CITY OF RUTLAND
P.O. BOX 969
RUTLAND, VERMONT 05702

DEPARTMENT OF PUBLIC WORKS
(802) 773-1813

PAUL G. CLIFFORD
COMMISSIONER OF PUBLIC WORKS

ALAN J. SHELVEY, P.E., L.S.
CITY ENGINEER

October 12, 2007

Mr. James Pease
VT ANR
Water Quality Division
103 South Main Street
Building 10 North
Waterbury, VT 05671-0408

Re: 2007 Moon & Mussey Temperature Monitoring

Dear Jim,

Enclosed is a memo from Evan Pilachowski regarding the results of the 2007 temperature monitoring of Moon and Mussey Brooks. Eleven "HOBOs" were installed at the end of April and removed in early October.

We recognize that elevated stream temperatures can be detrimental to one of the key indicator species, brook trout. As Wayne Laroche, Commissioner of Vermont Department of Fish and Wildlife wrote in December of 2005: "Elevated water temperature downstream of Combination Pond is almost certainly the factor that causes impairment of Moon Brook resulting in the listing as an impaired water."

In an effort to quantify the adverse effects of thermal pollution, a web search was conducted. Our research seems to indicate that temperatures above 68 degrees F (and definitely above 75 degrees) pose a severe problem. The New Mexico study cited by Evan was the source that was most definitive in its conclusions.

The HOBOs tell us that the survival of brook trout in Moon Brook downstream of Combination Pond is unlikely but above the pond conditions are very good. This corresponds with the field data.

It is evident that the two ponds (Combination and Piedmont) adversely affect the habitat downstream to the point where fish criteria will not be met regardless of compliance with any proposed TMDLs based on stream flow or the implementation of optimal sediment control. We were unable to find a study that addresses the influence of temperature on

the viability of the macroinvertrabates, perhaps because there are so many different species.

The thermal pollution situation combined with the fact that the wrong criteria (upland stream) are being used for the lower reaches of Moon Brook make attaining an unimpaired status for Moon Brook impossible.

It appears that it may be possible to address and correct the thermal pollution issue. We have discussed re-routing the brook around the ponds. It is likely that doing so will result in the establishment of a healthy population of indicator species downstream in the reaches that are stony-bottomed. If the State adopts reasonable criteria for the lower reaches of the brook, we may find the entire stream to be unimpaired.

Unfortunately, with its fixation on "urban runoff" the State made assumptions regarding the cause of the impairment and directed mandates and resources along a path that would be ineffective in restoring Moon Brook.

Nonetheless, we intend to cooperate further where feasible and time and resources allow.

Sincerely,

Alan J. Shelvey, P.E., L.S.
City Engineer

Cc: Paul Clifford, Commissioner of Public Works
Ethan Swift, VTANR
Shannon Pytlik VTANR
Nanci McGuire Rutland NRCD

Memorandum

To: Alan Shelvey, City Engineer

From: Evan Pilachowski, Associate City Engineer

Date: 10/10/2007

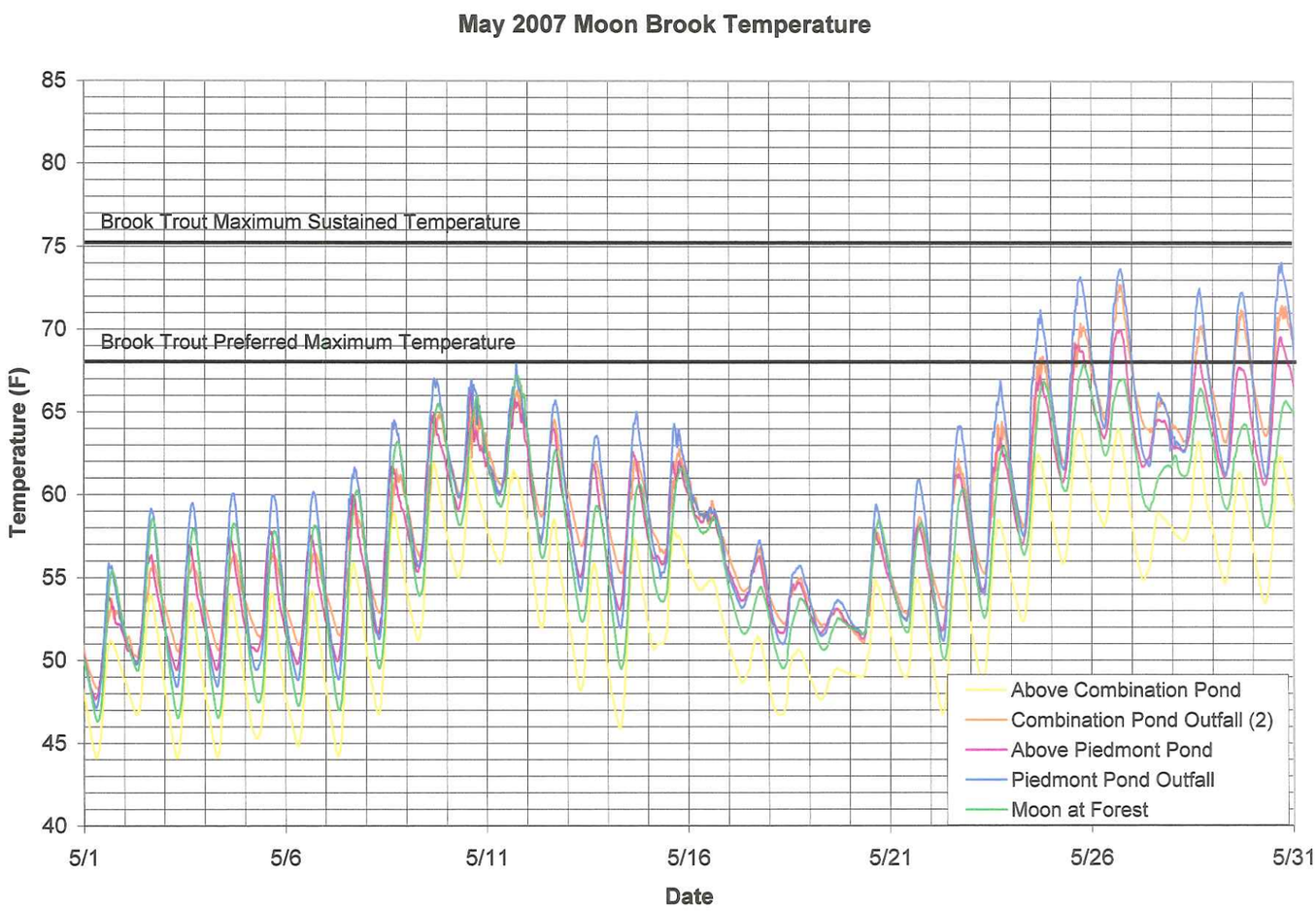
Re: 2007 Brook Temperature Monitoring Summary

