HooRWA's Stream Temperatures Sampling in the Hoosic Watershed in 2023

The Hoosic River Watershed Association has been collecting stream temperature data within the Hoosic River watershed for over 20 years, with the objective of better understanding the conditions that make it a cold-water fishery. The program in 2023 had two objectives. The first was to gain a better understanding of Notch Brook, a tributary to the Hoosic draining an area of 3.61 square miles and having a slope of 32%. This tributary is 91% forested, but flow into and out of a reservoir that is part of the North Adams water supply. It enters the main stem of the Hoosic in the Braytonville section of North Adams.

The second objective was to determine the contributions of two other tributaries to the temperature of the south and north branches of the river. Phillips Creek has a drainage area of 2.55 square miles, a slope of 28% and is 78% forested. It enters the south branch adjacent to the Southview Cemetery in North Adams. Canyon Brook has a drainage area of 1.88 square miles, a slope of 21% and is 77% forested. It connects to the north branch near the intersection of East Road with Route 8 in Clarksburg.

Procedure

Five temperature data loggers (Tidbit MX2203 from Onset) were placed along Notch Brook, starting from near the beginning of the Cascade Trail and continuing upstream, ending just across the Adams town line. A sensor was also placed in the Hoosic just upstream of the confluence of Notch Brook with the Hoosic. Sensors were placed in Phillips Creek near its confluence with the south branch plus one in the south branch just upstream of that confluence. And similarly in Canyon Brook and the north branch, for a total of 10 sensors.

The sensors were placed on May 10 and retrieved on or about September 12. They were set to record the water temperatures hourly. The primary statistic calculated from the readings was the maximum weekly average temperature (MWAT). Additionally, we calculated the number of days the average temperature exceeded 68 degrees Fahrenheit (20 degrees Centigrade). A daily temperature above 68 degrees F is considered a critical threshold for many cold-water fish species. And we also examined the trends over time of the weekly average temperatures.

Results

Six of the 10 sensors were retrieved successfully. They are shown in the following table. The sensor at NBT04.43, upstream of the reservoir and downstream of NBT05.50, was not found, nor was the one in the Hoosic upstream of the confluence with Notch Brook (HR11.67). The sensor in the north branch (NB05.64) upstream of Canyon Brook was also missing. The sensor just downstream of the Cascades on Notch Brook (NTB01.85) escaped while being retrieve and floated downstream and out of reach.

(Note 1. The site codes are derived from the name of the stream, i.e. NBT for Notch Brook, and the distance from the stream's confluence with the next higher order stream, in kilometers).

The overall pattern for the MWAT is as might be expect. The 3 Notch Brook sensors show that the upstream values are coolest upstream of the reservoir, considerably warmer just downstream of the reservoir and then cooling somewhat by the time the waters reach the downstream sensor. The reservoir apparently acts similarly to Cheshire Lake in warming the stream just beyond the outflow. The two other tributaries are much cooler than the south branch of the Hoosic, as would be expected. Somewhat surprising is that the maximums occur on several different dates, which, based on our previous results in other years, is unusual.

Table 1.

Variable	NBT05.50	NBT03.43	NBT00.62	PC00.13	HR17.25	CB00.01
MWAT (date of max)	61.07 (9/8)	65.30 (6/27)	63.73 (9/8)	62.53 (7/16)	68.83 (7/27)	63.21 (9/8)
Days > 68.0 F	0	2	0	0	16	0

The results for the two other tributaries monitored were similar to previous results from other tributaries we have studied. The MWAT in Phillips Creek (62.5 degrees F) was over 6 degrees cooler than the south branch of the Hoosic at that location. In general, we have found that the tributaries contribute cooler waters to the next higher order river segment they connect to.

The number of days with average temperatures above 68 degrees F appear to show the effect of the dam on Notch Brook in one case and the general warmth of the main segments of the Hoosic in the other. At least during this above average rainy summer, the other segments of the streams remained sufficiently cool for cold water species.

Looking at the average weekly temperature over time (Figure 1) helps to clarify why the MWAT's occurred on different days at the three locations on Notch Brook. And also reveals a puzzling anomaly. All three locations show a rise in temperature in September, but the location immediately downstream of the dam shows warmer periods in late June and mid-July. An abrupt drop in the average weekly temperature started on July 13. There was an unusually warm period in early September. But we believe the abrupt drop in temperature below the dam may be related to the reservoir's connection to the North Adams water supply.

