

Wing Brook, Tributary to the Green River

The tributaries to cold water fisheries provide cold water refugia during warm periods, cooling of the higher order stream into which they flow, and possible spawning areas for the fish. Wing Brook is a small (drainage area 1.03 square miles) tributary to the Green River, which is a much larger (43 sq. mi. drainage area) tributary to the Hoosic River. In 2023 we explored the headquarters of Wing Brook in order to identify its origins. In 2024, we placed temperature sensors in the brook and the Green River in order to assess its contributions to the health of the cold water fishery.

Wing Brook flows down the west flank of Mount Prospect, starting from a spring at an elevation of 2040 feet. Three other headwater streams originate in swampy areas before all join together at an elevation of 1245 feet at the point mapped by Massachusetts Division of Fisheries and Wildlife as the beginning of Wing Brook. Other springs feed into the brook at lower elevations as it flows toward the Green River.

One temperature sensor was placed at the point that the headwater streams joined to form the main brook and which is the highest point identified by Massachusetts Division of Fisheries and Wildlife as a cold water fishery (Wing 1). The second was located just upstream of where the vegetation adjacent to the brook transitions from forest to field (Wing 2). The third was located at the point the vegetation transitions back to forest (Wing 3). The fourth sensor was placed just upstream of the confluence of the brook with the Green River (Wing 4), and the fifth sensor was placed in the Green River just downstream of that confluence (Green).

Stream temperature data was recorded hourly from April 30, 2024 until Sept. 17, 2024, a total of 141 days. The hourly readings were used to calculate the average daily temperature and to extract the maximum temperature for each day. The maximum weekly average temperature (MWAT) and the maximum weekly maximum temperature (MWMT) for each location was used for comparing the locations. Also, the number of days that the daily temperature exceeded 68 degrees F was extracted and compared. Water temperature above 68 degrees is considered to be quite stressful for trout and other cold water fish.

The seven day averages (WAT) show two temperature peak periods during the summer, the first around July 13 and the second around Aug. 3 (Fig. 1). The MWAT for Wing 1 and Wing 3 are 63.8 and 60.5 degrees respectively near the August peak. The other three locations showed peaks in July, Wing 2 at 63.5 degrees, Wing 4 at 68.0 and the Green at 73.4 (Table 1). All three upstream locations remained comfortably below the 68 degree 7-day average considered important for a cold water fishery. Just before the confluence with the Green River, Wing Brook has warmed to the threshold for a cold water fishery while the Green river exceeds that threshold at that time.

Table 1. Wing Brook

Characteristic	Wing 1	Wing 2	Wing 3	Wing 4	Green River
Location	N 42.6708 W -73.1883	N 42.6732 W -73.1901	N 42.6794 W -73.1964	N 42.6843 W -73.2031	N 42.6848 W -73.2030
Site Code	WB02.30	WB01.98	WB00.97	WB00.04	GN05.05
MWAT (degrees F)	63.81	63.53	60.54	67.96	72.41
MWMT (degrees F)	65.27	65.90	65.52	71.22	78.87
# days > 68 degrees F	0	0	0	4	30
Average all 141 days	57.52	57.27	55.31	60.26	63.23

The number of days during which the temperature exceeded 68 degrees at each location provides additional support for the above conclusions. Wing 1, Wing 2, and Wing 3 had no days during which the stream temperature exceeded 68 degrees, while at Wing 4 that threshold was exceeded for 4 days and in the Green River for 30 days during the summer.