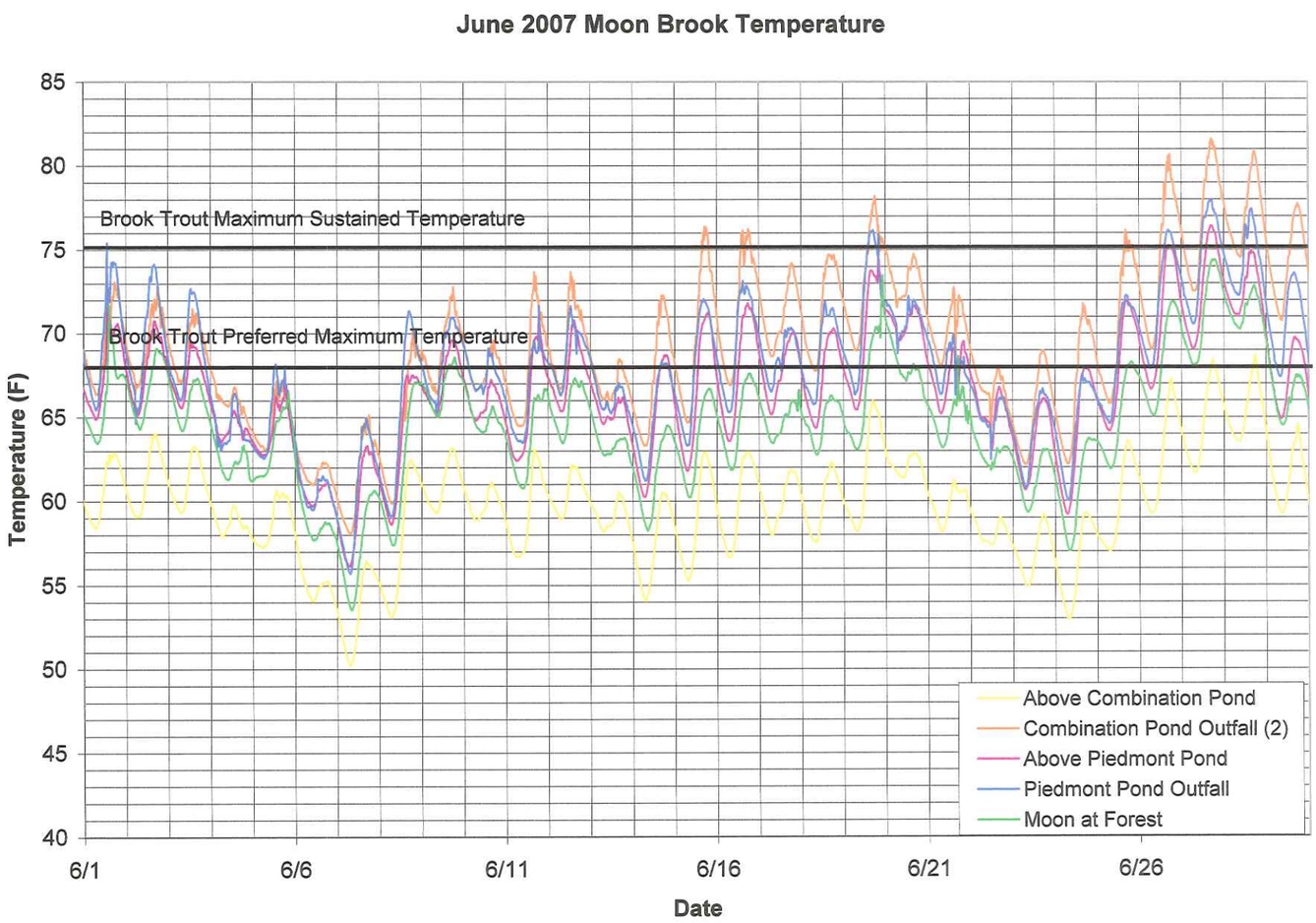
I have analyzed the temperature monitoring data from 2007. Graphs are attached that summarize my findings. In addition to the graphs, I have analyzed the habitat suitability of Moon Brook for brook trout in relation to temperature and the accuracy of the determination of Moon Brook as a Coldwater Fishery according to standards established by the Surface Water Quality Bureau of the New Mexico Environment Department (Bureau). According to a study conducted by the Bureau 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). The following table was prepared using these standards for the 160 day period from April 26, 2007 to October 3, 2007.

