

Attachment 1
City of Rutland Water Temperature Data

Water Temperature Data

Moon Brook Watershed

City of Rutland

Prepared by Evan Pilachowski, City Engineer, City of Rutland

Summer water temperature monitoring conducted by the City of Rutland from 2005 through 2007 has shown Combination Pond to have the greatest influence on temperature warming. Temperatures have been recorded with the HOBO Water Temp Pro from Onset. Six of these underwater temperature loggers were deployed in 2005 and eleven were deployed in 2006 and 2007. This monitoring project was partially funded through the Local Community Implementation Fund (LCIF) administered by the State of Vermont. The loggers were deployed in the spring of each year and collected in fall. The City has maintained certain sampling locations while adding new locations from year to year.

The monitoring results have shown a significant increase in temperature across Combination Pond and Piedmont Pond (Exhibit #1). Results have also shown an increase in temperature on Mussey Brook across the fairgrounds (Exhibit #2). Brook trout serve as an indicator organism for coldwater fisheries because they are intolerant of high temperatures. Biological indicator testing in Rutland City has consistently shown a lack of coldwater species including brook trout. According to a study conducted by the Surface Water Quality Bureau of the New Mexico Environment Department in July of 1999, a coldwater fishery is classified as having instantaneous temperatures below 75.2 °F (20 °C), no single day with temperatures above 68 °F (20 °C) for more than 8 hours, and no more than three days in a row with maximum temperatures above 68 °F (20 °C). This study was based on survival rates of trout species at different temperatures. The following table was prepared using the coldwater fishery standards and the collected data from the 160 day period from April 26, 2007 to October 3, 2007.

Location	Approximate Location Upstream of Confluence (mi)	Number of Days Outside Coldwater Fisheries Criteria
Paint Mine Brook ¹	0.1	3
Mussey Brook Above Fairgrounds ²	0.1	18
Mussey Brook Below Fairgrounds	0.7	40
Moon Brook Above Combination Pond ³	2.9	0
Moon Brook 3ft Below Combination Pond Outfall	2.7	95
Moon Brook 20 ft Below Combination Pond Outfall	2.7	94
Moon Brook Above Piedmont Pond ⁴	2.3	64
Moon Brook Below Piedmont Pond Outfall	2.1	81
Moon Brook at White's Playground ⁵	1.2	33
Moon Brook at Strongs Ave ⁵	0.9	28
Moon Brook at Forest St ⁵	0.3	32

¹ Paint Mine Brook is a small tributary of Moon Brook approximately 1.6 miles upstream of the confluence with Otter Creek. The stream is well vegetated and is monitored because of its relatively pristine condition.

² Mussey Brook is a tributary of Moon Brook approximately 0.3 miles upstream of the confluence with Otter Creek. The fairgrounds are a straight, unshaded stretch of brook, and it is suspected that this area contributes greatly to the thermal load on the brook.

³ The surface area of Combination Pond is approximately 2.15 acres and is mostly unshaded. The thermal impacts of the pond to Moon Brook are of concern.

⁴ The surface area of Piedmont Pond is approximately 0.68 acres and is mostly unshaded. The thermal impacts of the pond to Moon Brook are of concern.

⁵ The remainder of the sampling locations were selected to periodically test the temperature. There are no suspected areas where major thermal impacts are expected to significantly increase the temperature in Moon Brook.

