



## MEMO

**To:** File  
**From:** Jeff Wennberg, Commissioner of Public Works  
**Date:** February 7, 2014  
**Re:** Analysis of temperature response to rainfall events in Moon Brook

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Evan Pilachowski determined from 2005 temperature and weather data that the in-stream response to summer rainfall events was a drop in stream temperatures. Since this runs contrary to the expected thermal effect of impervious runoff to receiving streams I decided to update and document his work.

Data from HOBO temperature recorders (15 minute intervals) from 4 locations was compared to precipitation data collected at the WWTP (5 minute intervals aggregated to 15 minutes). The results are shown in a series of graphs, attached.

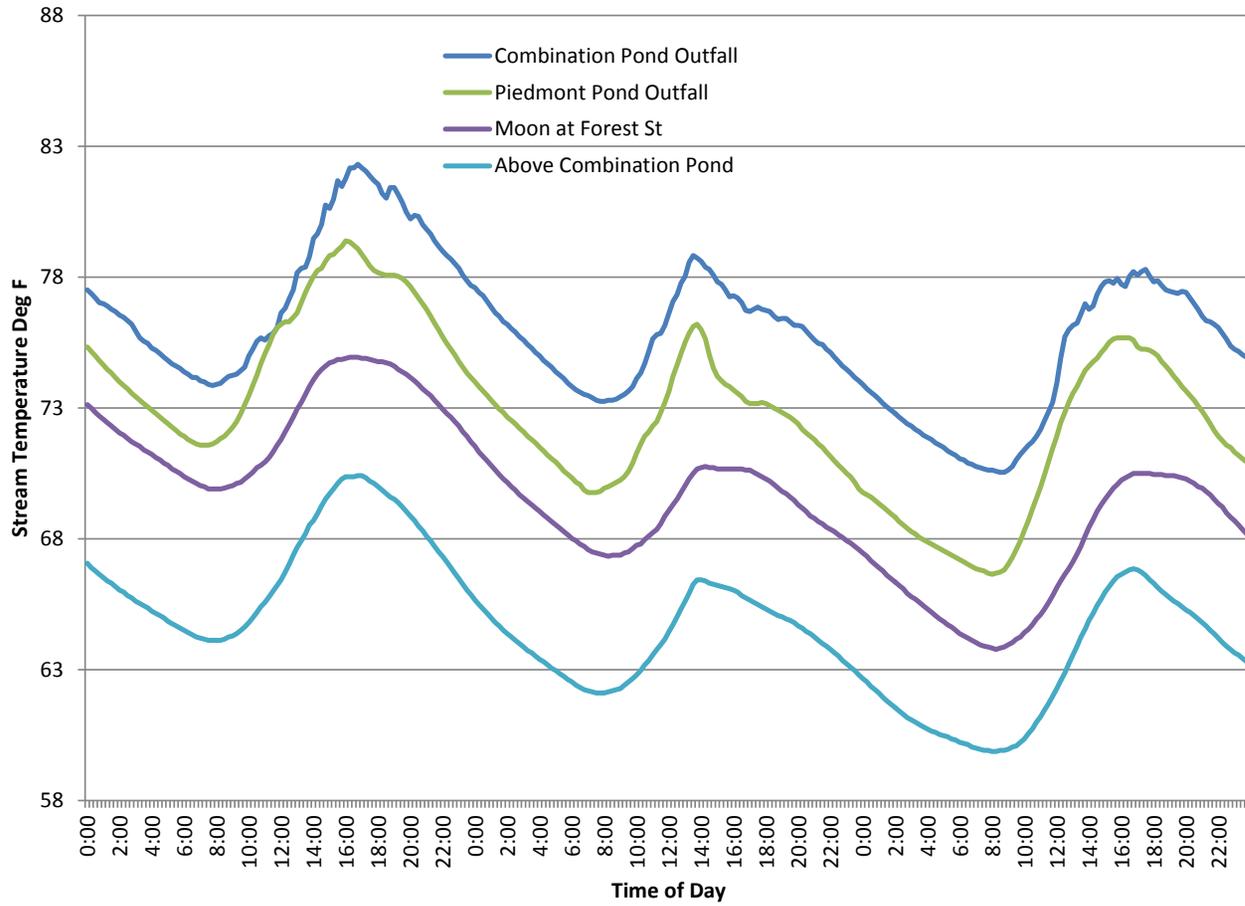
I looked at all the days during 2012 for which we have HOBO data (May 1 through Oct 25) and selected four summer dates when it rained – 6/2/12, 6/12/12, 6/25/12 and 7/15/12. I selected days following periods of dry weather and picked two with sudden rain events and two with long periods of precipitation. I also looked at a 3-day period of dry weather to determine a dry weather baseline of daily temperature swings (6/22/12 – 6/24/12).