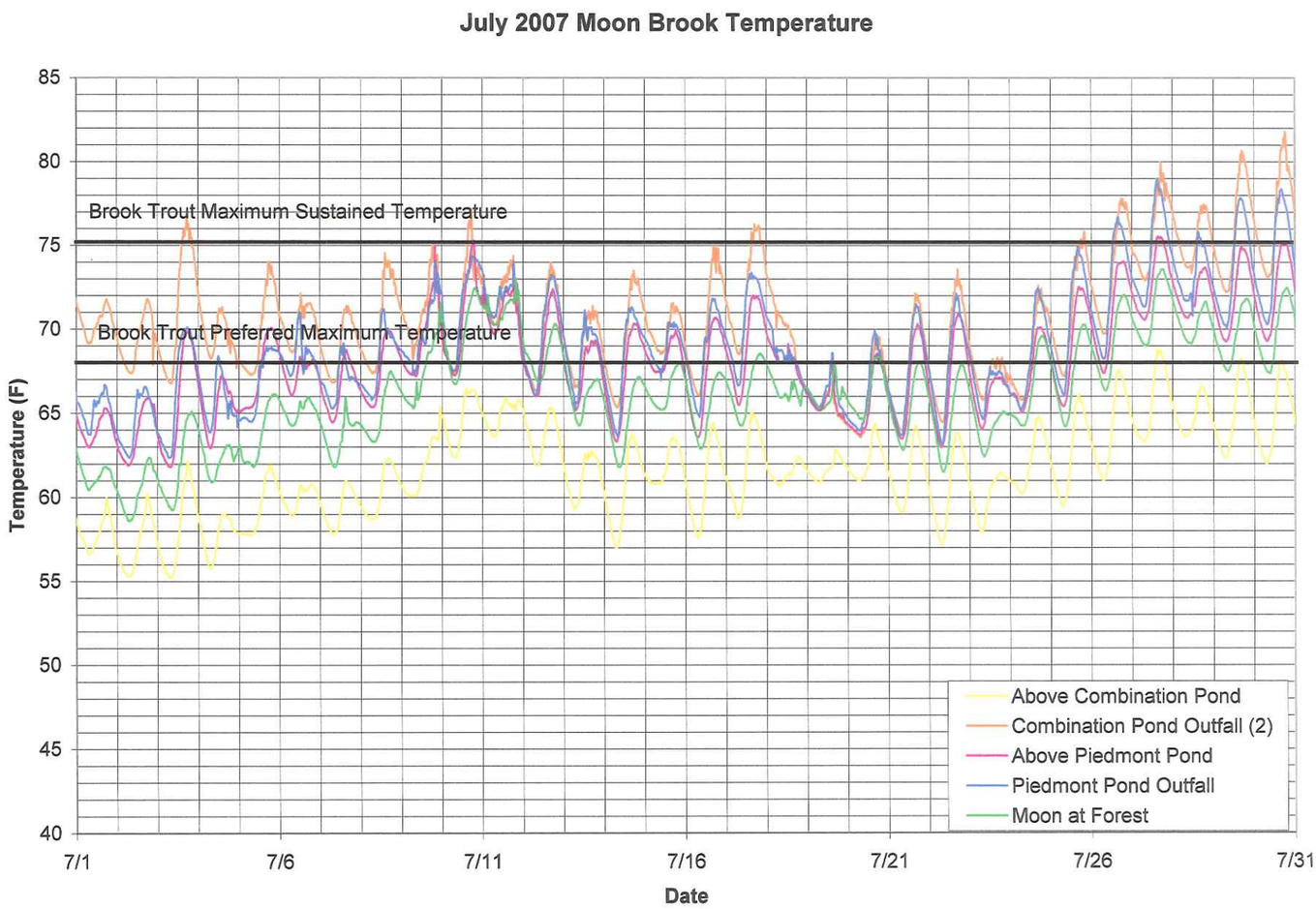
Location	Number of Day Outside Coldwater Fisheries Criteria
Paint Mine Brook	3
Mussey Brook Above Fairgrounds	18
Mussey Brook Below Fairgrounds	40
Moon Brook Above Combination Pond	0
Moon Brook 3ft Below Combination Pond Outfall	95
Moon Brook 20 ft Below Combination Pond Outfall	94
Moon Brook Above Piedmont Pond	64
Moon Brook Below Piedmont Pond Outfall	81
Moon Brook at White's Playground	33
Moon Brook at Strongs Ave	28
Moon Brook at Forest St	32