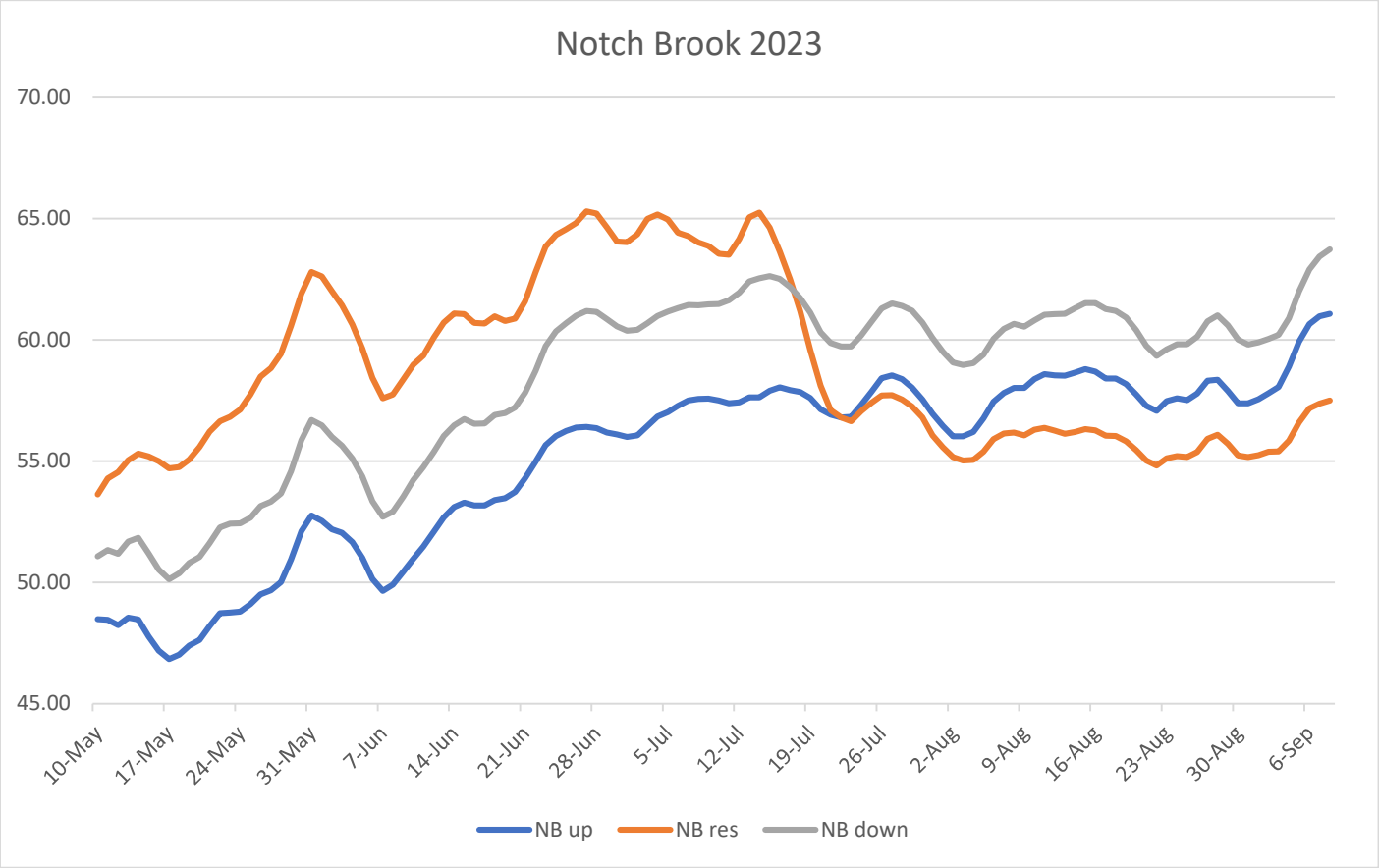

Figure1. Notch Brook results.

The Notch Brook dam was built in 1897. The earth dam is 60 feet high and 600 feet long. There is an uncontrolled spillway at the east end of dam and a pump at the west end. The pump moves water out of the Notch Brook drainage through a pipe to a tributary within the Mount Williams Reservoir drainage. Presumably, pumping waters from the reservoir either removed the warm surface waters and/or stirred up the colder deeper waters such that cooler water flowed out the spillway.

A graph for the other 3 locations shows a more normal pattern (Figure 2). Canyon Brook appears to be slightly warmer than Phillips Creek, but both are significantly cooler than the south branch at its confluence with Phillips Creek. Again, there is a rise in stream temperature in early September, just before we retrieved the sensors.

