

# NEW Water's Pilot Watershed Program: A Water Quality Perspective

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## Abstract:

Silver Creek is in a subwatershed of Duck Creek, located one mile west of Green Bay, WI where a suite of best management practices (BMPs) are addressing high levels of nutrient and sediment runoff (Figure 1). NEW Water, the brand of the Green Bay Metropolitan Sewerage District, is leading an agricultural-based Adaptive Management (AM) pilot project to evaluate if it is more cost effective to spend \$60-150 million of wastewater treatment plant improvements or work with agriculture to reduce the amount of phosphorus and sediment reaching Green Bay. Reductions in the watershed are likely to improve local water quality far beyond what improved wastewater treatment plant effluent could, at a much lower cost. Baseline data and inventory of the watershed are being used to develop enhanced nutrient management plans and conservation plans to aid implementation of BMPs that reduce total phosphorus and total suspended solids in Silver Creek. Implementation of most large and small practices have been completed. Water quality data, in-stream sediment data, and invertebrate assessments will aid in evaluating the success of these practices. The pilot study is utilizing innovative tools to execute field-level assessments, gather soil and water data, work closely with landowners and growers, and leverage local agronomist experience to target the most effective practices. This effort will guide framework for implementing a future full scale AM program to achieve continued permit compliance for NEW Water.

## Sampling Methods:

### Grab Samples:

- Five main road crossings,
- Once a week during spring and fall runoff, every other week during summer low flow conditions
- Flow composite sample during high flow conditions, middle of stream grab sample during low flow conditions

### Event Samples:

- One USGS gage station
- USGS automated event sampling
- Gage height
- Discharge

### Water Quality Parameters:

- Total Phosphorus (lachat, ascorbic acid)
- Total Suspended Solids (filter weight)

### Stream Bed Sediment Sampling:

- Sediment Core Dimensions: 5cm diameter X 5cm depth
- 5 cores combined per site - composite for soil nutrient sampling
- 3 replicate cores per site - bulk density analysis (dry weight)
- Core Sediment Analysis: total phosphorus, total nitrate, ammonia, TKN, total organic carbon and percent solids (Synergy Environmental Lab, LLC)