During dry summer weather all locations showed a temperature low point at 8:00 AM and a peak at 4:00 PM. Temperature rise in the morning is faster than the decline after 4:00 PM. The highest temperature reading through all time periods are below Combination Pond, followed by below Piedmont Pond, followed by Moon Brook at Forest St, and finally the lowest temperatures were above Combination Pond.

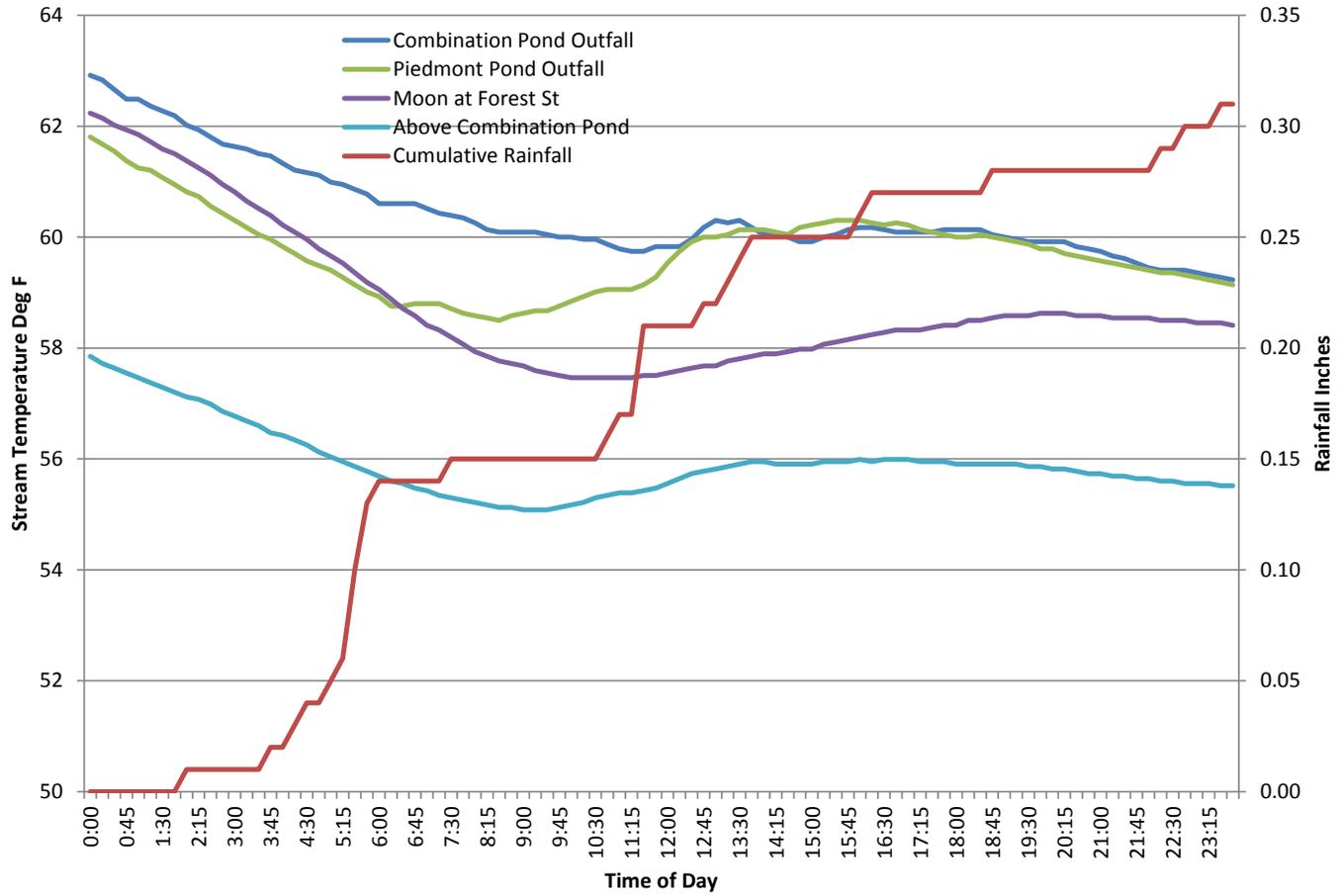
During days when it rained (following several days of dry weather) stream temperatures invariably went down in response. The Above Combination Pond location showed the least response, while the locations below Combination and Piedmont ponds showed the most pronounced responses. The Forest St location was between these two. Steady rains gradually lowered temperatures from the daily norm. Sudden rains produced a spike of lowered temperatures below the ponds of between 1 and 3 degrees F lasting 15 to 30 minutes, followed by a general decline. Larger events produced more pronounced cooling.