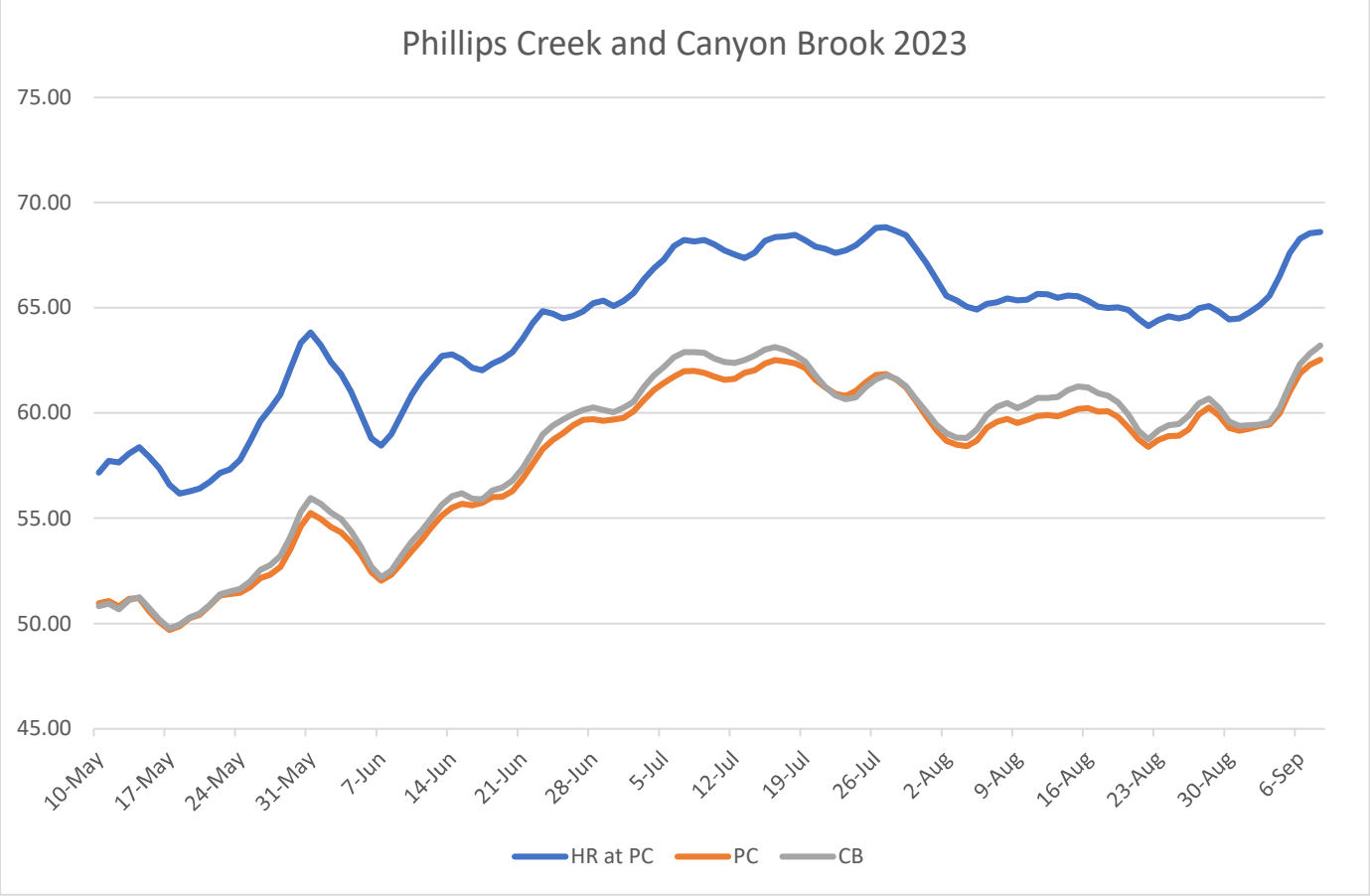

Figure 2. Other locations.

Conclusions

The 3 tributaries were all cool enough to support a cold water fishery during the 2023 period. The MWAT in Phillips Creek was 6.3 degrees cooler than that in the adjacent segment of the south branch of the Hoosic. Thus, although this segment of the Hoosic was warmer than the standards for a cold water fishery, Phillips Creek would have provided some beneficial cooling at this location. Because the sensors in the segments of the Hoosic adjacent to Notch Brook and Canyon Brook were not found, we can not compare their temperatures to those just upstream at there confluences with the the Hoosic. Based on our data from previous years in the north branch and the main stem, it is likely that each were warmer than the adjacent tributaries and thus would have benefited from the cooler waters.

It is apparent that the Notch Brook Reservoir is an important element when characterizing Notch Brook. In what was a year with above average rainfall, the diversion of water to the Mount Williams Reservoir appears to be beneficial to the brook in that deeper cooler waters exited the spillway to the brook. However, it is possible that during a period of below average the diversion might significantly reduce the flowing the brook downstream of the dam. Identifying particulate features within the drainage area of the tributaries that could affect the overall conditions within a tributary is important for interpreting the stream temperature data.

The fact that several of the MWAT's occurred at the very end of our sampling period indicates we may need to sample later into the fall. Brook trout spawning period is between September and November when stream temperatures are between 42 and 52 degrees F. Understanding how climate change might affect the Hoosic as a cold water fishery may require additional information later in the year than we have previously thought.

January 25, 2024. Dan, Lauren, Dick.