Sustainable Solutions For Stream Management

Stream Restoration and Watershed Assessment Case Studies from the Ozarks Environmental and Water Resources Institute

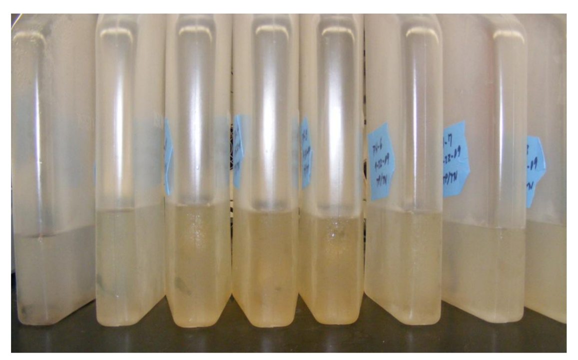
Sources and Reductions of Storm Water Runoff in the James River Basin - 319 Project

Project Description/Purpose

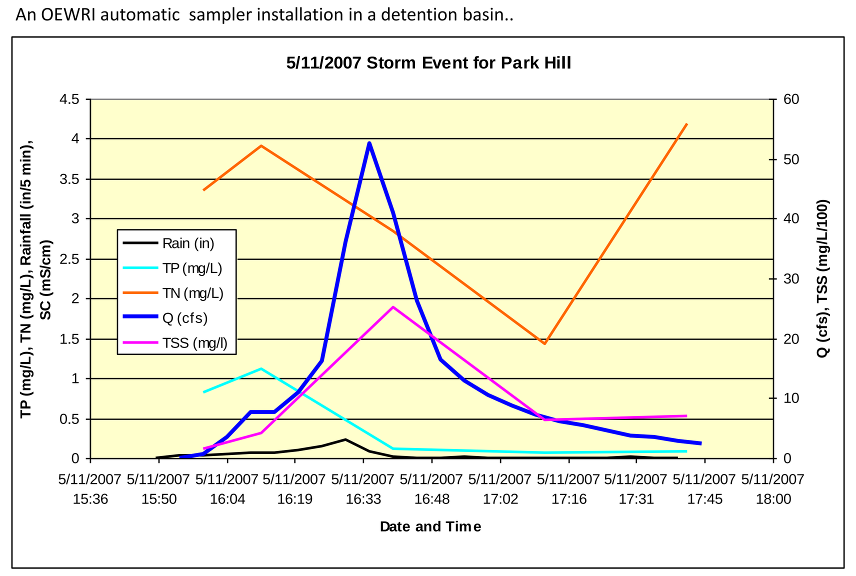
This project is a subdivision scale project to address non-point nutrient contributions from subdivision stormwater outfalls which are a poorly understood component of watershed management in the James River Basin. Little is known about how nutrient concentrations change with hydrology, seasonal variations, or stormwater management best management practices (BMPs) in our area. The purpose of this study is to quantify nutrient concentrations from three subdivisions in Christian County before and after construction of Low Impact Development (LID) BMPs.

An OEWRI automatic sampler installation in a detention basin..

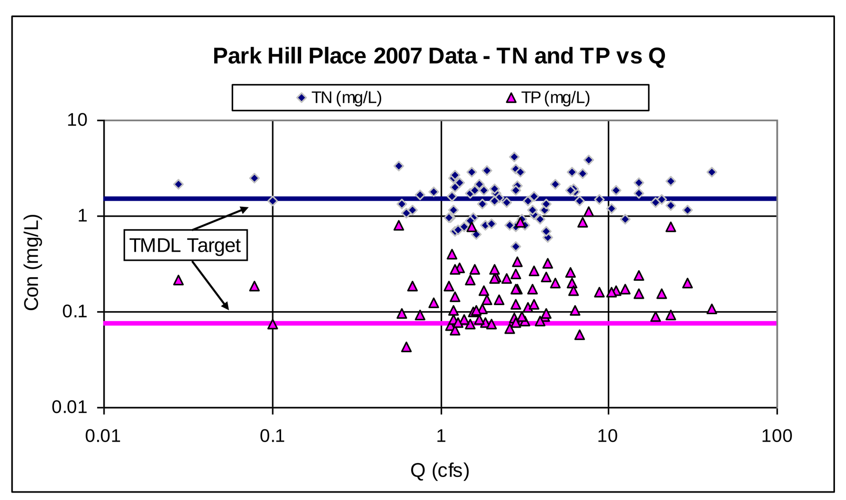
Automatic sampler.



