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An Addendum to Segment Analysis of Sucker Brook: The Location of Sources of Pollution

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An Addendum to
Segment Analysis of Sucker Brook
The Location of Sources of Pollution
Part of the Canandaigua Lake Watershed
Located in the City of Canandaigua

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Funded by the Canandaigua Lake Watershed Task Force

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Introduction

This supplemental report is an addendum to the original study ‘Segment Analysis of Sucker Brook: The location of sources of pollution’ (Makarewicz et al. 1999). In the original study, recommendations for further investigation of two segments of Sucker Brook were suggested as follows.

1. The segment above Site 7 (Figure 1) in the City of Canandaigua had high concentrations of soluble reactive phosphorus (SRP) and total phosphorus (TP) during an event in January 1999. The source(s) was not identified.

2. The segment between Sites 3 and 4 (Figure 1) had high concentrations of soluble reactive phosphorus (SRP), total phosphorus (TP) and total suspended solids (TSS). The source(s) was not identified.

Three separate supplemental events, two for Site 7 and one for the segment between Sites 3 and 4 were sampled in 2000 to conclude the Sucker Brook Stressed Stream Analysis.

Methods

Detailed methods on sampling procedure and water quality methodology are reported in the original study (Makarewicz et al. 1999). In general, samples were analyzed for total phosphorus, soluble reactive phosphorus, nitrate, total Kjeldahl nitrogen, chloride and total suspended solids.

Sample Location: Segment Upstream from Site 7 (Table 1, Figure 2):
Seven samples upstream from Site 7 were taken on 21 April 2000 and eight samples were taken on 18 May 2000.

Sample Location: Segment between Sites 3 and 4 (Table 2, Figure 9):
Robin Evans of the Canandaigua Lake Watershed Task Force performed a supplemental Stressed Stream Analysis on 23 September 2000. The segment was divided into six smaller segments (Table 2, Figure 9).
RESULTS and DISCUSSION

Segment Upstream from Site 7:
21 April 2000 (Table 1, Figures 3 to 5):

Figure 2 identifies the various sampling sites in this segment. A point source, Site SBG, had the highest concentrations of total phosphorus (419.5 µg P/L) (Fig. 3), soluble reactive phosphorus (154.1 µg P/L) (Fig. 5), total Kjeldahl nitrogen (970 µg N/L) (Fig. 4) and chloride (456.3 mg/L) (Fig. 5) on 21 April 2000. Inspection of Figures 3-5 suggest that this location, a pipe which is labeled ‘Teneco 001’, at the headwaters of this tributary is a source of nutrients to Sucker Brook. The outflow from the pipe drains into a ditch that flows into Sucker Brook. The origin of the water flowing in the pipe is not known. However, the pipe flows underneath a parking lot (behind the Sonoco Corporation). It is possible that the flow in the pipe originates from the outlet of the pond in front of Practiv Corporation because Teneco previously owned the property but there is no confirmation of this. Nitrate and total suspended solids were not high at this location. For this date the major source of TKN, SRP, TP and chloride appeared to be from this pipe. We need to sample the ditch above the confluence of this pipe during the next event.

Although there is a suggestion of a source of phosphorus above Site SBB, it appears not to be a major source in this segment. The levels of total phosphorus and soluble reactive phosphorus increase slightly due to runoff from the beaver pond at Site SBB.

Sucker Brook flows under the building that houses the Canandaigua Wine Company. At Site SBD, which is directly downstream the Canandaigua Wine Company, we did not observe any significant changes in nutrient or soil concentrations with the exception of chloride. Chloride increased by >100 mg/L from Site SBF, which is directly upstream of the Canandaigua Wine Company. Chloride is usually associated with de-icing salt.
18 May 2000 (Figures 6 to 8):

As in April, the upper reaches of the watershed had the highest concentrations of phosphorus (by a factor greater than 100%) and total Kjeldahl nitrogen in the Site 7 segment of Sucker Brook. Site SBG (the Teneco pipe) and a new site, SBH (the drainage ditch that received flow from the pipe, but sampled upstream from the outflow of the pipe) were sources of TP (Fig. 6), SRP (Fig. 8) and TKN (Fig. 7) to this segment of Sucker Brook. Site SBH also had the highest concentrations of TSS (168.0 mg/L).

As Sucker Brook flowed underneath the Canandaigua Wine plant, TP (83.0 to 161.2 μg P/L) and SRP (47.4 to 105.4 μg P/L) doubled and nitrate tripled (0.08 to 0.25 mg N/L) during the precipitation event of 18 May 2000.

**Segment between Sites 3 and 4 (Table 2, Figures 10 – 12):**

Between Sites SB1 and SB3, there is a tributary that enters Sucker Brook (Fig. 1). Within this segment, there is a source of total phosphorus, nitrate and total suspended solids between Sites SB1 and SB3, that we suspect is coming from this unnamed tributary. Total phosphorus increased 190%, nitrate increased 86% and TSS increased over 5600% between Site SB1, upstream of the tributary, to SB3, downstream of the tributary. The tributary receives runoff from the Town of Canandaigua Highway Barns and a farm. This area was not sampled due to the large area of privately held and posted property. This tributary is the likely source of pollution in this reach.

