

An assessment of phosphorus sources & sinks in the West Branch of the Tioughnioga River watershed

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Introduction

Phosphorus is an essential nutrient that is often either limiting or in excess in aquatic systems due to small changes in concentrations, contributing to large differences in productivity. Inorganic forms of phosphorus, like soil fertilizers, are entering both lotic & lentic systems in excess, causing adverse affects on aquatic health & biota. However, phosphorus may be taken up/released in organic forms by both aquatic organisms and also vegetation and used for growth. By measuring concentrations of phosphorus within different parts of a watershed, it is possible to delineate both sources & sinks in order to best manage the system.

Objective

- Assess concentrations of total phosphorus (includes particles) & total dissolved phosphorus to determine sources and sinks within the aquatic system
- Qualitatively assess upstream vegetation & land cover type to determine if riparian buffers, or lack-thereof, influence phosphorus concentrations
- Analyze potential effects of storm events on phosphorus concentrations

Methods

- 10mL of each sample were filtered (TDP). Both filtered and unfiltered (TP) samples had potassium persulfate added and were autoclaved to convert all forms of P to orthophosphate.
- Standard methods (Wetzel & Likens 2000) were used to determine the concentration of phosphorus on a spectrophotometer
- Concentrations calculated based on standard curve of a known sample
- The 1st sampling occurred on Nov. 14th and occurred after a dry period. The 2nd sampling occurred on Nov. 22nd and occurred after a wet period
- Land cover data were qualitatively analyzed for trends in decreased P concentrations correlating with increased vegetated riparian buffer zones

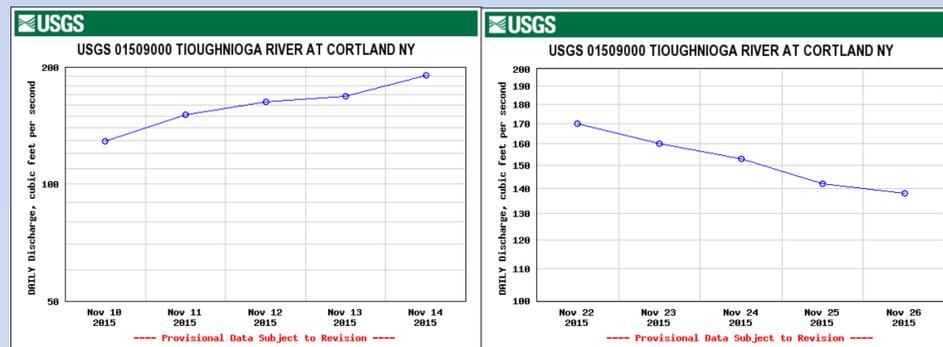


Figure 2 & 3. Discharge of the Tioughnioga River in Cortland, NY. The rising limb (right) and falling limb(left) occurred 4 days after sampling on Nov. 26th & Nov. 14th, respectively.



Table 1. Approximate sampling locations along the West Branch of the Tioughnioga River.

Sample #	Location
101	N st/Warren St, Tully, NY
102	Assembly Park, Tully Lake Inlet
103	Assembly Park, Tully Lake Outlet
104	Rt. 281 & Currie Rd, Tully, NY
105	Rt. 11/Preble Rd, Preble, NY
106	Rt. 11 Preble, NY
107	Goodale Lake Inlet, Preble, NY
108	Goodale Lake Outlet, Preble, NY
109	Dwyer Memorial Park, Upper Little York Lake Inlet
110	Upper Little York Lake Outlet
111	Little York Crossing Rd (Lower LYL Inlet), Preble, NY
112	Rt. 109, Lower LYL Outlet, Preble, NY