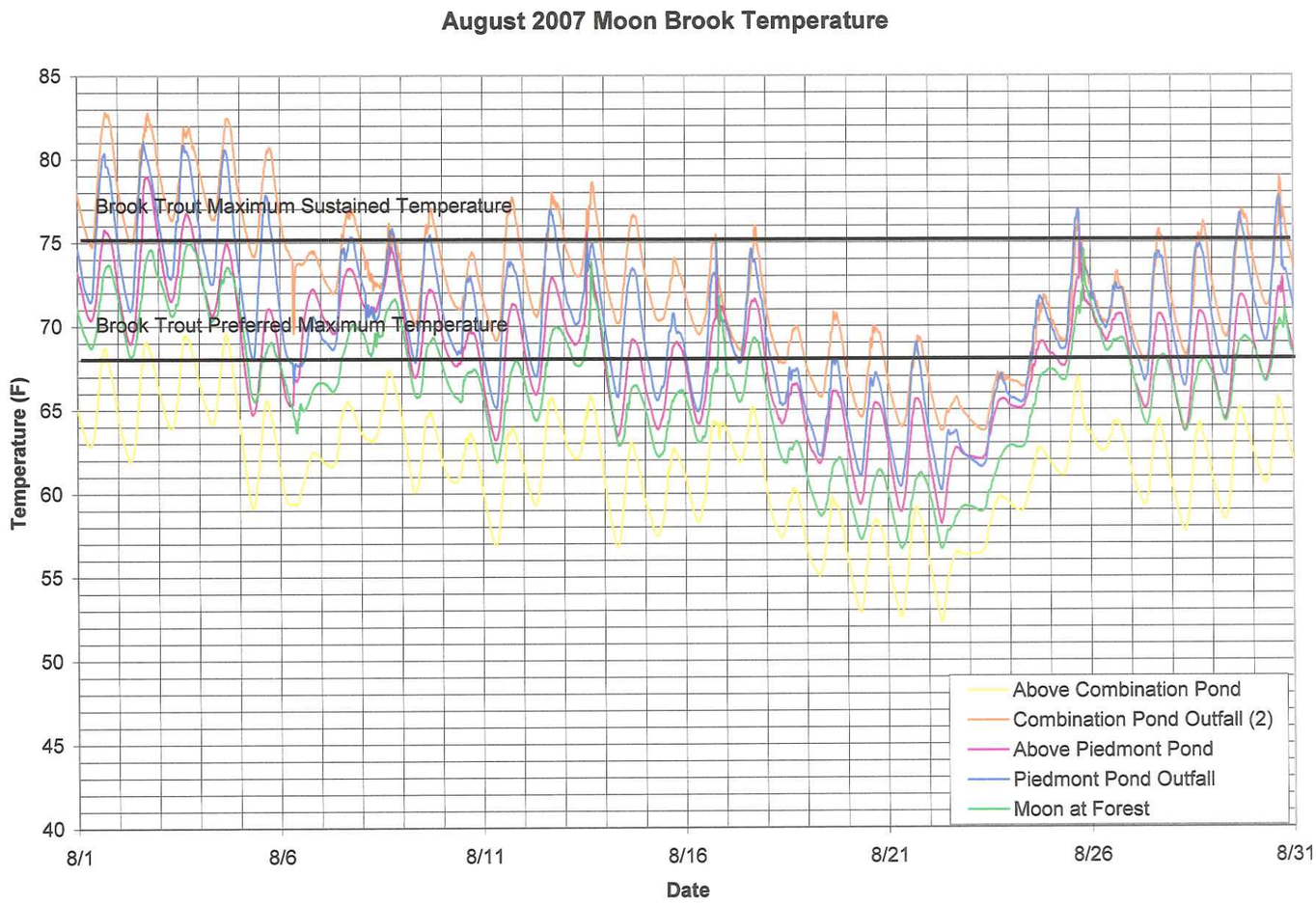
The temperature effects of Combinations Pond, Piedmont Pond, and the fairgrounds are all clearly visible. According to "Vermont Brook Trout Conservation Strategies" prepared by Rich Kirn of the Vermont Department of Fish and Wildlife on January 31, 2007, "as water temperature is still the most critical factor in determining the distribution of brook trout populations, land-use practices that help maintain cool water

