

Spatial variation of sources and transport of phosphorus within major river basins in North Carolina

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Efforts to limit eutrophication of nutrient-sensitive water bodies in North Carolina have prompted an interest in modeling frameworks that can be used to assess phosphorus transport and the effect of management practices. The SPARROW (SPAtially-Referenced Regression on Watershed attributes) model was developed to study linkages between monitoring data and watershed factors that determine water quality at a regional scale. It consists of a nonlinear regression equation describing the transport of contaminants from point and non-point sources on land to streams and through the river network. The model was applied to major river basins in North Carolina and six other southeastern states to estimate rates of transport and delivery of phosphorus as a function of landscape and channel characteristics, based on 1:500,000-scale hydrography. Phosphorus loads in the Roanoke, Cape Fear and Neuse River basins were found to be significantly ($p < 0.001$) correlated to point discharges, applied manure and background phosphorus sources. Delivery rates were found to be significantly correlated to watershed factors that influence phosphorus transport, including precipitation, soil characteristic and conservation practices. The results describe the proportional contribution to stream phosphorus load from different sources, as well as the proportion of phosphorus load from each watershed that reaches nutrient-sensitive water bodies and coastal areas.