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Estimation of Stream Metabolism in Urban Study Sites

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The estimation of a stream's metabolism has previously been used as an indicator of its aquatic health. Stream metabolism results from two major processes, primary production and ecosystem respiration (Appling et al., 2018). Environmental influences, such as water velocity and diversity of organisms, have been shown to affect stream metabolism. In the Tri-State Mining District in Southwest Missouri, there are many mine adits that continue to discharge heavy-metal contaminated water into nearby streams. One of these mine adits discharges into Lone Elm Creek, in Joplin, Missouri. Heavy metals negatively impact the microbes and other aquatic organisms in streams. The pollutants accumulate in sediments, where microbes and aquatic organisms reside (Song, Müller, and Friedman, 1999). Since heavy metals are unable to biodegrade, they bioaccumulate as they travel through the aquatic food web, including the primary producers and heterotrophic organisms. In this study, we investigate the relationships between land use and stream metabolism by analyzing various parameters from two urban streams, one affected by legacy mining (Lone Elm Creek, Joplin, MO) and the other not affected (Flat Branch Creek, Columbia, MO). We collected temperature, dissolved oxygen, and dissolved oxygen saturation from Flat Branch Creek and Lone Elm Creek by using a MiniDOT, an optical oxygen sensor with a data logger. Dissolved oxygen concentrations in both streams showed a strong diel pattern, from subsaturation to supersaturation following light availability. Flat Branch was colder and had higher levels of dissolved oxygen than Lone Elm, most likely reflecting the differences in streamflow, riparian canopy cover, and general water quality. Further analysis will be conducted to confirm our hypotheses. This study seeks to improve the understanding of how the overall health of these freshwater bodies relates to land use practices (heavy metals and vegetation).