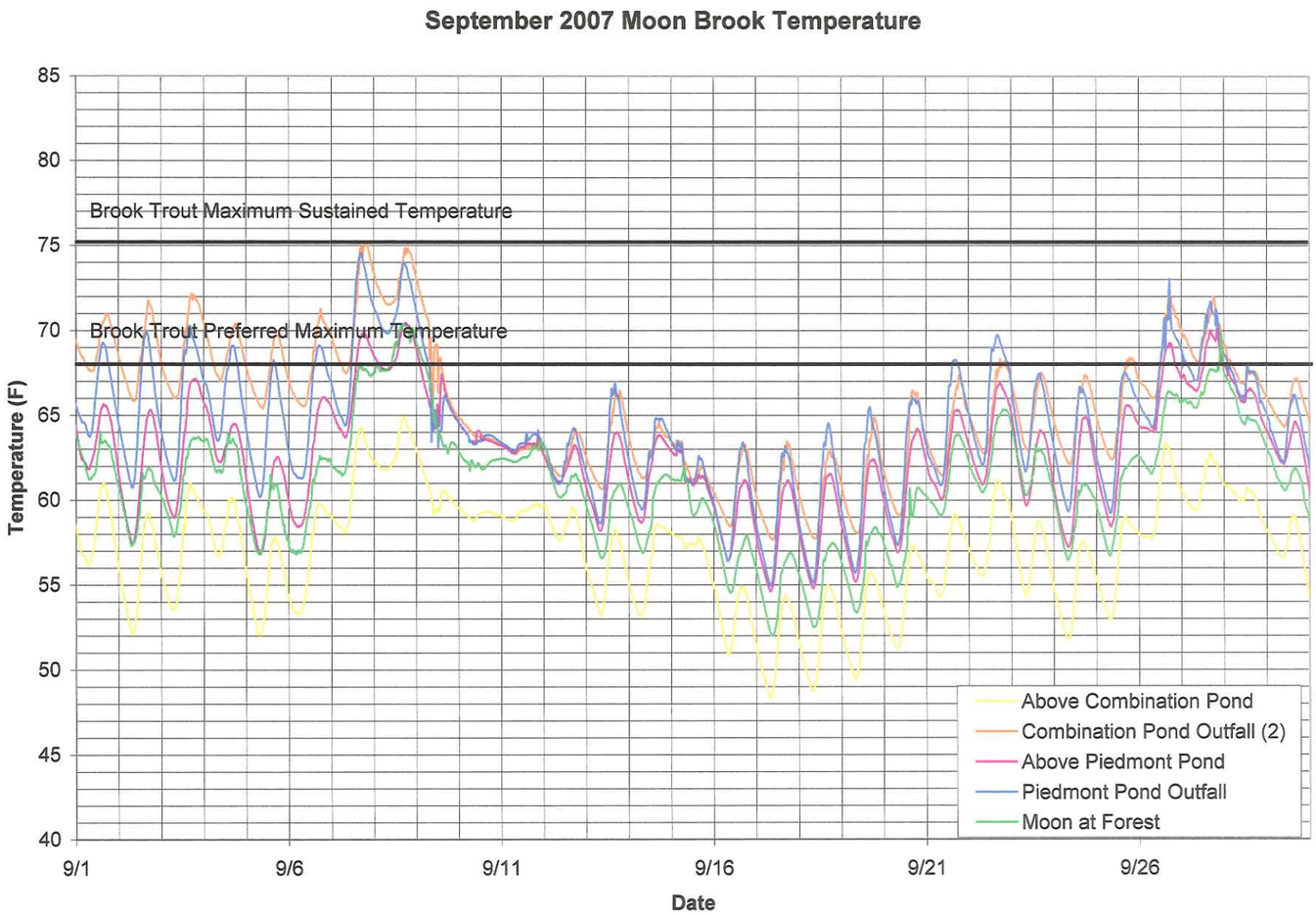
temperatures are of the utmost importance." Mr. Kirn goes on to list channelization and pond construction as contributing factors of increased water temperatures. It appears that the suitability of Moon Brook in the City of Rutland as a brook trout habitat is severely questionable in light of this information. It is little wonder that biological monitoring along Moon Brook has failed to identify coldwater fishery species including brook trout. It appears that it is critical to address the temperature effects of the three major areas listed in order to improve coldwater fishery habitat.

