What is a Tributary?

A tributary is a river or stream that runs into a lake or a larger river and can provide many ecosystem functions, such as carrying vital sediments and nutrients into the mainstream. This project will address why tributaries are so vital to the health of rivers and streams with regard to water quality, and how they influence and aquatic organism’s habitat.

Study Area

- The Pomperaug River (PR) is located in a forested area and runs through Southbury CT (Figure 1).
- Transylvania Brook (TB) is a tributary that runs into the PR via a culvert. This confluence is the point of study in this project (Figure 1).
- The lower Pomperaug is a freshwater river that serves as a habitat for aquatic and wildlife along with providing recreational value and an industrial and agricultural water supply. It begins at the confluence of TB (CT DEEP, 2011).

![Figure 1. Left: Map of the upper Pomperaug River (green) and the lower Pomperaug River (purple) along with the surrounding area. The yellow star indicates where TB enters PR. We surveyed directly above and below this confluence. Right: Taking data on stream characteristics and water quality as community partner Glen Somogie wades in the Pomperaug River.](image)

Project Goals

- Through sampling the PR and TB, this study seeks to show how characteristics, such as stream temperature, water quality and streamflow are major factors of a healthy river, and how water quality and stream characteristics can vary seasonally.
- By studying these characteristics, findings will help to better understand the impact TB has on PR.

Water Quality Standards

According to the Ubante Total Dissolved Solids (TDS) meter:

<table>
<thead>
<tr>
<th>Table 1. Water quality standards for TDS</th>
<th>Ideal/Pure Water</th>
<th>Good</th>
<th>Fair</th>
<th>Marginally Acceptable</th>
<th>Barely Sufficient</th>
<th>1.5 EPA Max Contaminant Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS (ppm)</td>
<td>0-50</td>
<td>50-100</td>
<td>100-200</td>
<td>200-300</td>
<td>375-490</td>
<td>490</td>
</tr>
</tbody>
</table>

**Epicollect5 Application:**

- Prior to the data collection at PR, a form was created in Epicollect5 app allowing us to enter data for each measurement described above as well as location, weather, date, and time.
- While at the river conducting measurements, data were recorded in the form I created (Figure 3).

**RESULTS**

- Temperature, conductivity, and total dissolved solids (TDS) all decreased from early fall to winter. Conductivity and TDS levels were lower downstream after the influences of Transylvania Brook in the late fall, but were of similar levels during early fall and winter. (Figure 4)

| Figure 4. A graph shows the relationship between temperature of the PR and the season. Graph B shows the relationship between conductivity of the PR and the season. Graph C shows the relationship between total dissolved solids in the PR and the season. |

| Table 2. Stream characteristics of PR upstream and downstream of TB confluence |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                                  | Average Depth Above Confluence | Average Depth Below Confluence | Average Width Above Confluence | Average Width Below Confluence | Average Streamflow Above Confluence | Average Streamflow Below Confluence |
| Autumn                           | 12”                      | 25”                      | 46”1”                        | 47”8”                        | 53.1 seconds                  | 19.1 seconds                  |
| Winter                           | 26”                      | 41”                      | 58”                          | 59”                          | 52.7 seconds                  | 15.6 seconds                  |

In the winter, PR water levels were higher and depth, width, and streamflow both upstream and downstream of the confluence were far greater than in the autumn. The streamflow decreases below the confluence of TB.

**CONCLUSIONS**

- These results show that overall the water quality was better in the winter. This is likely due to high water levels and heightened streamflow, which creates increased turbulent diffusion of oxygen into the water because faster moving water hits obstacles in the river more violently causing increased contact with atmospheric oxygen and the water molecules as they spray into the air. (Water on The Web, 2008). With more oxygen dissolved in the water, aquatic organisms have plenty of oxygen to breathe. Also, temperature, conductivity, and TDS were lower during the winter.
- Based on the findings, TB contributes more water, causing an increase in volume and a decrease in streamflow below the confluence of TB.

**ACKNOWLEDGEMENTS**

- A sincere thank you to my community partner, Glen Somogie, who assisted me in my data collection and provided helpful ideas along with a great location for data taking.
- A special thanks to Laura Cianeros and Abby Beissinger for having this great program and assisting me in just about every aspect of this project.
- Also a big thanks to my parents for supporting me throughout this project.

**REFERENCES**

- Ubante TDS Meter Manual