

Bacterial community assembly in the Upper Oconee Watershed

Morgan Teachey
UGA Microbiology
Ottesen Lab
mteachey@uga.edu

The Ottesen Lab strives to understand microbial community assembly and succession in several ecosystems using techniques ranging from field studies to molecular microbiology to bioinformatics. We are currently studying bacterial community assembly in the water column of the Upper Oconee Watershed. Since the spring of 2013, we have partnered with UOWN to collect seasonal water samples across the network. Through these studies, we are enhancing our understanding of how microbial populations change along the course of streams, rivers and entire networks. Specifically, this work explores seasonal community assembly; the influence of physical, chemical and biological factors on the pelagic communities; the effect of storm events on succession and recovery; and the impact of surrounding inoculum sources from different environments. A yearlong seasonal study of the entire Upper Oconee watershed has revealed a general pattern of microbial community assembly that is in line with previous studies in other stream systems. In three out of five seasonal samplings, we found a decrease in microbial taxonomic diversity as the distance from headwaters increases. This decrease accompanied by an increase in the relative abundance of bacterial taxa that are commonly found in freshwater lakes, suggesting that bacteria that are suited for freshwater pelagic environments are being selected for. However, for two out of five seasons microbial community assembly was disrupted throughout the watershed, with diversity remaining high and the fraction of freshwater taxa remained low across all stream orders. Currently, it is hypothesized that physical factors, such as heavy rainfall and temperature, contributed to the disruption of community assembly at these sampling dates. We plan to complete follow-up studies on our additional seasonal data as well as the effects of landscape-level storm events and the functional capacities of microbes in the pelagic zone. High-resolution pilot studies along McNutts Creek are in progress to serve as a model for a larger system. Our work aims to further the understanding how microbial communities are shaped in the water column in local streams and rivers, and therefore can be used to help improve watershed management programs and community practices, and will continue to promote citizen science and outreach.