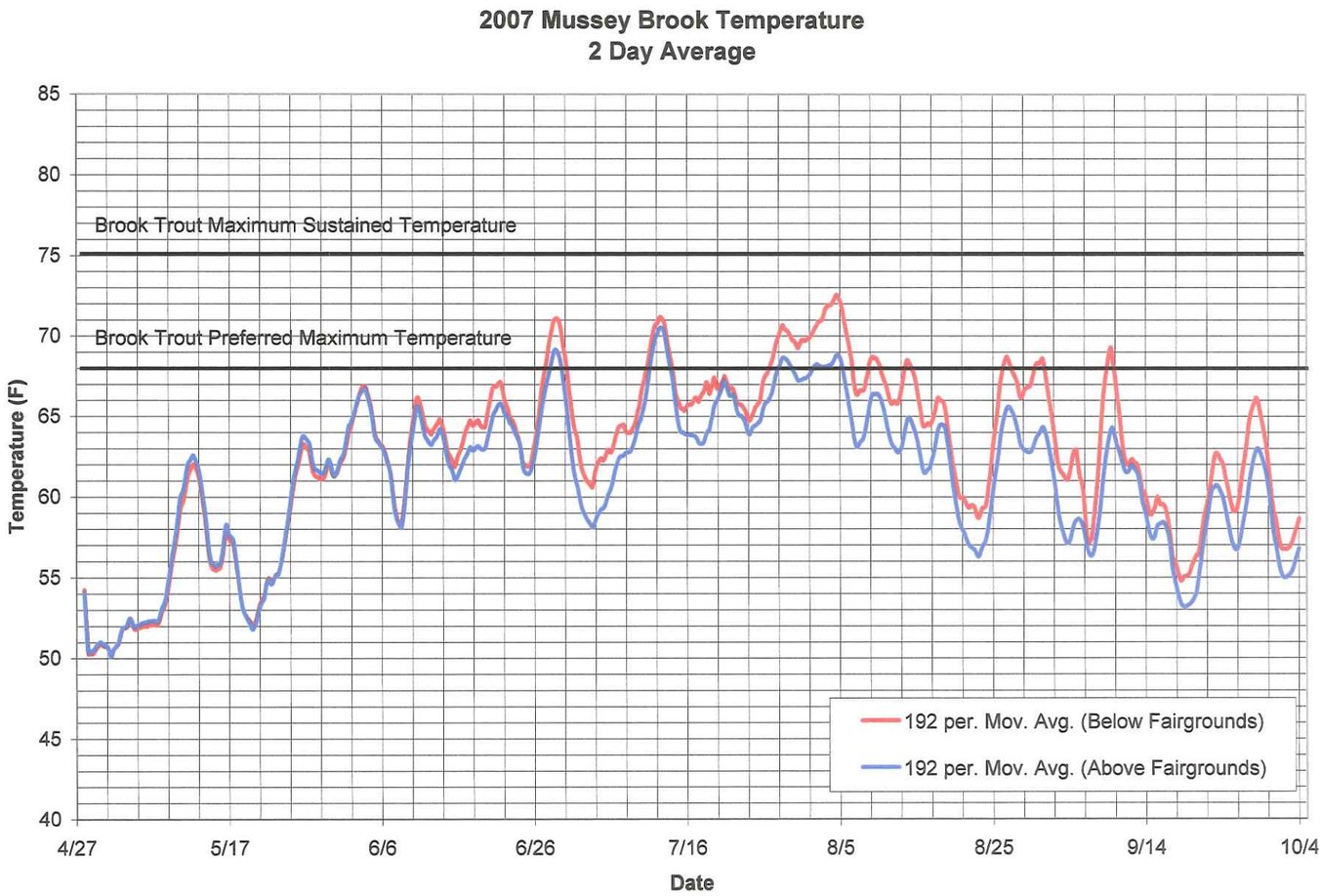

May 2007 Moon Brook Temperature
Temperature (F)
85
80
75
70
65
60
55
50
45
40
Brook Trout Maximum Sustained Temperature
Brook Trout Preferred Maximum Temperature
5/1
5/6
5/11
5/16
5/21
5/26
5/31
Date
Above Combination Pond
Combination Pond Outfall (2)
Above Piedmont Pond
Piedmont Pond Outfall
Moon at Forest