The conclusion is that stormwater runoff to Moon Brook lowers in-stream temperatures for both short and longer timeframes. Spikes indicate that rain, and not cloud cover, is the main cause of the cooling.

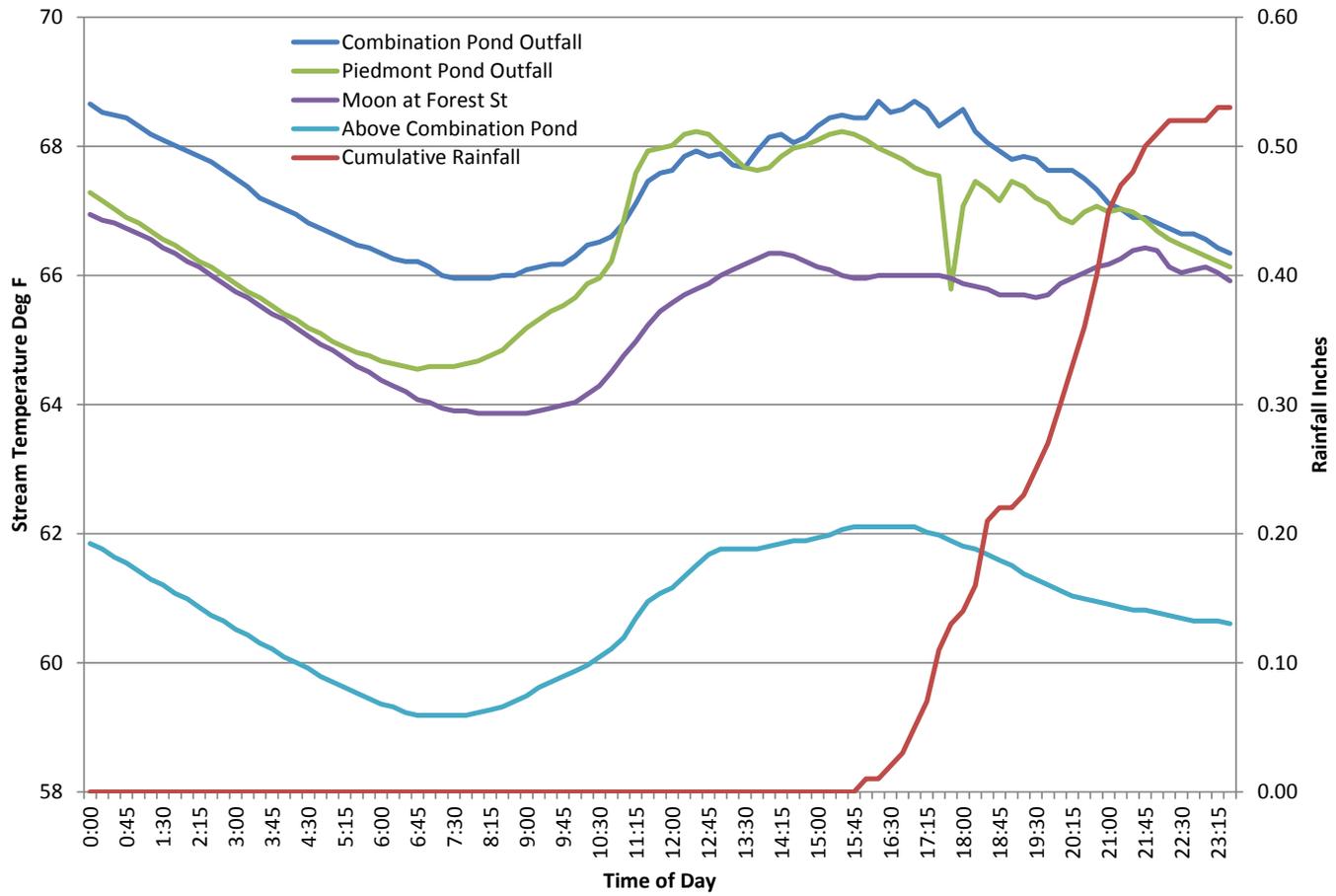
### Stream Temp - 3 Dry Days 6/22/12 - 6/24/12



