

Temperature Impairment Presentation



CITY OF RUTLAND
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DEPARTMENT OF PUBLIC WORKS
(802) 773-1813

PAUL G. CLIFFORD
COMMISSIONER OF PUBLIC WORKS

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

June 4, 2008

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

Re: Moon Brook

Dear Mr. LaFlamme,

The 2006 303(d) list indicates that Moon Brook is impaired due to stormwater. We do not believe that there is sufficient evidence to draw this conclusion. This assumption seems to have been made because the brook is impaired and it flows through an urban area.

In 2005, after some discussion regarding the nature of the impairment and the appropriateness of the protocol used to determine Moon Brook's status, the issue of the detrimental effect of stream temperature increases due to the on-stream ponds was highlighted by the Agency's staff.

Staff biologists expressed concern over the effect that these ponds are having on water quality and consequently the stresses on the aquatic biota that the State are using as water quality indicator species.

We later received a letter dated December 12, 2005 from the Commissioner of the Department of Fish and Wildlife, Wayne Laroche who, after consultation with staff from the Water Quality Division, wrote *"Elevated summer 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."*

Over the last few years we have researched this issue further and discovered that the Agency is correct.

In-stream temperature monitoring has shown that summer temperatures are above the levels tolerated by the target fish and macro-invertebrate indicator species. The elevated temperature was determined to be due to the adverse effects of the on-stream ponds.

June 4, 2008

There is solid, real world evidence to support the conclusion that the stream is impaired due to temperature. Enclosed is a summary of that data.

In light of the above, we request that the Agency issue a determination that, due to recently reported evidence, VTDEC will propose that the cause of the impairment to Moon Brook be listed as temperature, (not stormwater).

We also request that beginning immediately all development within the Moon Brook watershed be subject to the Stormwater Management Rule for Unimpaired Waters (i.e. the "rule for the management of stormwater runoff in waters that are not principally impaired by stormwater runoff.")

Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Alan J. Shelvey". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

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

Cc: Mayor Louras
Jim Pease, VT ANR Water Quality Division
Doug Burnham, VTANR Aquatic Biologist Supervisor
Wayne Laroche, Commissioner, F&W
Paul Clifford, Commissioner of Public Works



State of Vermont

AGENCY OF NATURAL RESOURCES

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation

DEPARTMENT OF FISH AND WILDLIFE
103 South Main Street, 10 South
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Tel.: (802) 241-3700
TDD: 1-800-253-0191

Wayne Laroche, Commissioner
Telephone: 802-241-3730
Facsimile: 802-241-3295

December 12, 2005

Alan J. Shelvey, P.E., L.S., City Engineer
City of Rutland
P.O. Box 969
Rutland, VT 05702

DEC 14 2005

Dear Mr. Shelvey:

I was asked by Scot Kline, General Counsel for Vermont Agency of Natural Resources, to review and consider the City of Rutland's request for reconsideration of the decision made by the Water Quality Division of the Department of Environmental Conservation (DEC) to keep Moon Brook on the State 303(d) list of impaired waters.

I have reviewed the materials you submitted with your request and questioned Water Quality Division staff regarding their procedure for classifying and listing impaired waters. I also questioned staff concerning the specific conditions found in Moon Brook related to their determination of the water quality classification and listing. DEC staff provided water temperature data for my review. We further discussed possible actions that might be taken that might lead to improvement in water quality in Moon Brook to objectively justify a change in classification.

As a result of my review, I believe that the decision made by DEC staff to continue to list Moon Brook was objective and warranted based upon the appropriate measures needed to assess and classify the condition of the waterway.

Elevated summer 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. Combination Pond is an on-stream pond that allows for solar heating of waters that discharge downstream. My understanding is that this pond is used to store water for fire protection. An obvious solution to this problem is to channel Moon Brook so that it does not pass through the pond.

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If stream temperatures were reduced to become comparable to those above Combination Pond, it is quite likely that biological conditions within Moon Brook would rapidly improve. It is quite possible that within several years conditions would improve enough to merit de-listing based upon the objective criteria used in the listing process.

In sum, I concur with DEC staff that the continued listing of Moon Brook as impaired is an objective and appropriate decision.

Sincerely,



Wayne A. Laroche
Commissioner

cpm

cc: Scot Kline, ANR General Counsel
Jeffrey Wennberg, Commissioner, Environmental Conservation

DEC 14 2005

Moon Brook Temperature Monitoring

The City of Rutland has conducted temperature monitoring in the Moon Brook Watershed within the City of Rutland each of the last three years (2005-2007). 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 sampling locations that have been maintained each year are shown below:

- Moon Brook Above Combination Pond
- Moon Brook Below Combination Pond Outfall
- Moon Brook Below Piedmont Pond Outfall
- Moon Brook at White's Playground
- Moon Brook at Forest St. Bridge
- Mussey Brook below Fairgrounds

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 have 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 is 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.

