow in urban catchments if leaky infrastructure or landscaping irrigation contributes to non-storm stream flow.

Channel Incision and Riparian Hydrologic Drought

One common observation along the urbanized streams in this region is that incision due to stormwater inputs may cause the stream to cut through the more permeable Quaternary valley fill deposits and into the older low permeability marine layers of Pliocene - Pleistocene origin (Figure 9). This pattern likely affects ground water/surface water interactions because it thins the surficial aquifer. In extreme cases of incision, ground-water inputs to the channel fill deposits may be short-circuited and ground water would have only one pathway to the channel via seeps along the streambanks. Aquifer thickness also influences riparian ground-water flux and is altered by channel incision. In our study region, a confining unit is typically present under the floodplain sediments at approximately 4 m. Shallow confining units would normally increase the potential for denitrification in unaltered settings (Hill, 1996), but in highly incised streams with thin floodplain aquifers this potential is diminished.

The results of this study were generally consistent with those conducted elsewhere. Extensive impervious cover in a watershed results in low sediment production and high stream power, both of which contribute to stream incision. Groffman *et al.* (2003) suggest that over time most urban watersheds stabilize with respect to land use. Geomorphic evolution of stream channels in urban areas can be represented by the model of Simon (1989) that has 6 stages (pre - modification, construction, degradation, threshold, aggradation, and restabilization stages). Typically, streams in the intermediate stages of urbanization will fall under the degradation stage where streams are incising and widening. Here, most stream segments in urbanized catchments were experiencing degradation as evidenced by highly incised channels in urban watersheds and the increase in the degree of incision with TIA (%) (Figures 8 and 9).

Evidence that this incision and widening is recent (within the last 50 years) is provided by observations of exposed tree roots along banks, erosion along fence lines, and enlarged channel cross - sections (48% increase) below stormwater culverts observed along the channels of Fornes and Reedy and within several other urban catchments within the study area (Soban, 2007). The lack of channel stabilization may be the result of several factors. Urbanization is still occurring in the headwaters of some of these catchments, especially the rural ones. The population of Greenville has approximately doubled over the last 25 years (35,740 (1980) to 72,227 (2006)) (North Carolina State