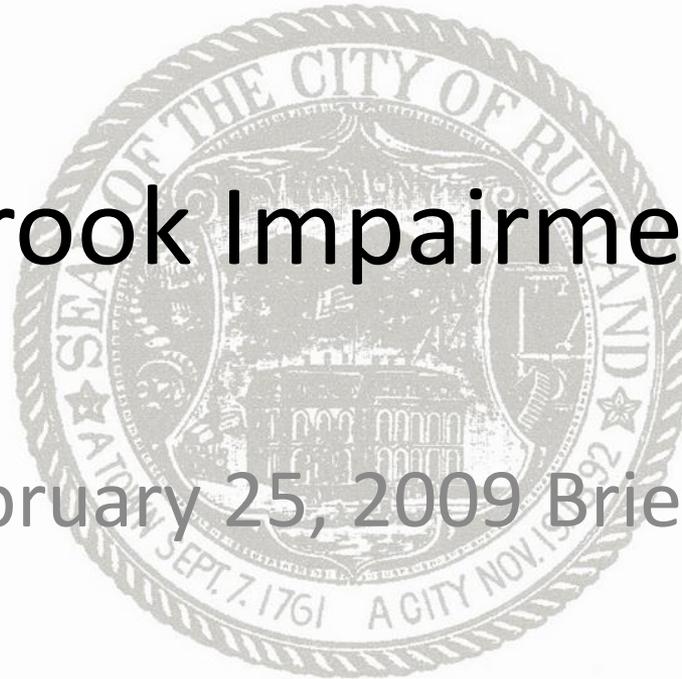


Moon Brook Impairment Status

February 25, 2009 Briefing



Overview

- ANR has historically defined and redefined the source of the Moon Brook impairment without any empirical proof for any of the suspected causes;
- Stormwater impaired status carries a heavy remediation burden; some micro watershed remediation costs are estimated in the millions;
- Impacts on public budgets and private property owners are already being felt;
- The City has compelling evidence that:
 - The impairment is not due to stormwater runoff
 - ANR has made multiple errors classifying and evaluating Moon Brook
 - The City has compelling evidence that the cause of the impairment is temperature, not stormwater
- Before regulatory requirements are imposed potentially costing millions of dollars, the true cause and proper treatment of the impairment should be known with certainty.

Issue 1: Misclassification

- 02-07-04 ANR biological assessment report assumed Moon Brook was a Warm Water Medium Gradient stream (WWMG); Moon Brook failed to meet the WWMG standard.
- 08-02-05 CoR contested the classification.
- 09-13-05 ANR acknowledges misclassification, but asserts stormwater impairment citing DEC procedure for stream types for which numeric criteria have not been developed.

Issue 1: Misclassification

- According to “*Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase*” (2/10/04), when the stream cannot be placed into any of the three stream categories with a high degree of confidence,

“ . . .the VTDEC shall give full consideration to identifying appropriate biological communities to evaluate, and to describing the appropriate reference condition for evaluating those communities. In evaluating appropriate reference conditions, VTDEC must describe the range of chemical, physical, and biological characteristics of waters minimally affected by human influences that reasonably establish attainable chemical, physical, and biological conditions for the specific water body under evaluation. . . Findings related to aquatic life use support in non-categorized waterbodies shall be based on the establishment of a compelling weight-of-evidence argument derived from monitoring data and best professional judgment. Such evaluations shall be conducted in a manner consistent with established principles of freshwater ecology and water pollution biology, and shall be fully documented.”

Issue 1: Misclassification

- In the case of Moon Brook:
 - “appropriate biological communities” were not identified for the stream type;
 - “appropriate reference conditions” for evaluation of communities were not identified, including
 - Chemical conditions
 - Physical conditions
 - Biological conditions
 - since these evaluations were not conducted, they have not been “fully documented.”

Issue 1: Misclassification

- Given that the assessment was conducted under the erroneous assumption that Moon Brook was a WWMG class stream, the standards for determination of compliance for non-categorized waterbodies have not been met.
- DEC has instead retroactively applied the same biological communities and other reference conditions they originally misapplied under the WWMG stream class.
- Given the misclassification, **ANR cannot assert that Moon Brook is stormwater impaired without following the prescribed procedure and reassessing the biological communities.**

Issue 2: Flow Duration Curve

- DEC seriously miscalculated stormwater runoff flows for Moon Brook;
- DEC has failed to consider “confidence intervals” when creating curves for reference and ‘impaired’ streams;
- DEC selected only 1 reference stream as the basis for demonstration of flow-induced impairment and targeted mitigation;
- DEC arbitrarily reduced flows for the reference stream;
- There is no statistical difference between the flows in the attainment stream and Moon Brook.