Samples collected throughout storm event, notice turbidity differences.



Nutrient and TSS variability throughout a spring storm event.



Annual water quality data for every storm sampled at Park Hill in 2007.

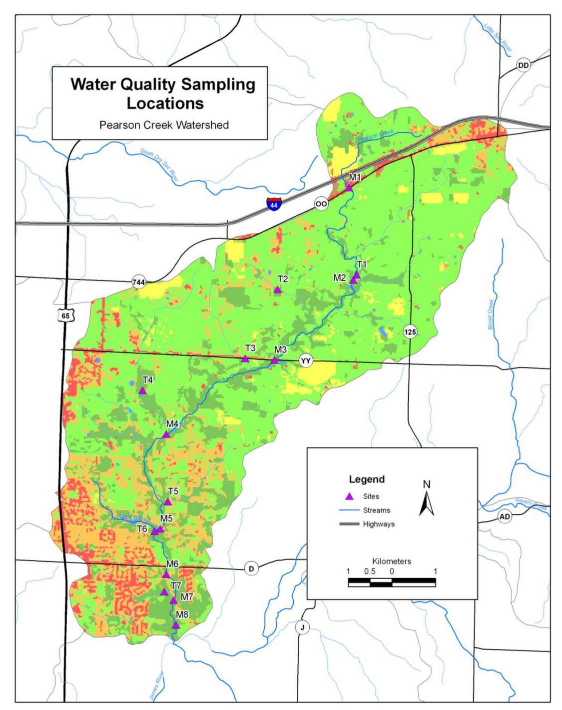
Results

Initial results show variability in nutrients across the hydrograph fluctuates with seasonal lawn care management. In the spring, during peak fertilizer applications, TP and TN concentrations are very high on the rising limb of the hydrograph and do not follow TSS trends which peak with discharge. This suggests nutrients are dissolved, or water soluble, which is typical in lawn fertilizers. In the fall, however, after water soluble fertilizers have long dissipated, nutrient concentrations more closely follow natural trends. When analyzing the annual water quality data for every storm sampled in 2007 at Park Hill, the mean annual TN concentration of 1.58 mg/L is near the target TMDL concentration of 1.5 mg/L. The mean annual TP concentrations of 0.216 mg/L, however, are nearly three times higher than the TMDL target load of 0.075 mg/L

Nonpoint Source and Water Quality Trends in the Pearson Creek Watershed

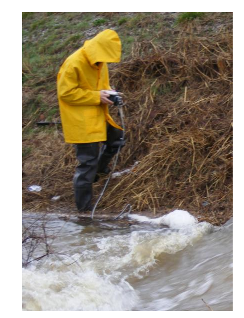
Project Description/Purpose

This project involves a watershed-scale water and sediment study of Pearson Creek to address unknown toxicity and nonpoint pollution sources including nutrients, metals, and bacteria to support efforts to develop a Total Maximum Daily Load (TMDL) by 2009. The watershed is composed of mixed agricultural, urban, and forest land uses and there are management concerns that nonpoint and industrial releases may be degrading aquatic life in lower Pearson Creek. Jones Spring receives runoff inputs from an urbanized section of Springfield and Springfield's drinking water supply may also be at risk since Pearson Creek discharges into the James River about 1 km upstream of the Blackman municipal drinking water intake and then flows into Springfield Lake.