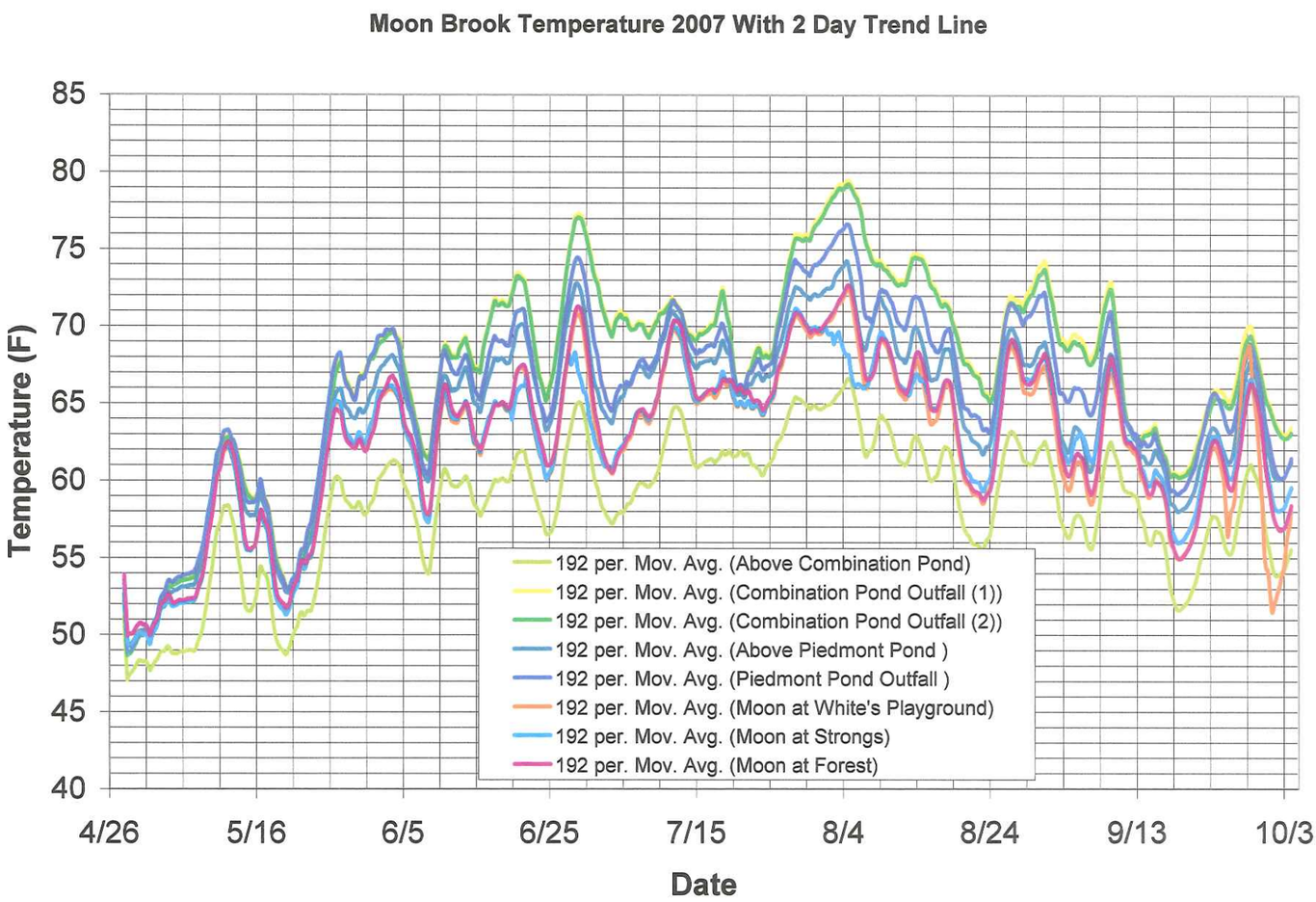

June 2007 Moon Brook Temperature
Temperature (F)
85
80
75
70
65
60
55
50
45
40
Brook Trout Maximum Sustained Temperature
Brook Trout Preferred Maximum Temperature
6/1
6/6
6/11
6/16
6/21
6/26
Date
Above Combination Pond
Combination Pond Outfall (2)
Above Piedmont Pond
Piedmont Pond Outfall
Moon at Forest


July 2007 Moon Brook Temperature
Temperature (F)
85
80
75
70
65
60
55
50
45
40
Brook Trout Maximum Sustained Temperature
Brook Trout Preferred Maximum Temperature
7/1
7/6
7/11
7/16
7/21
7/26
7/31
Date
Above Combination Pond
Combination Pond Outfall (2)
Above Piedmont Pond
Piedmont Pond Outfall
Moon at Forest