## Site Locations:

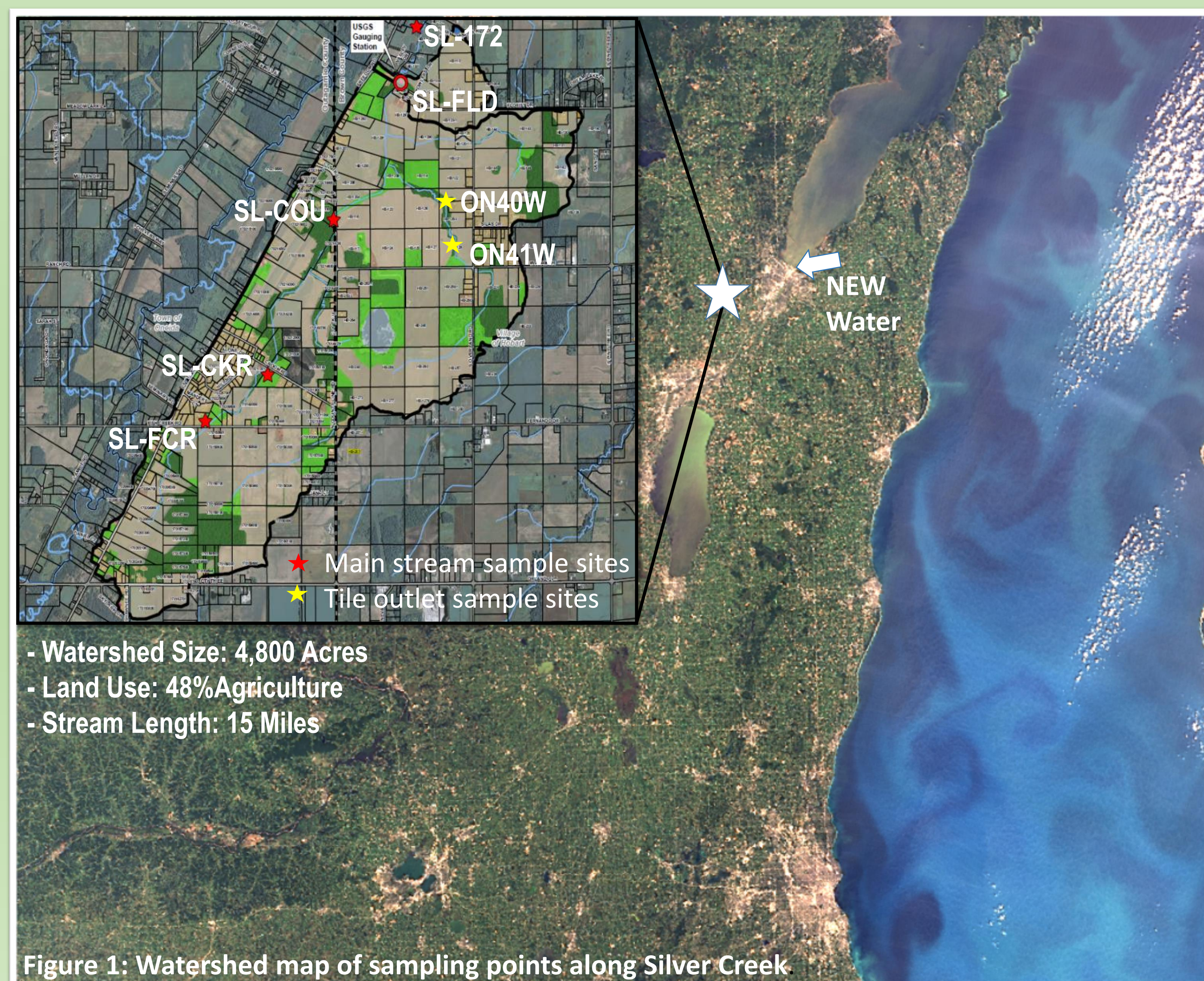


Figure 1: Watershed map of sampling points along Silver Creek

## Results:

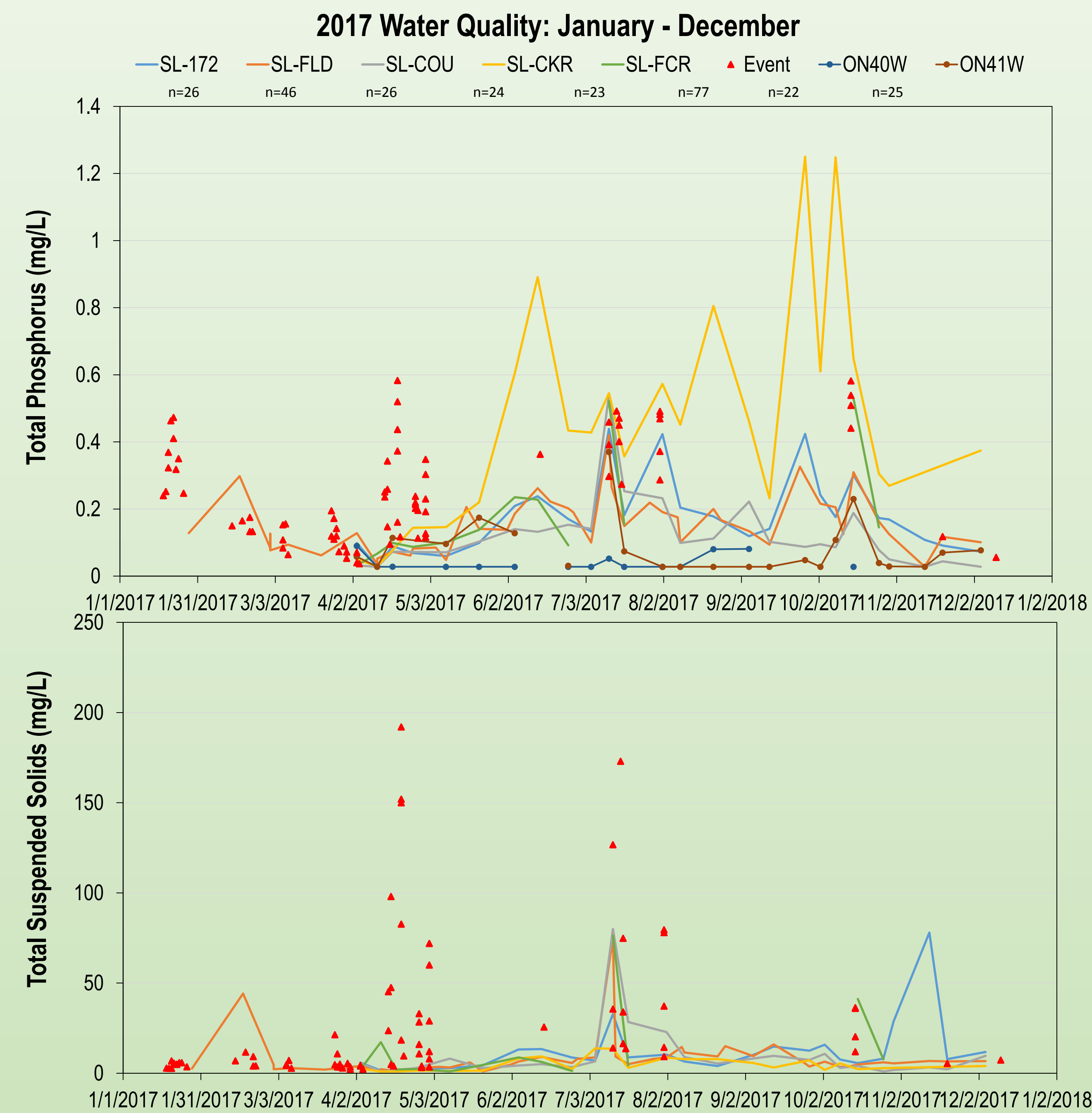


Figure 2: 2017 total phosphorus and total suspended solids results for all Silver Creek sample locations and two additional tile outlets.