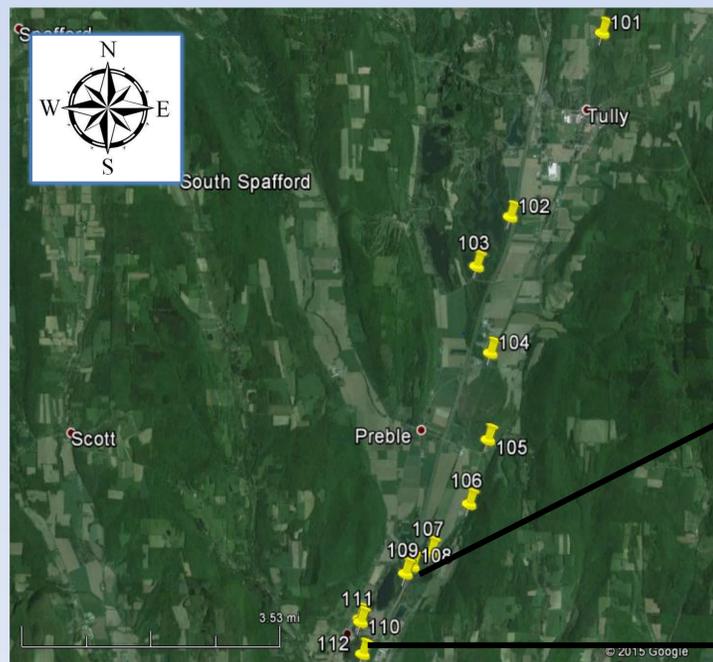


Figure 1. Water sample locations in the West Branch of the Tioughnioga River watershed.

Results

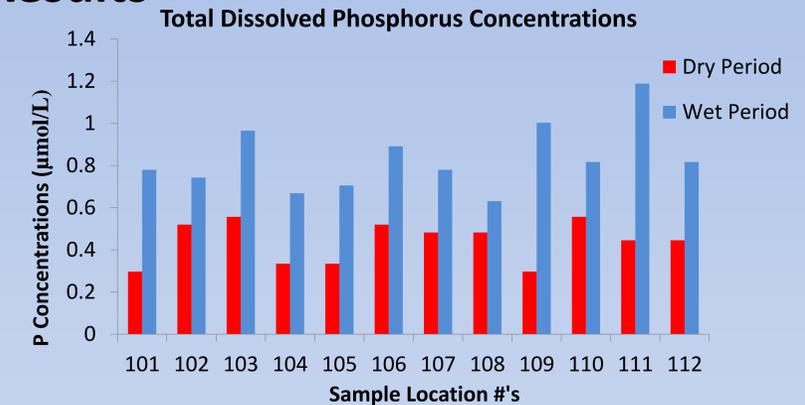


Figure 4. Comparison of TDP concentrations between 2 sampling periods in the West Branch of the Tioughnioga River watershed.

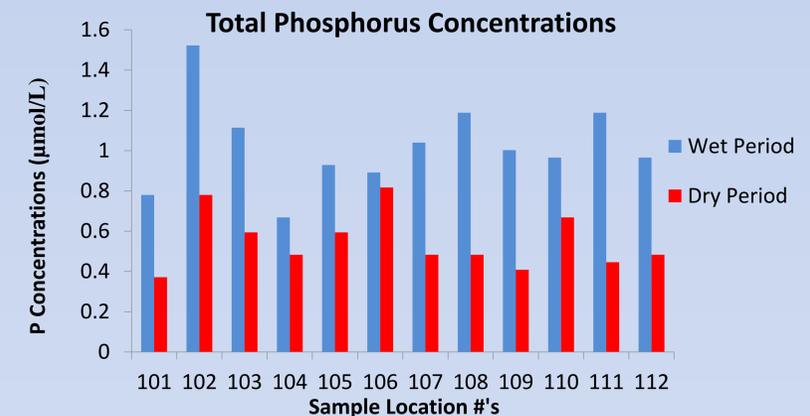


Figure 5. Comparison of TP concentrations between 2 sampling periods in the West Branch of the Tioughnioga River watershed.

- Higher portion of TP was particulate P after storm event (primary source debatable)
- Decrease in P between inlet & outlet (sites 102 & 103) provides evidence for Tully Lake being a major P sink
- Upper & Lower Little York Lakes acted as P sources during the dry period & as P sinks during the wet period

Conclusion & Further Research

- Further analysis of nitrogen collected at same locations and times
- Using ArcGIS, quantitatively assess riparian zone buffers and estimate vegetative cover upstream of sampling locations
- Study helps create a baseline for further analysis of watershed health