

National Aquatic Resource Surveys: Integration of Geospatial Data in Their Survey Design and Analysis
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The National Aquatic Resource Surveys (NARS) are a series of four statistical surveys conducted by the U.S. Environmental Protection Agency working in collaboration with states, tribal nations and other federal agencies. The surveys are conducted for lakes and reservoirs, streams and rivers, estuaries and intercoastal waterways, and wetlands. The focus of the presentation is on how geospatial data is integrated with the survey design and analyses in NARS. Fundamental to the design is the dependence on geospatial data from the National Hydrography Dataset (NHD) as a basis for the sample frame for three of the four surveys. For each survey, the R package `spsurvey` is used to select a spatially-representative sample of sites from this geospatial sample frame. Sites selection is based on a generalized random tessellation stratified design (GRTS). Geospatial information is also used in the local neighborhood variance estimator that was developed for GRTS designs. The local variance estimator has been shown to provide better coverage probability than the Horvitz-Thompson estimator. Based on spatial survey designs, NARS studies provide nationally consistent and scientifically-defensible assessments of the nation's waters and can be used to track changes over time.