



Flow and habitat dynamics associated with entrenched channels

Abstract

In order for restoration activities to be successful, managers need a good understanding of the dynamics inherent in a particular system. Entrenchment is a morphological condition which results from disequilibrium in aquatic systems due to the disconnection of a channel and its adjacent floodplain. In the Southeast, this is most typically due to land use practices that eroded historic sediment from the hillslopes and caused the channel to aggrade. As the stream incised through this deposited sediment, it became entrenched. These types of streams, although the focus for widespread restoration efforts, have not been quantitatively studied. This study focuses on the dynamics of entrenched stream reaches and how they respond during baseflow and flood conditions in relation to channel morphology, streambed composition, and sediment transport.



floodplain/
non-entrenched reach



entrenched reach

Scientific Approach

- 5 wadeable (<200 km²) streams-similar veg. and slope
- ~20 transects/reach type (entrenched, non-entrenched)
- placed at EPA habitat types
 - pool, riffle, rapid, glide, cascade, or falls sediment
- terrace – terrace cross-sections, including channel
- Wolman pebble count in reach and 100 in one riffle
- predominant ψ size class in 0.5m diameter
- embeddedness of bed sediment
- presence/absence of fine sediment drape
- velocity (0.6 depth) in thalweg at each 0.5x bankfull width
- discharge measured at upstream end of reach



Preliminary Results

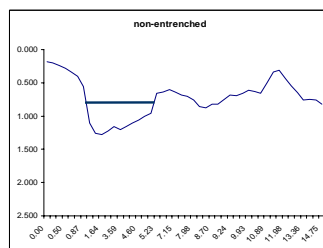


Figure 1: Cross-sectional profile of a sample non-entrenched reach on Coweeta Creek. Notice the water depth and the heterogeneous floodplain on stream right.

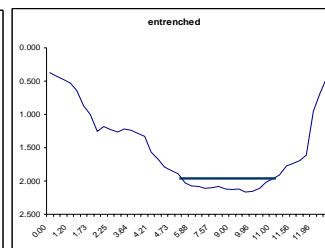


Figure 2: Cross-sectional profile of a sample entrenched reach from Coweeta Creek. Notice the difference in water depth from the non-entrenched reach.

Expected Results

- non-entrenched reaches:
 - heterogeneous channel shape, both laterally and longitudinally
 - larger width/depth ratio and shallower channels
- entrenched reaches:
 - homogeneous channel shape, both laterally and longitudinally
 - prevent most overbank flow
 - more fines? fewer fines?

Expected Significance

- restoration/rehabilitation of aquatic ecosystems are valuable management tools
- better understand sediment and flood dynamics within entrenched reaches
- implications for whole-system functioning, including biotic habitat, sediment composition, and watershed protection
- help link research with practical applications management decisions and restoration