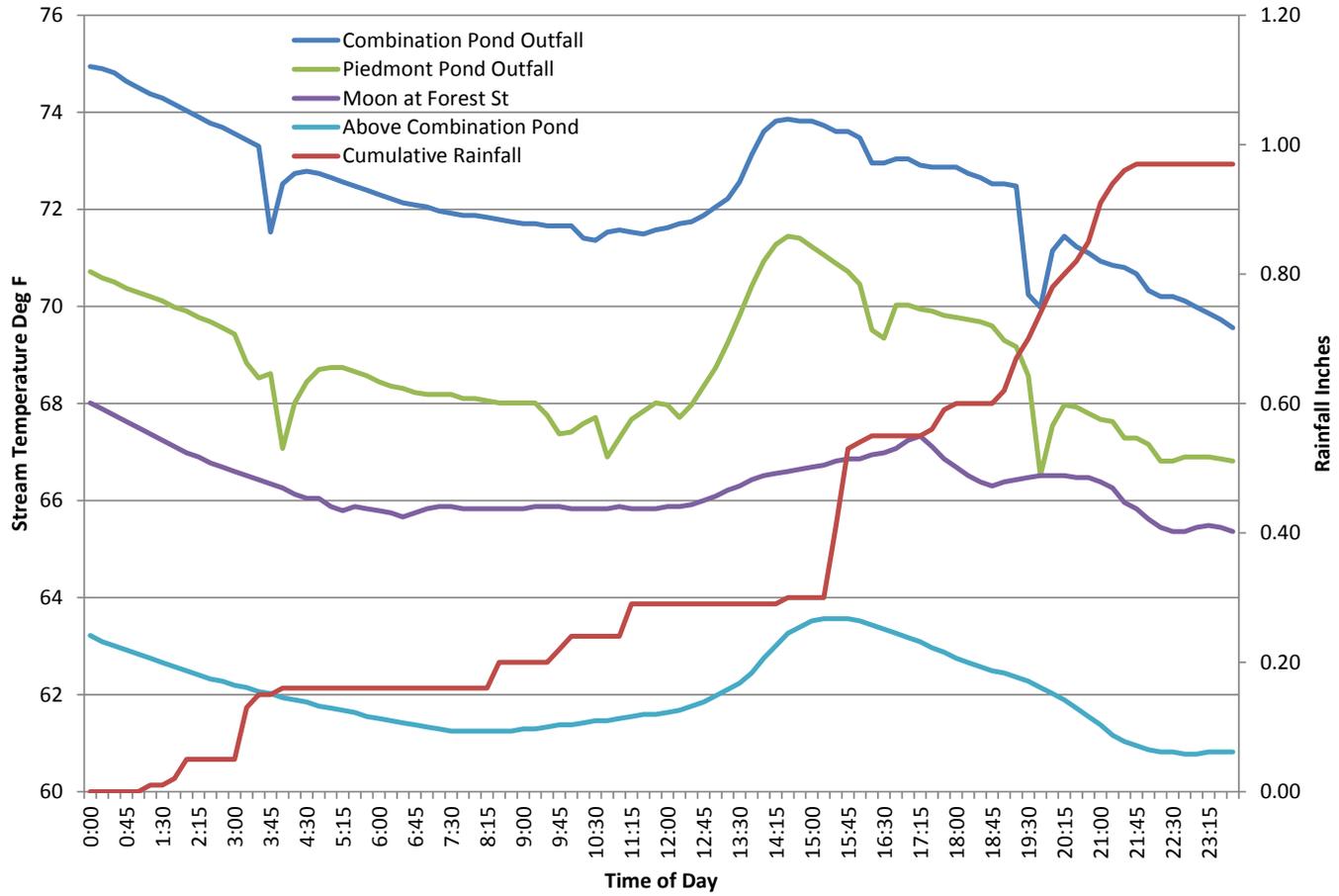
## Stream Temp vs Rainfall 6/2/12



### Stream Temp vs Rainfall 6/12/12



## Stream Temp vs Rainfall 6/25/12



## Stream Temp vs Rainfall 7/15/12