### Silver Creek WDNR May – October Median Water Quality



Figure 3: Silver Creek WDNR May – October median total phosphorus and total suspended solids 2014-2017.

### Silver Creek Stream Bed Nutrients

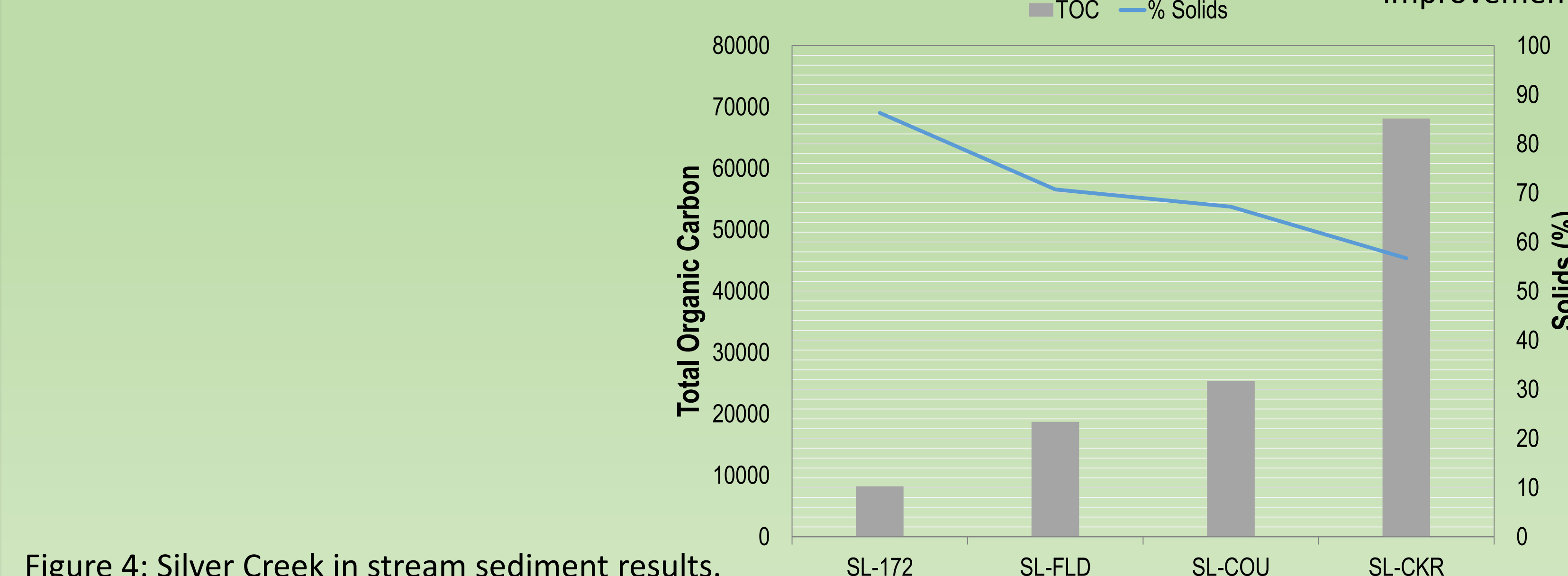
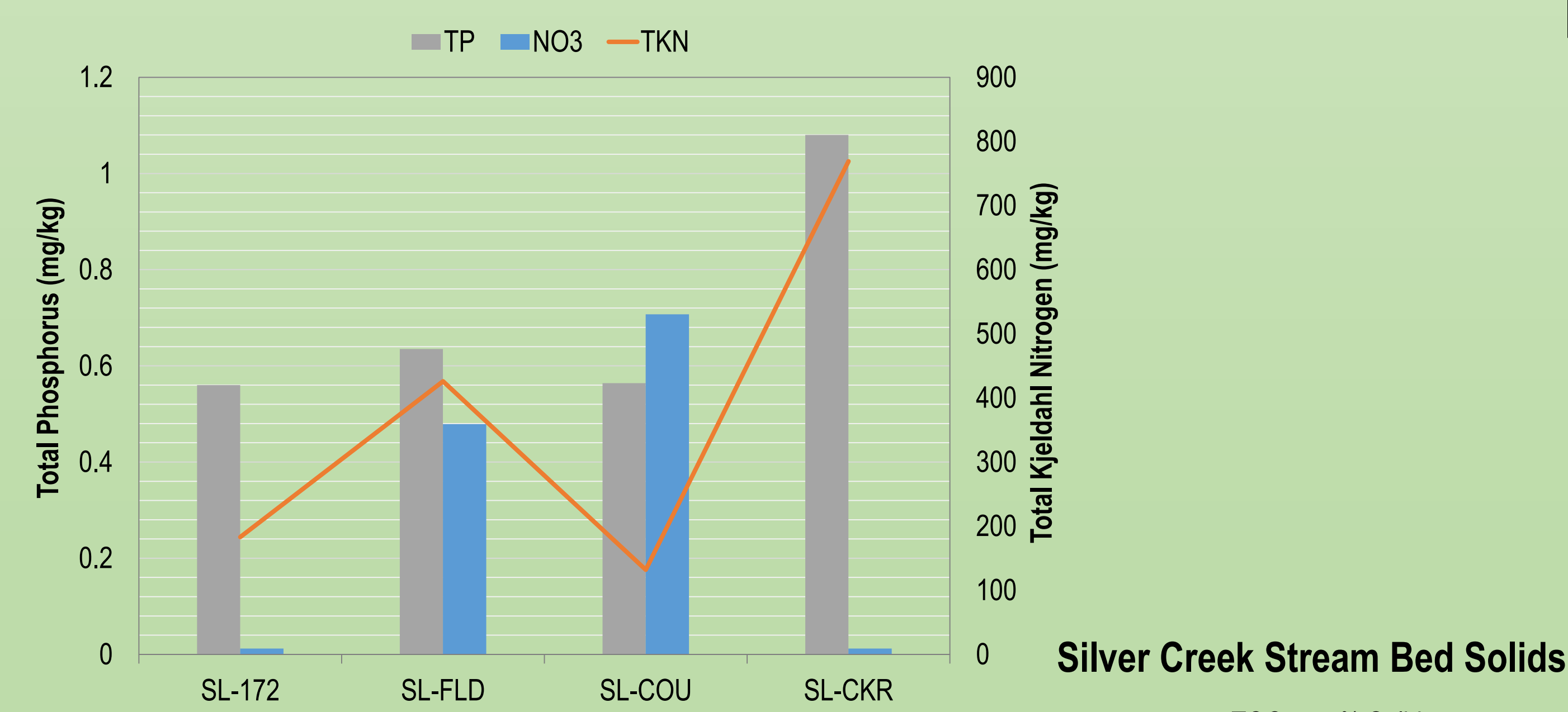