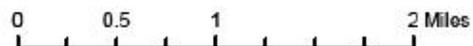
Issue 2: Flow Duration Curve

- The key measurement in the calculation of flows is ‘impervious surface’;
- DEC used satellite imagery to calculate impervious surface in Moon Brook;
- DEC apparently failed to back out impervious surfaces that deliver runoff to the city’s combined sewer system;
- The result is a significant overstatement of the impervious runoff delivered to Moon Brook.

Source:
*Draft Moon Brook
TMDL;*
July, 2008



Figure 1: Moon Brook Stormwater Impaired Watershed



Issue 2: Flow Duration Curve

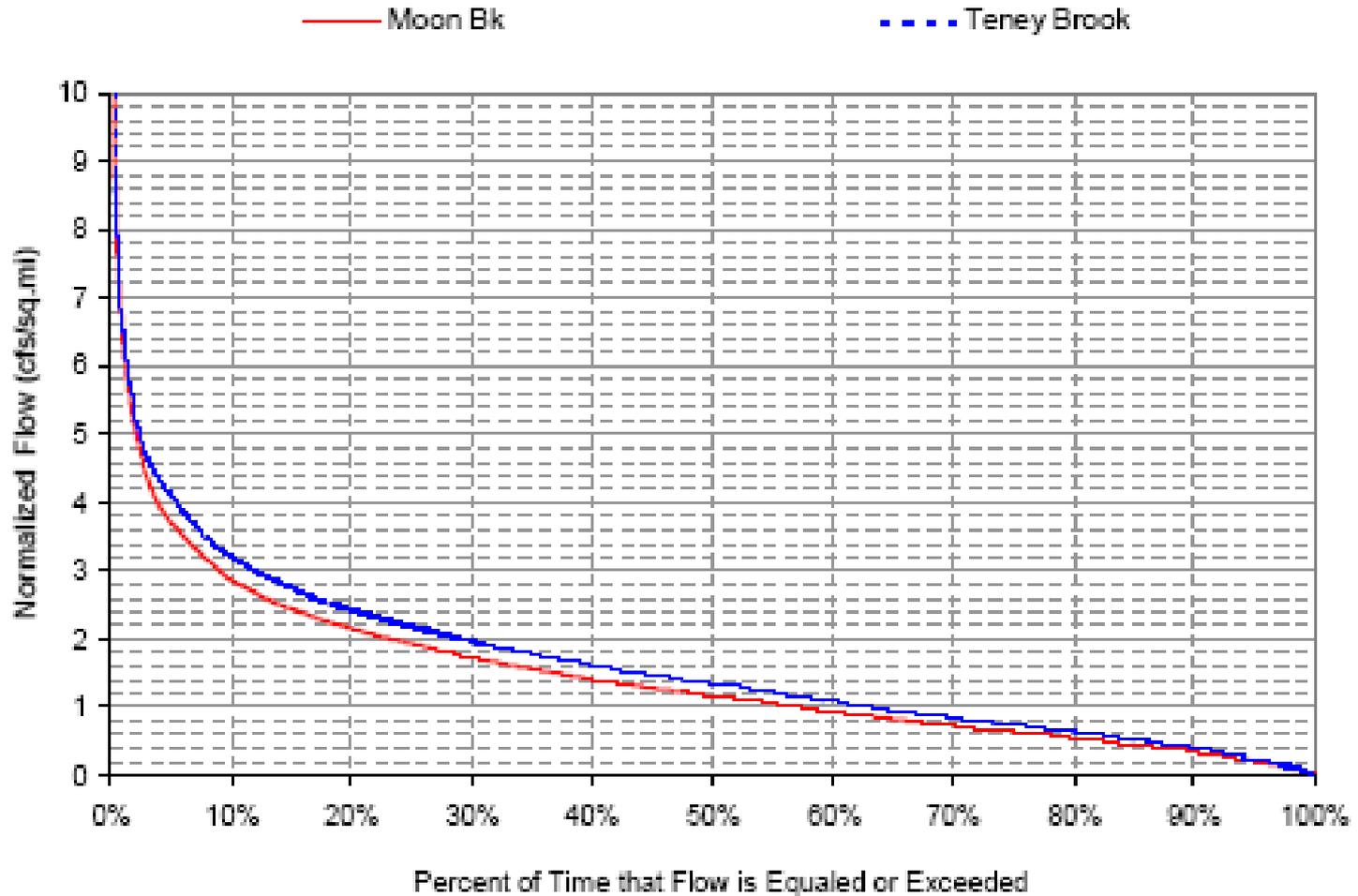
- CoR has calculated that the high-flow diversion to combined sewers is 14 acre-feet;
- The draft Moon Brook TMDL calls for mitigation of 10 acre-feet under high-flow conditions;
- **The City of Rutland had achieved 140% of the TMDL-required mitigation at the time the DEC assessment concluded Moon Brook was impaired!**

Issue 2: Flow Duration Curve

- The selection of Tenney Brook as the Moon Brook reference stream is not consistent with the requirements of the P8-UCM flow duration curve model.
- Moon Brook contains large impoundments (Combination Pond and Piedmont Pond) which are not present on Tenney Brook and are excluded from the model's development:

“Although the P8-UCM is capable of simulating impoundments such as pond, reservoirs, wetlands, etc., the present analysis excluded the detailed representation of impoundments for two reasons. One is that the objective of the project is to develop hydrologic targets for impaired watersheds in relation to attainment watersheds. This comparative exercise can eliminate the errors associated with the exclusion of impoundments if the selection of an attainment watershed for each impaired watershed is carefully conducted. . .” – 07-27-05 TetraTech Model Calibration Memo, p. 7.