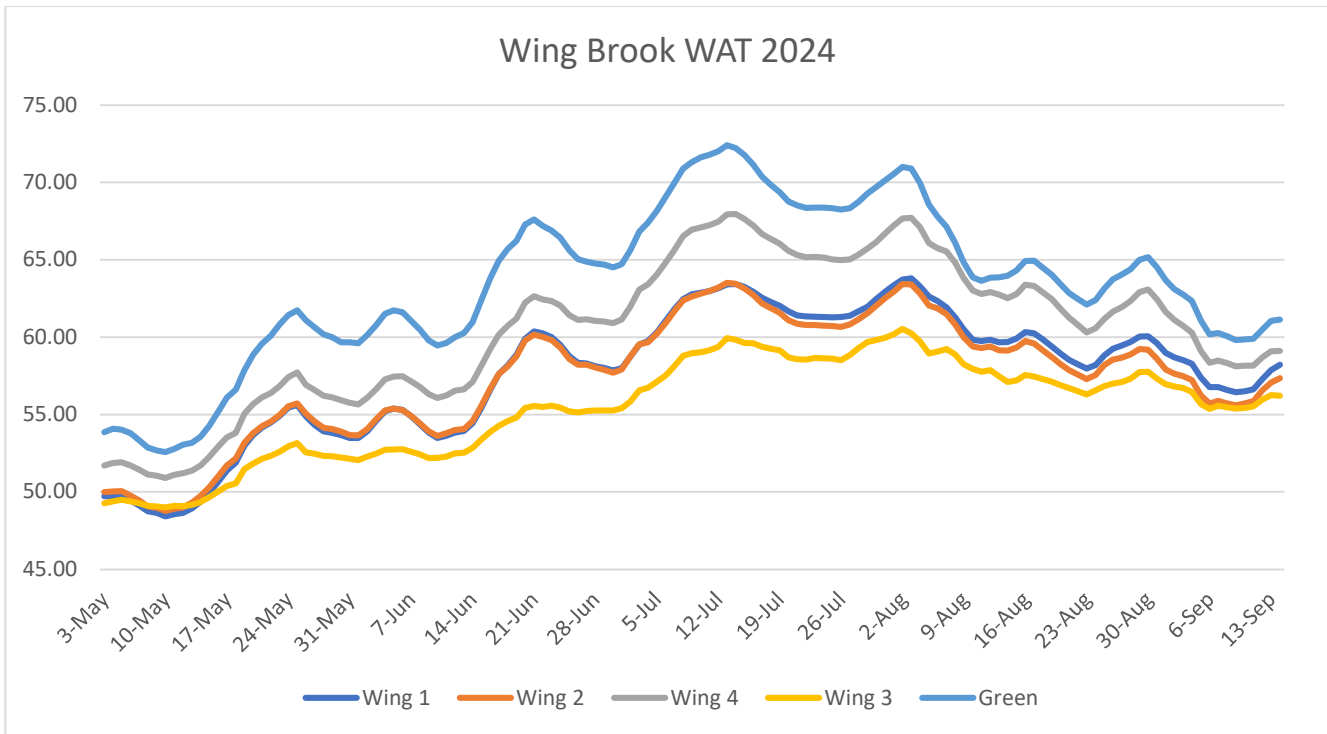


Figure 1. Weekly (7 day) average temperatures.

As expected, the Green River location was overall the warmest, averaging just over 63 degrees over the 141 day period. The Wing Brook location just upstream of the confluence (Wing 4) averaged just over 60 degrees, cooler than the Green but 5 degrees warmer than the next location upstream (Wing 3). There is a tributary to Wing Brook than enters the brook between the two locations. It's drainage area is about 25% of the total drainage, is less forested than the other 75% and has two small ponds that could be sources of warmer waters.

Surprisingly, Wing 3 was the coolest location for most of the 141 day period, averaging 2 degrees cooler than Wing 2 and Wing 1, both of which are located on the forested slope of Mount Prospect. Since the brook flows through open pastures between Wing 2 and Wing 3, the expectation was that the brook would become warmer, not cooler. However, there is at least one major spring adding waters to the brook between Wing 2 and Wing 3. It and possibly other cold water springs might be helping to maintain cooler temperatures within this segment of the brook.

Wing Brook is considered a coldwater fish resource (CFR) by the Massachusetts Division of Fisheries and Wildlife. Our data support that designation for Wing Brook, and the cooler waters as it joins the Green River would benefit that larger tributary to the Hoosic. Both the Green River and the Hoosic River are also considered CFR but both are warmer than cold water fish require for portions of the summer months. Cooler tributaries feeding the larger streams are important for providing refugia for the fish during those warmer periods.

A final lesson from our study of Wing Brook is that these small tributaries are likely each unique in one or more ways, such that it is difficult to generalize how the tributaries contribute to the health of the CFR without specific information on a tributary.

11/27/24 Dick and Lauren