

Microplastic Concentrations and Dynamics in Headwater Streams in the Southern Appalachian Mountains

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Abstract. There is a growing concern regarding the ubiquity of microplastics (<5 mm) in our environment and atmosphere potentially threatening the health of wildlife and humans; however, little research has been done to explore how microplastics behave in freshwater systems. In this study, we measured microplastic concentrations and loads at baseflow and during a storm event in the headwaters of the Chattooga River over a two-month period. We also measured the atmospheric deposition rate of microplastics at three locations in the watershed. At two sites along the Chattooga River, we collected water samples throughout a storm event to assess how microplastic concentrations varied with discharge. No significant relationship between river discharge and MP concentration was identified, however, similarities were identified between atmospheric deposition and stream particles indicating potential atmospheric circulation and deposition of MPs into freshwater systems. These data also indicate a potentially high concentration of microplastics polluting the Chattooga Watershed. 82% of the MPs collected in this study were confirmed as anthropogenic microparticles via Raman spectroscopy. Although this is a preliminary study, our results are important to further the current understanding of microplastic contamination in freshwater systems and can hopefully be used to better inform future microplastic studies and management efforts.

Key words: atmospheric deposition; baseflow; Chattooga River; discharge; microplastics; stormflow; southern Appalachians; Wild and Scenic River; western North Carolina