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Developing a sampling strategy for volunteer water quality monitoring based on water quality and spatial analyses in Butler County, Ohio

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Abstract Text:

Volunteer monitoring groups are an important element in water quality monitoring in many areas where financial and personnel constraints prevent baseline monitoring. Prioritizing sample locations is important for volunteer groups to collect water quality data representative of all land uses and to monitor areas with high pollution potential. The Butler County Stream Team (BCST) is a volunteer monitoring group in southwest Ohio that has collected and analyzed water samples for chemical water quality parameters within the Great Miami River Watershed since March 2006. The BCST analyzed the spatial distribution of 470 sample locations and prioritized them into high, medium and low using Geographic Information System (GIS). Water quality indicators of nitrate, phosphate, and conductivity from January through September 2007 were analyzed to determine if water quality differences exist between rankings. High, medium and low priority samples did not have a significant water quality difference, which demonstrates that high priority samples do not necessarily have higher concentrations of pollutants. Data were also qualitatively and quantitatively analyzed to determine if water quality differences exist between samples collected from urban and agricultural locations. Nitrate and phosphate concentrations were higher in agricultural than urban sites, and E. coli and conductivity detections were higher in urban than in agricultural sites. This information has been incorporated to create a sampling strategy that can represent all land uses that exist in the county, and provide a comprehensive coverage of locations from all priority levels. Local environmental stresses of land use, hydrology, well field and septic system location, and population density are considered equally when using GIS as a site prioritization tool. Volunteers will be directed to areas of low coverage or high priority according to monthly map alterations. This strategy will allow the BCST to operate efficiently in watershed protection and water resource monitoring in Butler County.

Impact Statement:

Prioritizing sample locations is important for volunteer groups to collect water quality data representative of all land uses and to monitor areas with high pollution potential. The spatial distribution of 470 samples collected by the Butler County Stream Team in Ohio were prioritized into high, medium and low using Geographic Information System (GIS), and water quality correlations were made between priority level and land use. Volunteers will be directed to areas of low spatial coverage or high priority according to monthly map alterations. This strategy facilitates the efficient operation of volunteer monitoring groups concerning watershed protection and water resource monitoring.