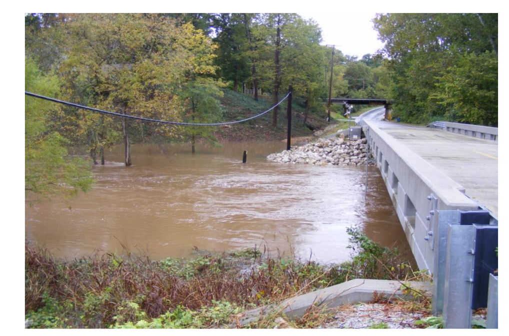


Land use within the Pearson Creek watershed.

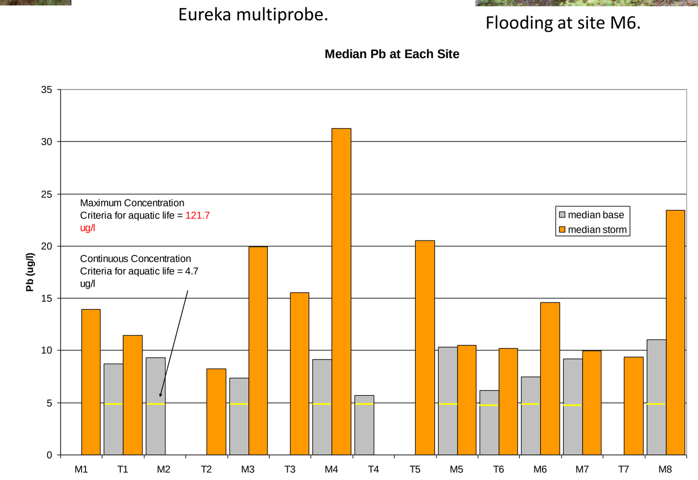
Flow meter.



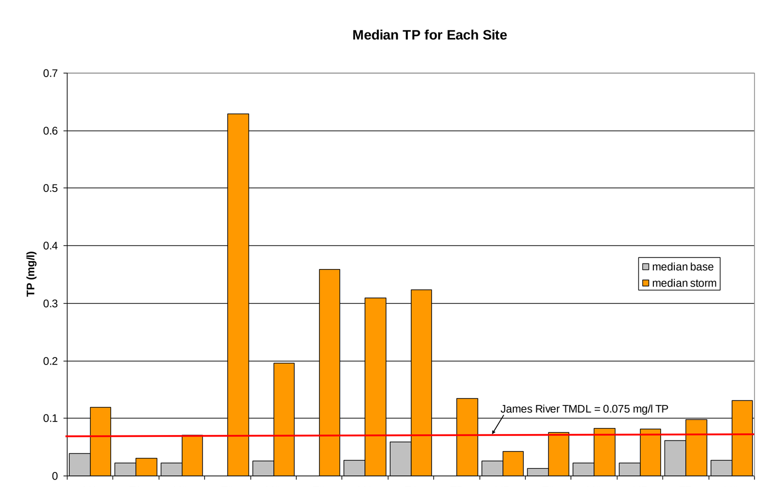
Eureka multiprobe.



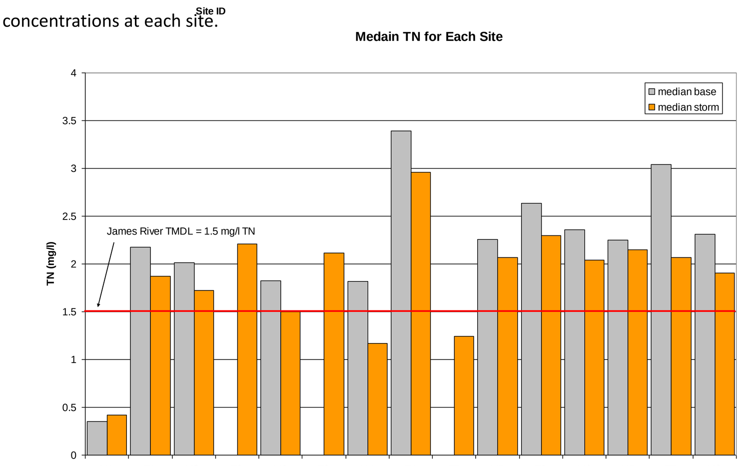
Flooding at site M6.



