**Lake Champlain Basin Program**

**Quarterly Report**

**January 10, 2018**

**Organization Name:** Stone Environmental, Inc.

**Project Name:** Assessment of Tile Drainage System Impacts to Lake Champlain and Phosphorus Loads in Tile Drainage in the Jewett Brook Watershed of St. Albans Bay

**NEI Job Code:** 0100-310-002

**Project Code:** L-2016-060

**Final Report Due Date:** September 2018

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**Summary of Activities:**

***Task 1: Literature Review Examining Tile Drainage Systems***

Completed

***Task 2: Assessment of Tile Drainage Systems in the Jewett Brook Watershed***

Flow monitoring and sample collection continues at all 12 tile drain monitoring stations. Samples are collected approximately weekly. Through December 2017, 37 sampling rounds have been performed.



Completing monitoring station construction at JBT01.

On October 11th, the autosamplers were reprogrammed with two-part programs, each program part having a unique flow pacing setting. This change was made to increase the likelihood of collecting representative, composite samples of sufficient volume, while reducing the risk of oversampling or premature filling of the full set of carboys.

Collection of flow-paced composite samples was generally successful until the week of November 14, 2017, when all the composite sample carboys were frozen. As of November 14th, automated composite sampling was suspended due to below freezing conditions. We are currently collecting grab samples at all stations once per week. The monitoring manholes were also insulated to protect the flowmeters against freezing.

Stone’s subcontractor, the Friends of Northern Lake Champlain, is performing the majority of sample processing. Various maintenance activities are performed on every sample collection date, including checking/changing instrument desiccant and removing vegetation or snow shading solar panels.

A tremendous effort was devoted in the last quarter to manipulating flow data and identifying and making estimates for any gaps in the continuous flow and concentration time series data. This laborious effort is a necesary precursor to calculating seasonal and annual flow totals and TP and TDP concentrations and loads.

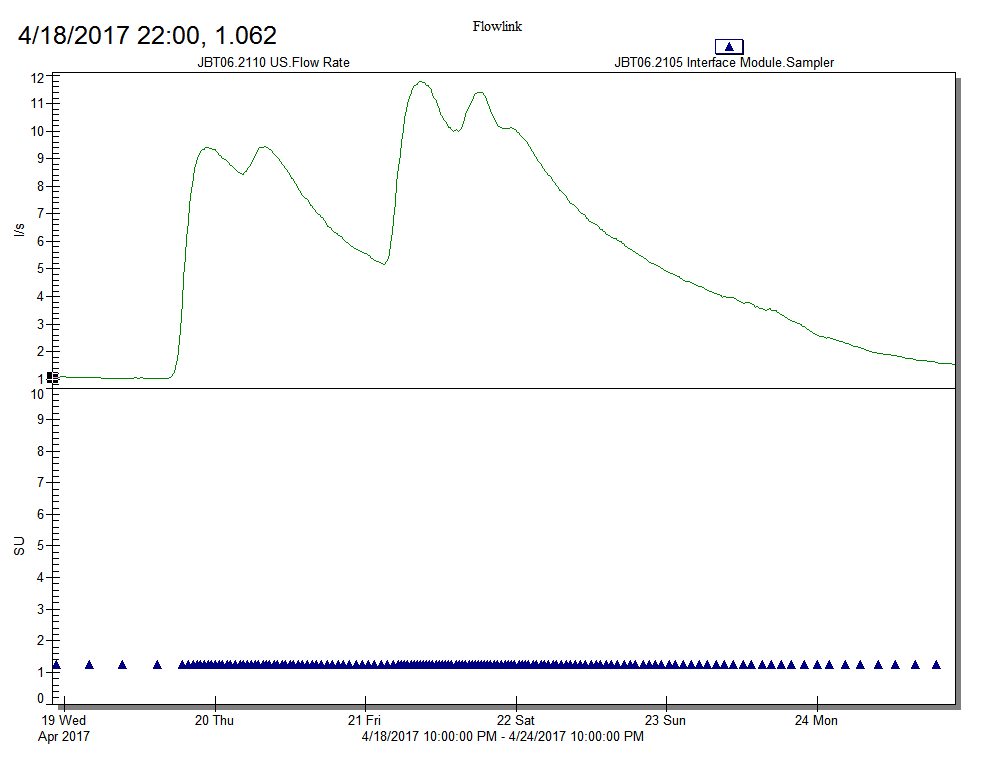
Each month, a brief monitoring report is prepared summarizing monitoring data collected to date. Thus far only nutrient concentration data have been included.

***Task 3: Phosphorus Load Estimation of Tile Drainage Systems in the Jewett Brook Watershed***

No activity.

**Project Status:**

Figure 1. Example flow rate and sampling marks from Station JBT06



Every 30 minutes, flow and sampling data are transmitted to Stone’s server. These data are checked periodically to assess whether the sampling program is working as intended. Figure 1 displays an example of flow data (top panel) at station JBT06, along with the time each sample aliquot was dispensed to the sample carboys (bottom panel).

Samples collected at the tile drain monitoring stations are analyzed by the Vermont Agriculture and Environmental Laboratory for concentrations of total phosphorus (TP), total dissolved phosphorus (TDP), and total nitrogen (TN). Beginning in August, VTDEC (which supports the TN analysis) requested TN be collected on alternate weeks (a cost saving measure) until field conditions change due to manure application or other agricultural activities.

**Challenges Encountered:**

Providing sufficient power to all stations was challenging under late fall conditions. The orientation of solar panels was adjusted, and additional solar panels were added at the three stations with poor solar exposure, JBT01, JBT02, and JBT04. At JBT02 and JBT04, the deep cycle batteries have needed to be replaced with fresh batteries, repeatedly. Additionally, the main solar panel at JBT02 was vandalized and was since replaced. In December, snow accumulation on the solar panels also resulted in low voltage conditions at certain stations.

During the December sampling events, it was not possible to collect grab samples at every station because the suction lines conveying water to the autosamplers developed ice plugs. Where possible, grab samples were collected at the outlet when the autosampler intake line was frozen.

**Work Anticipated Next Quarter:**

In the next quarter, sampling and data management activities will continue, agronomic data for 2017 will be updated, and work should begin on analysis of statistical associations between water quality and agronomic variables.