

MEASURING AND MODELING STREAM AND AIR TEMPERATURE
RELATIONSHIPS IN A MULTI-LAND USE WATERSHED OF THE CENTRAL
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ABSTRACT

A nested-scale experimental watershed study design approach was used in an urban watershed of the central U.S. to investigate stream water temperature (T_w) variability during water year's 2011, 2012, and 2013. Drought conditions were observed during water year 2012 when total annual precipitation was approximately 340 mm less than the 30 year record. Sudden increases of >1 °C within a 15 minute time interval in T_w (T_w surges) following summer thunderstorms were observed at urban sites. Differences in mean T_w between gauging sites were significantly ($p=0.02$) correlated to urban land use and downstream distance as discharge increased. Linear and nonlinear regression analyses were performed between T_w and air temperature (T_a) data at time scales ranging from 15 minute to seasonal time steps. Additionally, the linear T_w model used in the Soil and Water Assessment Tool (SWAT), and a new process based T_w model that accounts for hydrology were evaluated. Significant ($p>0.05$) differences in model efficiency were not found between the linear T_w model used in SWAT and the new process based T_w model. Results from this study will provide land managers with quantitative information and T_w models needed to make informed management decisions and improve water quality in urban watersheds.