The Rocky Branch ~~stream~~ ecosystem, NCSU campus, Raleigh:

the beginning of a long-term study

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Background

Urbanization is a major source of stress for stream ecosystems. Streams draining urban areas carry large solute loads, have altered geomorphologies, and are inhabited mostly by tolerant aquatic fauna.

Physical restoration of channel features (hydromorphic restoration) is a commonly employed with the goal of improving the biotic condition of stream ecosystems in urban areas.

Understanding how restored streams function as ecosystems is a priority to help improve our ability to restore them in urban landscapes.

Objective

To lean about Rocky Branch as a case study of ecological structure and function and function of a degraded, urban stream following hydromorphic restoration.

Study Site

Rock Branch is a first order stream North Carolina piedmont stream. It flows through NCSU main campus and its watershed is intensively urbanized.

Restoration of the physical habitat of Rocky Branch was completed in 2011; sequences of cascade/riffles and pools were constructed in the upper section, runs and pools in the middle section, and the lower section was connected to an engineered floodplain habitat.

Methods

We characterized macroinvertebrate and fish assemblages using standard techniques.

Fish diets were characterized.

Sampling started in 2019.

Results

Macroinvertebrates are abundant and dominated by tolerant taxa, including aquatic insects (dipterans and damselflies) and crayfish.

The fish assemblage is almost exclusively Green Sunfish *Lepomis cyanellus*, an introduced species, known to suppress native fish populations in first-order headwater streams in the North Carolina Piedmont.

Green Sunfish are macroinvertebrate predators whose diet shifts with size. Small individuals primarily consume benthic insects while terrestrial prey occur frequently in the diet of large individuals.

Conclusion

The stream maintains signs of degradation, remains a functional ecosystem where autochthonous secondary production and riparian subsidies supply the upper trophic level.

Our plan is to continue monitoring Rock Branch over time to understand how its ecosystem function.

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Nine years after hydromorphic restoration, Rocky Branch has a low-diversity community dominated by tolerant and introduced taxa, but remains a functioning, novel ecosystem.

This baseline research could inform future biotic restoration design and evaluations.

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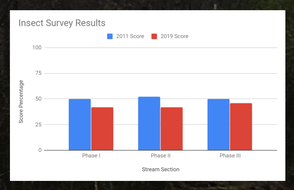

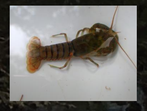

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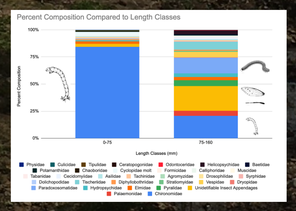

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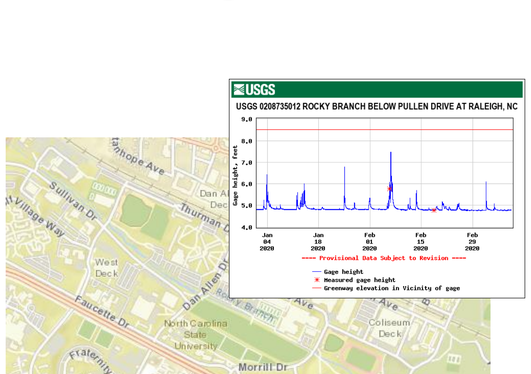

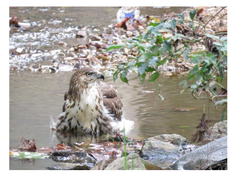

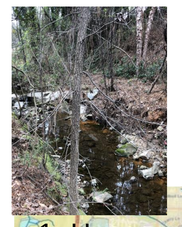

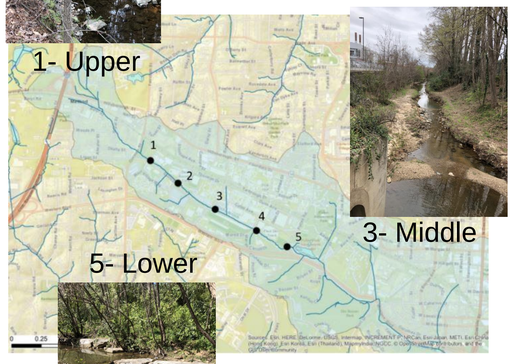

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