There appears to be a minor source of total Kjeldahl nitrogen (TKN) in the reach of Sucker Brook between Sites SB3 and SB4. TKN increased ~50% in this segment. Although we walked the area, we were not able to identify a source. Further sampling is required.
The other two point (pipes) sources sampled (Sites SB5 and SB6) did not show elevated levels of nutrients or soil.

**Summary**

**Segment 7**

In the segment of Sucker Brook that is upstream of Site 7, the major source of pollution appears to be located in the very upper reaches of the watershed. A discharge pipe located at the rear of the Sunoco Corporation parking lot discharges water into a drainage ditch. Both the pipe effluent and the ditch are sources of nutrients and soil to Sucker Brook. It is possible that the pipe is the outflow from the Prativ pond.

Sucker Brook flows underneath the Canandaigua Wine Plant on Buffalo Street. Sucker Brook was sampled immediately upstream of the plant and directly below the plant. Concentrations of SRP and nitrate increased on 18 May 2000, while only chloride was affected on 21 April 2000. These data suggest that an intermittent source exists within this segment.

**Segment 3 to 4:**

In the segment of Sucker Brook between Sites 3 and 4 a small tributary flowing from the west into Sucker Brook was the most likely source of TP, nitrate, and TSS to the main stream. This tributary drains an area containing Town of Canandaigua Highway Garages and a farm. Sources were not identified further due to the inaccessibility of the site. Further sampling effort should be directed at this tributary after obtaining the permission of the land owner.
Table 1. Site description from Stressed Stream Analysis performed on the Site 7 segment of Sucker Brook on 21 April and 18 May 2000.

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBA</td>
<td>East branch of creek at the school bridge</td>
</tr>
<tr>
<td>SBB</td>
<td>Below beaver pond</td>
</tr>
<tr>
<td>SBC</td>
<td>In back of apartment complex of Buffalo Rd. Is ‘above beaver pond’</td>
</tr>
<tr>
<td>SBD</td>
<td>Directly downstream of Canandaigua Wine</td>
</tr>
<tr>
<td>SBE</td>
<td>Drainage ditch flowing from the west along Buffalo Rd. that drains a retention pond of housing complex.</td>
</tr>
<tr>
<td>SBF</td>
<td>Above Canandaigua Wine Plant, sampled at the rear of the parking lot – some wetlands in the area</td>
</tr>
<tr>
<td>SBG</td>
<td>Blue discharge pipe behind and underneath the Sonoco Corp. parking lot. The pipe was labeled ‘Teneco 001’. May drain the pond in front of Practiv Corp.</td>
</tr>
<tr>
<td>SBH</td>
<td>Drainage ditch behind Sonoco Corp. upstream from outflow from Site SBG.</td>
</tr>
</tbody>
</table>
Table 2. Site description from Stressed Stream Analysis performed on the Site 3 to 4 segment of Sucker Brook on 23 September 2000.

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB1</td>
<td>Upstream from County Road 30. Above the tributary flowing from the west</td>
</tr>
<tr>
<td>SB2</td>
<td>12 inch pipe into Sucker Brook from detention pond draining Canandaigua Estates</td>
</tr>
<tr>
<td>SB3</td>
<td>Sucker Brook, upstream of Site SB2- below the tributary flowing from the west.</td>
</tr>
<tr>
<td>SB4</td>
<td>Sucker Brook upstream of Buffalo St.</td>
</tr>
<tr>
<td>SB5</td>
<td>24 inch pipe draining storm sewers in established development</td>
</tr>
<tr>
<td>SB6</td>
<td>8 inch pipe just upstream of Buffalo St. culvert probably drains storm sewers on road</td>
</tr>
</tbody>
</table>
Figure 1. Map of the Sucker Brook watershed highlighting the areas of the watershed that supplemental Stressed Stream Analysis has been performed on.
Figure 2. Sample locations for Site 7 branch of Sucker Brook.
Figure 3. Total phosphorus and nitrate concentrations from 21 April 2000 on the Site 7 branch of Sucker Brook.
Figure 4. Total Kjeldahl nitrogen and total suspended solids concentrations from 21 April 2000 on the Site 7 branch of Sucker Brook.
Figure 5. Chloride and soluble reactive phosphorus concentrations from 21 April 2000 on the Site 7 branch of Sucker Brook.
Figure 6. Total phosphorus and nitrate concentrations from 18 May 2000 on the Site 7 branch of Sucker Brook.
Figure 7. Total Kjeldahl nitrogen and total suspended solid concentrations from 18 May 2000 on the Site 7 branch of Sucker Brook.
Figure 8. Soluble reactive phosphorus concentrations from 18 May 2000 on the Site 7 branch of Sucker Brook.
Figure 9. Sampling sites on the Site 3 to Site 4 branch of Sucker Brook.
Figure 10. Total phosphorus and nitrate concentrations from 23 September 2000 on the Site 3 to Site 4 branch of Sucker Brook.
Figure 11. Total Kjeldahl nitrogen and total suspended solid concentrations from 23 September 2000 on the Site 3 to Site 4 branch of Sucker Brook.
Figure 12. Chloride and soluble reactive phosphorus concentrations from 23 September 2000 on the Site 3 to Site 4 branch of Sucker Brook.