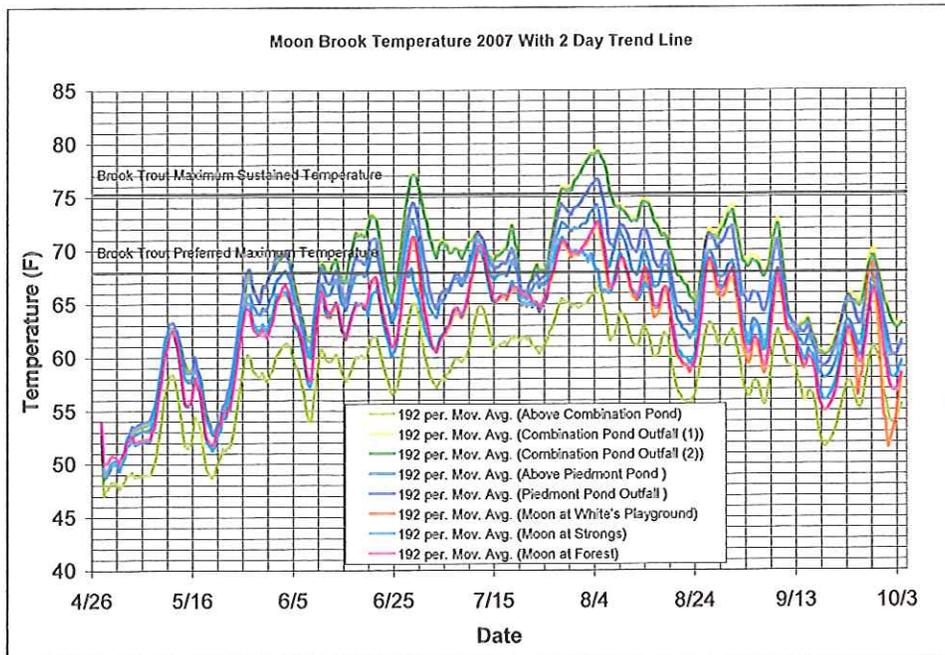


Exhibit #1

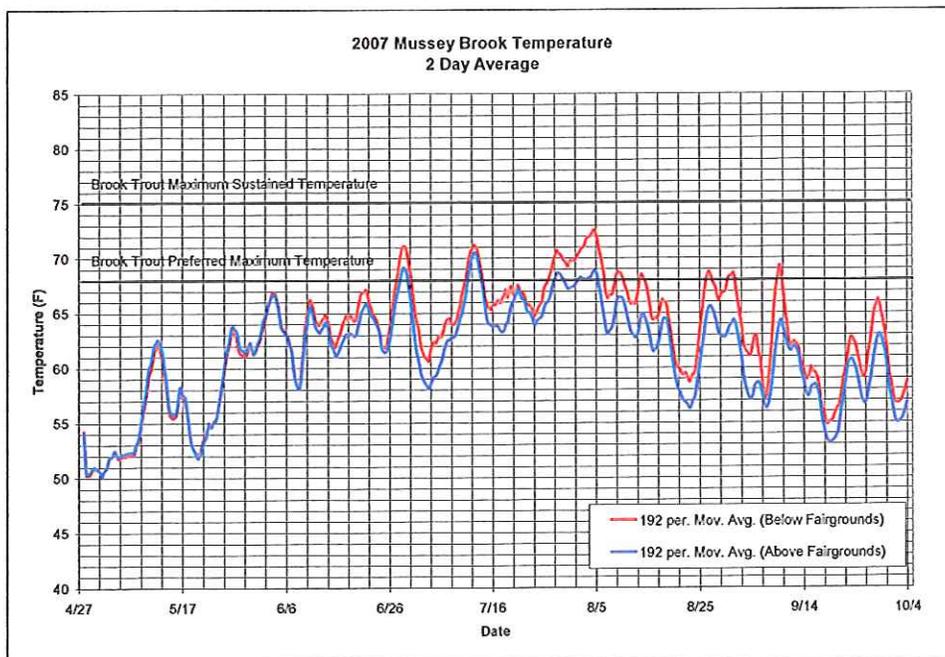


Exhibit #2

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.

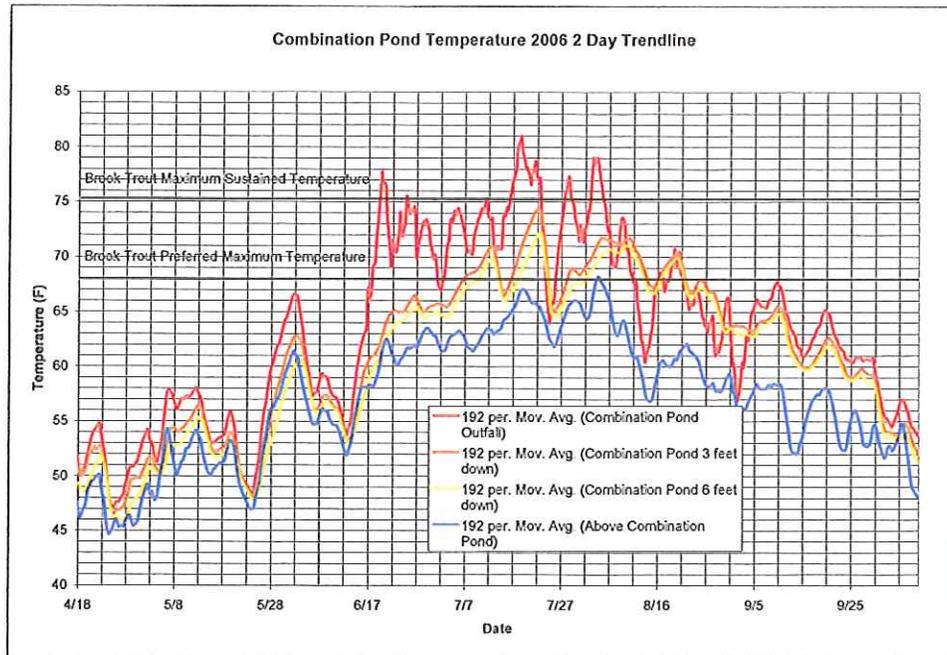


Exhibit #3

The City plans to continue monitoring temperatures within the Moon Brook Watershed, and to use this data to analyze the effectiveness of any future temperature mitigation projects.

Moon Brook Average Temperature 8/1/07

