

# RESPONSE OF STREAM FISH ASSEMBLAGES TO AN URBANIZATION GRADIENT IN METROPOLITAN ATLANTA, GEORGIA

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**Abstract.** The U.S. Geological Survey National Water-Quality Assessment (NAWQA) Program's study on the effects of urbanization on stream ecosystems investigated the response of fish communities to urbanization in the Atlanta, Georgia, metropolitan area during 2003. Urbanization was quantified using an urban intensity index that included multiple land-cover variables that were positively correlated with population density and thought to be negatively correlated with stream-water quality. Hydrologic variability metrics, water-quality, stream habitat, and land-use data were summarized for each of 30 watersheds and correlated with fish community metrics using traditional correlation analysis. The overall community response was assessed using non-metric multidimensional scaling (MDS) analysis and multivariate comparison techniques.

Results indicate that only a few fish community metrics have significant correlations to increased watershed urbanization with the strongest of these being with percent cyprinids—a group composed of several taxa sensitive to altered flow and water-quality conditions. Community analysis indicated that fish assemblages responded to a suite of hydrologic, water quality, and land-use characteristics, although stream habitat conditions were not significantly correlated with the fish community. When analyzed by season, the hydrologic variability metrics explained most of the variance during the winter and spring. Both the frequency of rising streamflow events greater than three times the median rise during the period of record and a metric that indicates the relative change in mean cross-sectional area explained most of the community variation in the winter and spring, respectively. Water-quality data collected during both low- and high-baseflow periods indicate that a similar set of constituents explain almost half the dissimilarity in the fish communities.