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The thermal regime of headwater streams has important consequences for fish physiology and population dynamics. However, research typically focuses on temporal variation in temperature at a single point (i.e., gage station) without considering its spatial structure in upstream locations. We sampled water temperatures using a spatially continuous design (10 m spacing) on the Owens Creek watershed (Catoctin Mountain Park, MD) and evaluated correlations to fish species abundance sampled by standard backpack electrofishing techniques (100 m reaches) during the summer of 2015. We also explored the utility of a new index of groundwater influence that measures the difference between surface water temperatures and substrate temperatures, Delta T (DT). For 9 of the 10 species analyzed, fish abundance was strongly correlated to observed water temperatures, and water temperature correlations to fish abundance were generally stronger than for the groundwater index DT. The observed fish-habitat relationships suggest the potential to model fish abundances based on spatial temperature surveys and demonstrate the importance of collecting spatially-structured data within stream networks.