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Detenbeck, Naomi E., Alisa Morrison, Ralph Abele, Darin Kopp, and Jessica Morgan. 2013.

Network-based prediction of lotic thermal regimes across New England.

Thermal regimes are a critical factor in models predicting effects of watershed management activities on fish habitat suitability. We have assembled a database of lotic temperature time series across New England (> 7000 station-year combinations) from state and Federal data sources. Using principal component analysis, we reduced 78 thermal metrics from the ThermoStat software package to four independent fish habitat predictor variables: July median temperature, Julian day of maximum daily temperature, mean daily temperature range, and maximum daily rate of temperature change. We are creating spatial statistical models for stream temperature regime metrics, using an approach developed by the U.S. Forest Service. These network-based models are unique because they account for patterns of spatial autocorrelation among locations based on both Euclidean and in-stream distances. Using a regional database of densiometer measurements, we predicted potential shading from the riparian zone as a function of percent canopy cover and channel width by land-use category. Predictor variables for stream temperature metrics include air temperature metrics, watershed area, surface water storage, drainage density, elevation, percent watershed in coarse deposits or well-drained soils, local and main channel slope, estimated stream flow, potential monthly solar radiation (corrected for topographic shading as well as riparian zone influences), and percent impervious area. Predicted thermal regime variables will be used as input to models that predict relative abundance of selected fish species, chosen based on their sensitivity to urban development. Predicted versus observed fish community composition will be compared for watersheds in which best management practices have been applied.