Median lead concentrations at each site.



Median TP concentrations at each site.



Median TN concentrations at each site.

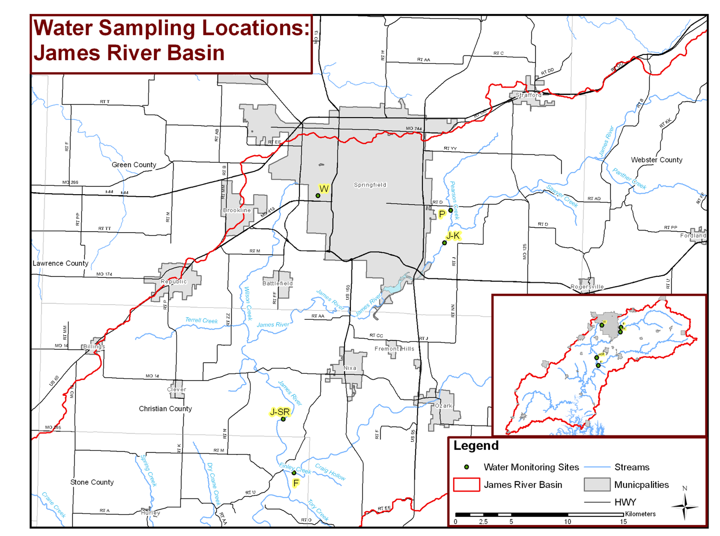
Results

Median lead concentrations exceeded the continuous concentration criteria for aquatic life during base and storm flow sampling. Tributaries within the middle portion of the watershed contributed a larger amount of TP during storm events than other sites and most median concentrations were well above the James River TMDL target of 0.075 mg/L. Most median TN concentrations for base flow and storm flow were above the TMDL target of 1.5 mg/L.

Suspended Sediment and Dissolved Solid Transport in the James River, SW Missouri

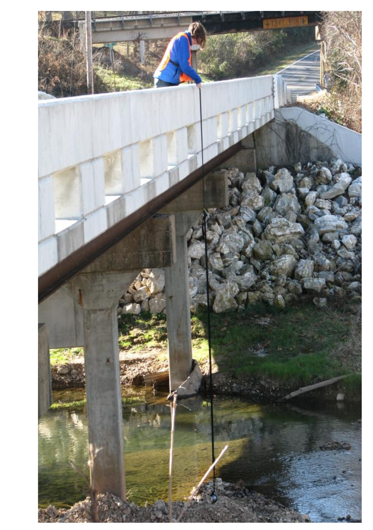
Project Description/Purpose

This study was designed to determine the dynamics of suspended sediment and dissolved solids transport in the karst-dominated upper and middle James River basin and it supports efforts to understand sources of pollutants in the basin and the degree of variation in concentrations of pollutants throughout the year due to runoff and seasonal influence. The EPA has recognized sediment as the primary nonpoint source pollutant in most water bodies.



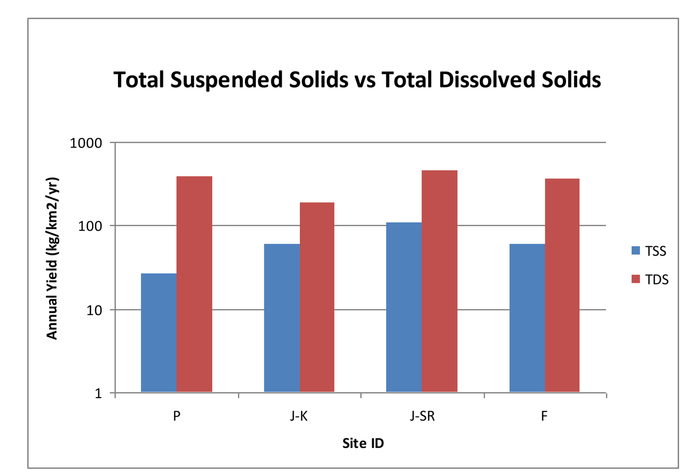
The James River drains 987 square miles where it flows into the 43,100 acre Table Rock Lake at Galena, Missouri.