Figure 4: Silver Creek in stream sediment results.

## Discussion:

Water quality in Silver Creek has responded well to implementation practices in the surrounding watershed. 2014 and 2015 were baseline water quality years while 2016 and 2017 were active implementation years. 2017 was a wet year in comparison to previous years in this study. As a result, higher values were observed in both grab and event samples collected in Silver Creek (Figure 2). Looking at trends over the last four years, concentrations at Crook Road crossing (SL-CKR) have remained higher than the other sites. However, 2017 results are encouraging. Even with the increased precipitation in 2017, Crook Road was not as high as pre-implementation due to numerous conservation efforts upstream (Figure 3). Stream sediment results indicate that some sites have high residual phosphorus and organic material that may also be contributing to the phosphorus and sediment values observed in the grab and event samples on the main stem of Silver Creek (Figure 4). NEW Water is encouraged by these early results and looks forward to continued improvements with additional growth and establishment of watershed practices.

## Acknowledgments:

NEW Water would like to acknowledge the contributions of our state certified laboratory staff, county staff, WDNR staff, and numerous project partners. We would also like to thank Ducks Unlimited, Fund for Lake Michigan, TNC, NRDA and others for additional funding that made these efforts possible. This project has received a \$1.67 million grant from the Great Lakes Restoration Initiative of the US EPA under an assistance agreement with NEW Water. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

