Analysis and Geoprocessing.
Modeling Spatial Relationships using Regression Analysis

Goals of the workshop

- Introduce the basic objectives, terminology, and strategies for performing regression analysis with spatial data.
- Present regression analysis in a way that is clear, straightforward, relevant, and accessible to people with a variety of skill levels, backgrounds, and interests.
- Demonstrate the Ordinary Least Squares and Geographically Weighted Regression tools.
- Outline the challenges of regression modeling with spatial data and the variety of diagnostic tools available in ArcGIS to help overcome these challenges.
- Provide strategies for navigating and interpreting regression results.
- Outline additional resources for learning more about regression analysis.

Major topics covered

- While regression analysis is a very commonly used statistical method, it is also one of the mostly commonly misused techniques when applied to spatial data.
- Regression analysis allows us to model spatial relationships; there are a large number and variety of application areas, from modeling fire frequency to identifying key factors contributing to crime, disease, or population growth.
- Spatial data is special: spatial autocorrelation and local variation present challenges for regression modeling with spatial data. The regression tools in ArcGIS were developed with these challenges in mind. Diagnostics and solid strategies can ensure regression models are properly specified.
- There are a number of ways that regression models can be flawed. Unfortunately, we cannot trust results of a mis-specified regression model. The good news is that these problems can very often be corrected with tools in ArcGIS.
- Ordinary Least Squares Regression (OLS) is the starting point for all regression analysis. Geographically Weighted Regression (GWR) is a local spatial regression method that allows us to explore regional variation in variable relationships and, consequently, can often help us more effectively target remediation policies.
- Output from regression analysis can sometimes be a lot to wade through. Simple strategies make the interpretation process much easier and provide confidence that results are reliable.