Organic carbon sources include seasonal inputs from vegetation and agricultural inputs from animals. Inorganic carbon sources include carbonate rock and urban landuse.

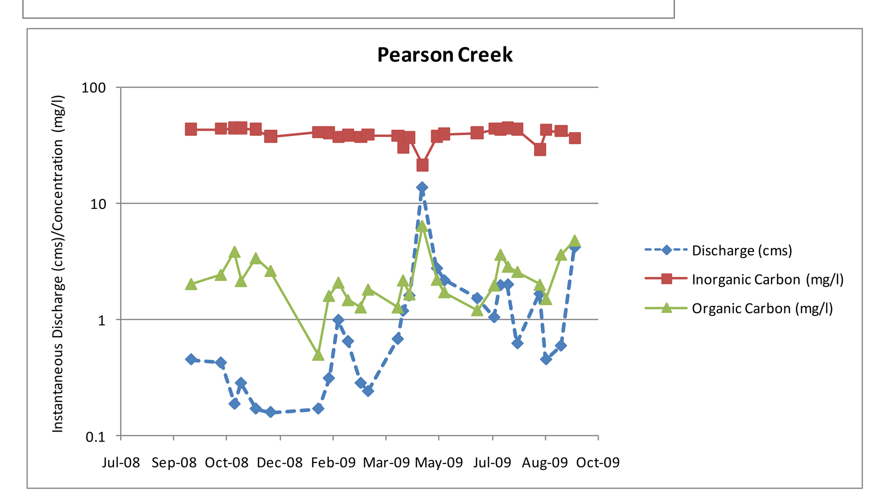


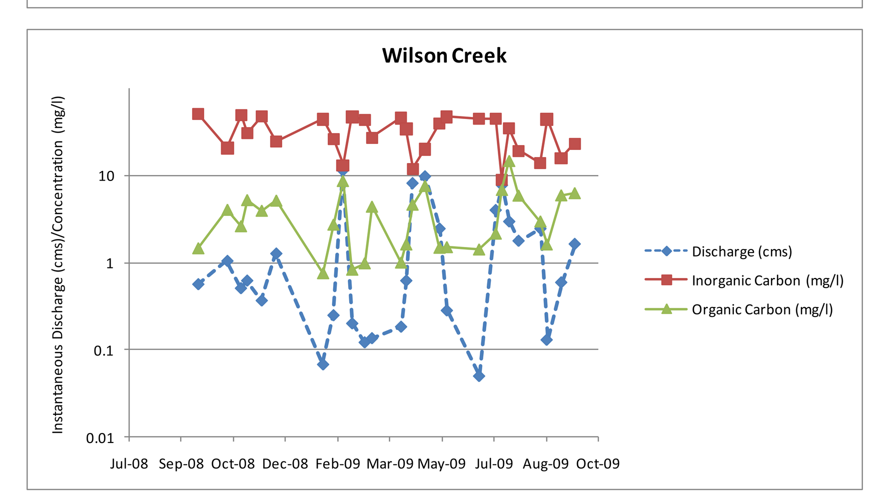
Depth-integrated sampling..

Preliminary Results



Interactions between surface water and groundwater associated with karst topography drives the total dissolved solid yields higher than the total suspended solid yields.





As discharge increases organic carbon concentrations increase and inorganic carbon concentrations decrease. Landuse does not appear to influence organic carbon as the concentrations between the Pearson site (mostly rural) and the Wilson site (mostly urban) are similar. Inorganic carbon concentrations fluctuate more in the urbanized creek.

OEWRI will continue to process and correlate findings to established standards.