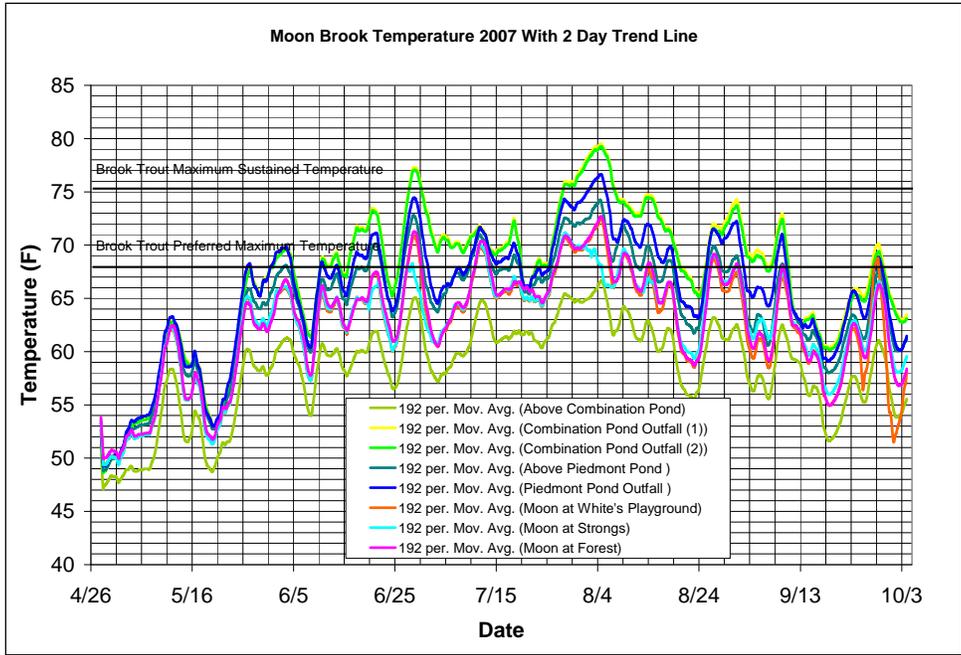


Exhibit #1

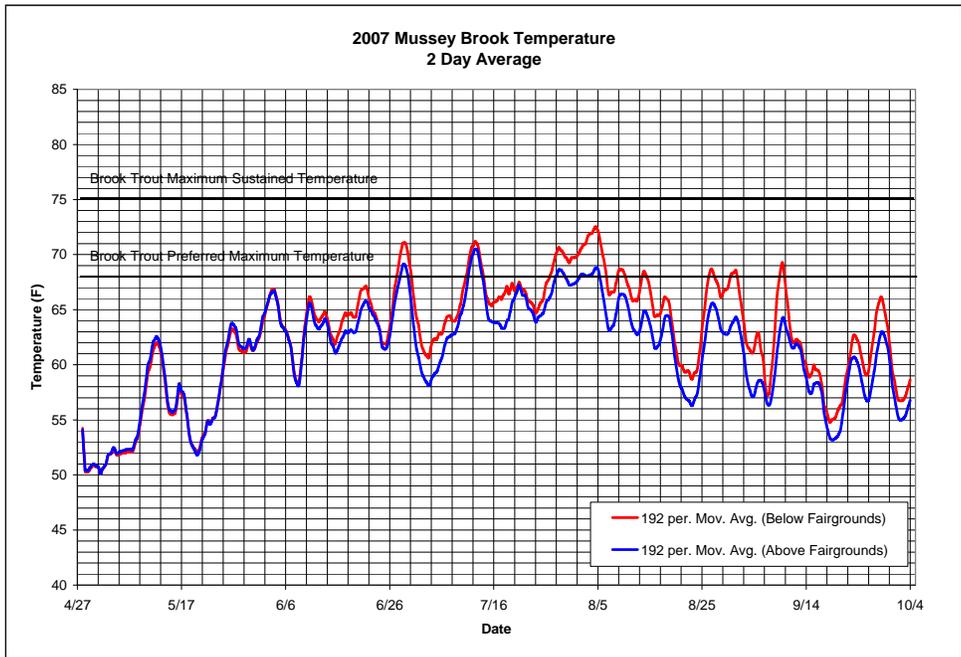


Exhibit #2

Because the influence of Combination Pond on downstream temperature was the greatest of any of the highlighted land features, further study of the pond was deemed necessary. In addition to temperature monitoring in the Moon Brook Watershed, a temperature profile of Combination Pond was completed in 2006 (Exhibit #3). A pond depth profile was prepared prior to monitoring temperatures. The depth of the pond was tested with a range pole to obtain an approximate contour map of the bottom of the pond. The pond is approximately 9 feet at its deepest, directly adjacent to the outfall. Four locations were tested using the underwater temperature monitors. The locations were upstream of Combination Pond, three feet below the surface of the pond at the outlet structure, six feet below the surface of the pond at the outlet structure, and in Moon Brook just downstream of the pond outfall. Since water flows over the top of a concrete outlet structure, the surface water temperature was assumed to be equal to the temperature measured just downstream of the pond. Though there was some data corruption downstream of Combination Pond due to some unknown source, the results showed that there is very little temperature difference between the different levels within Combination Pond.

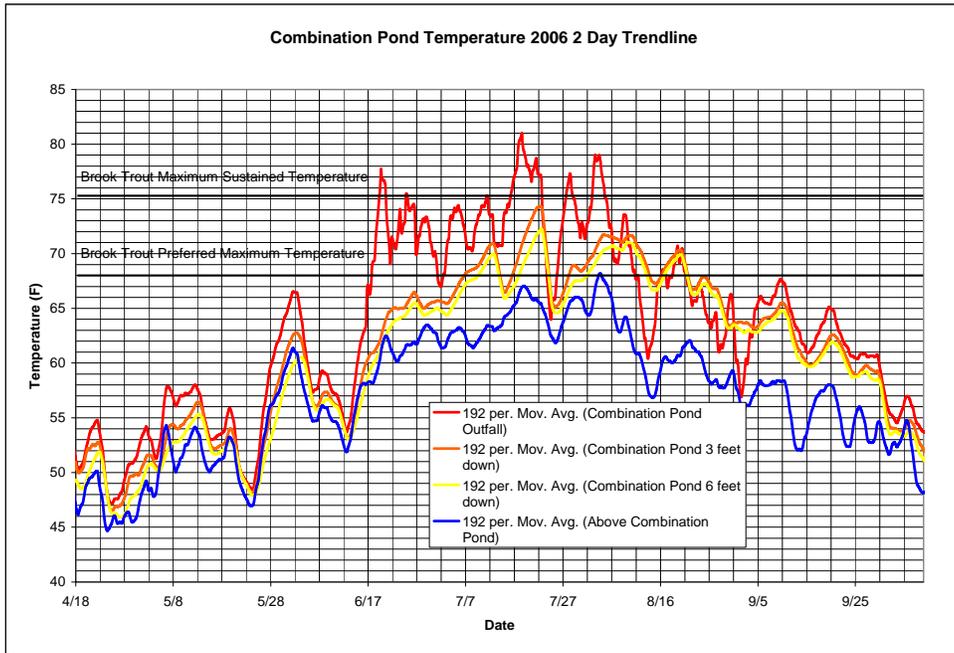


Exhibit #3

Moon Brook Temperature 2012 (2-Day Moving Average)

