

Air and Water Temperature Monitoring in the Valley Creek Watershed

Background

In July of 2005, the Valley Forge Trout Unlimited undertook a project to monitor the temperature of the water in Valley Creek and two of its tributaries, Little Valley Creek and Crabby Creek. The project, titled "Air and Water Temperature Monitoring in the Valley Creek Watershed", was funded with a 2005 Embrace-A-Stream grant. With the grant funding in hand, the chapter purchased 3-air temperature and 20 water temperature monitors. Both types of monitors are battery-powered independent units that can be programmed to record data in a variety of ways. We programmed all of them to record temperatures every 15 minutes. The sensors do this 24 hours a day and will continue to do it for up to nine months before requiring maintenance.

We installed 13 water sensors along the length of Valley Creek starting close to its headwaters and following the creek down to its confluence with the Schuylkill River. There are 4 sensors placed along Little Valley Creek, 1 on Crabby Creek and 1 on Cedar Hollow Run (connecting the Atwater Quarry with Valley Creek). The three air sensors are placed throughout the local area and record not only the air temperature but also lumens per square foot, a measure of light intensity.

In October, we collected the sensors and downloaded the data collected since July. We now have available water and air temperature data from 12 Jul 05 thru 27 Oct 05, a total of over 12,000 data points for each of our sensors, a total of over 231,500 temperature points! Unfortunately, in our October roundup, we could not find 5 of the sensors in the streams and only have data for those through the end of August.

Interpretation

We continue to work on understanding what all this means but one of the things that can be quickly assessed is the impact of high rain falls on the temperature of the water in Valley Creek. One of these events took place on 8 October this year where over 4" of rain fell on that Saturday. The impact of that rainfall on Valley Creek was substantial. Normal flow on Valley Creek is around a daily average mean of 15 to 20 cubic feet per second. On that Saturday, the daily mean flow for the day hit 461 cubic feet per second – a lot of water going down Valley Creek. One of our objectives for this project is to understand the impact of storm water on the temperature of the creek. This event gave us a perfect opportunity to do just that.

Valley Creek on October 8, 2005

To readily see the impact of the Saturday storm on Valley Creek, we looked at the three sensors located toward the end of the creek and near where the USGS has its stream flow station, all in Valley Forge National Historic Park. These sensors are located near Wilson's bridge below the Turnpike overpass, downstream of the covered bridge and 100 yards from the confluence with the Schuylkill River. The plot covers every fifteen minutes from 8:30pm on Friday 7 Oct 05 to 12:30am on Sunday 9 Oct 05. Water temperature that Friday evening was around 64 degrees F at all three stations. As the

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rain started around 9:00pm, the temperature in the creek started to rise and over the next 12 hours rose to over 70 degrees F, an increase of over 6 degrees. While more investigation and interpretation needs to be done, our initial conclusion is that stormwater runoff in the area near the covered bridge sent a surge of warm water into the creek. Once that initial surge subsided, the three stations showed a consistent rise in water temperature as the rainfall swelled the level in Valley Creek.

8 Oct 05 Storm Event - Temperature Change on Valley Creek