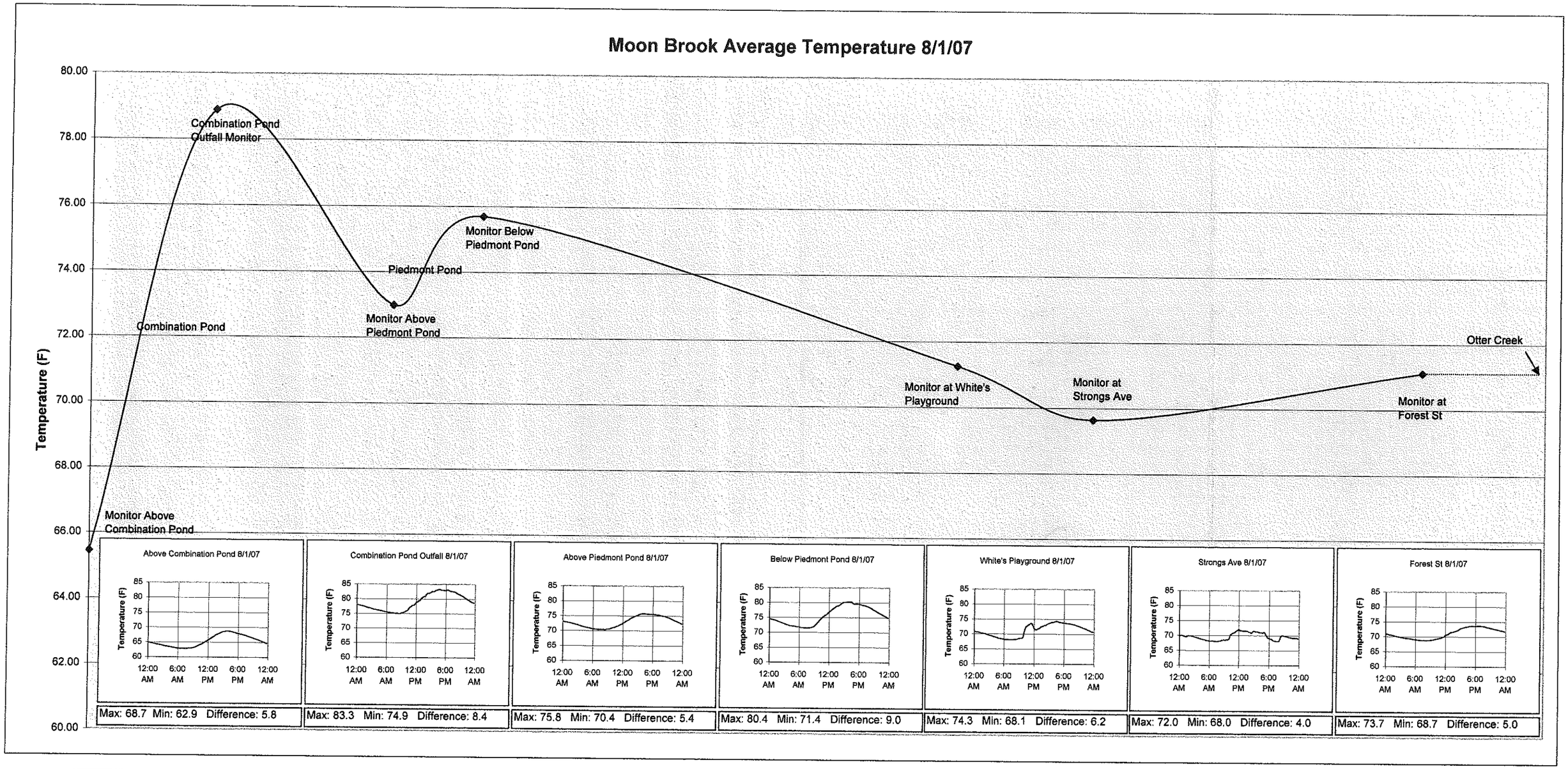

August 2007 Moon Brook Temperature
Temperature (F)
85
80
75
70
65
60
55
50
45
40
Brook Trout Maximum Sustained Temperature
Brook Trout Preferred Maximum Temperature
Above Combination Pond
Combination Pond Outfall (2)
Above Piedmont Pond
Piedmont Pond Outfall
Moon at Forest
8/1
8/6
8/11
8/16
8/21
8/26
8/31
Date

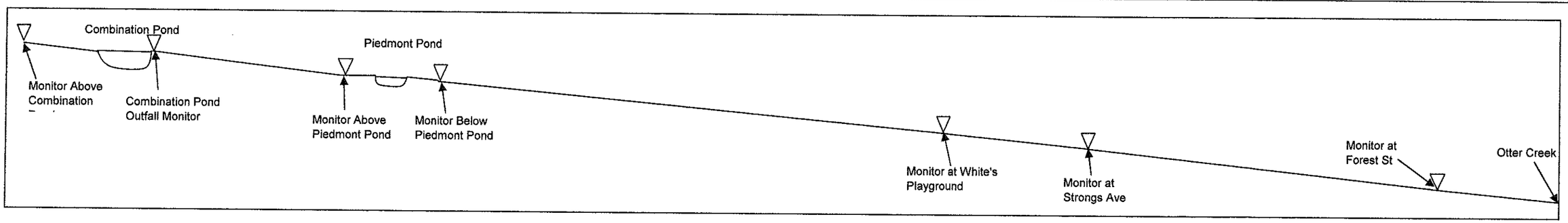

September 2007 Moon Brook Temperature
Brook Trout Maximum Sustained Temperature
Brook Trout Preferred Maximum Temperature
Temperature (F)
85
80
75
70
65
60
55
50
45
40
9/1
9/6
9/11
9/16
9/21
9/26
Date
Above Combination Pond
Combination Pond Outfall (2)
Above Piedmont Pond
Piedmont Pond Outfall
Moon at Forest


2007 Mussey Brook Temperature
2 Day Average
Brook Trout Maximum Sustained Temperature
Brook Trout Preferred Maximum Temperature
Temperature (F)
85
80
75
70
65
60
55
50
45
40
4/27
5/17
6/6
6/26
7/16
8/5
8/25
9/14
10/4
Date
192 per. Mov. Avg. (Below Fairgrounds)
192 per. Mov. Avg. (Above Fairgrounds)


Moon Brook Temperature 2007 With 2 Day Trend Line
Temperature (F)
85
80
75
70
65
60
55
50
45
40
4/26
5/16
6/5
6/25
7/15
8/4
8/24
9/13
10/3
Date
192 per. Mov. Avg. (Above Combination Pond)
192 per. Mov. Avg. (Combination Pond Outfall (1))
192 per. Mov. Avg. (Combination Pond Outfall (2))
192 per. Mov. Avg. (Above Piedmont Pond)
192 per. Mov. Avg. (Piedmont Pond Outfall)
192 per. Mov. Avg. (Moon at White's Playground)
192 per. Mov. Avg. (Moon at Strongs)
192 per. Mov. Avg. (Moon at Forest)

Moon Brook Average Temperature 8/1/07





Moon Brook Average Temperature 8/1/07