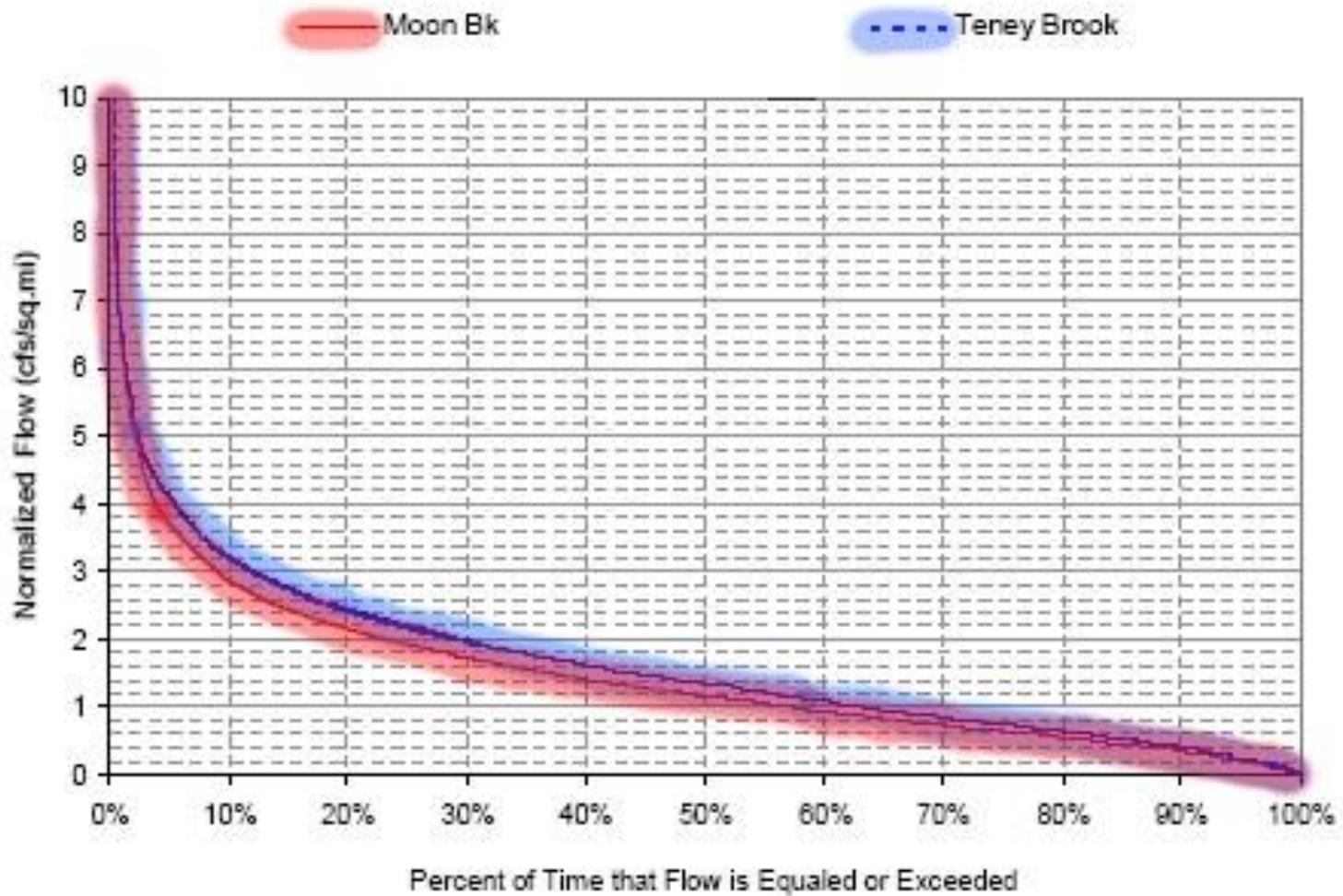
This is how the Moon Brook and Tenney Brook flow duration curves are Presented in the Draft TMDL



Issue 2: Flow Duration Curve

- Reference stream flows are arbitrarily reduced by 5%; but for this adjustment, the curves would be indistinguishable.
- Both lines are presented as precise curves; this is not accurate.
- In reality all key inputs to the model are estimates and the model itself is an approximation.
- A more accurate representation of these curves would be as shown in the next slide:

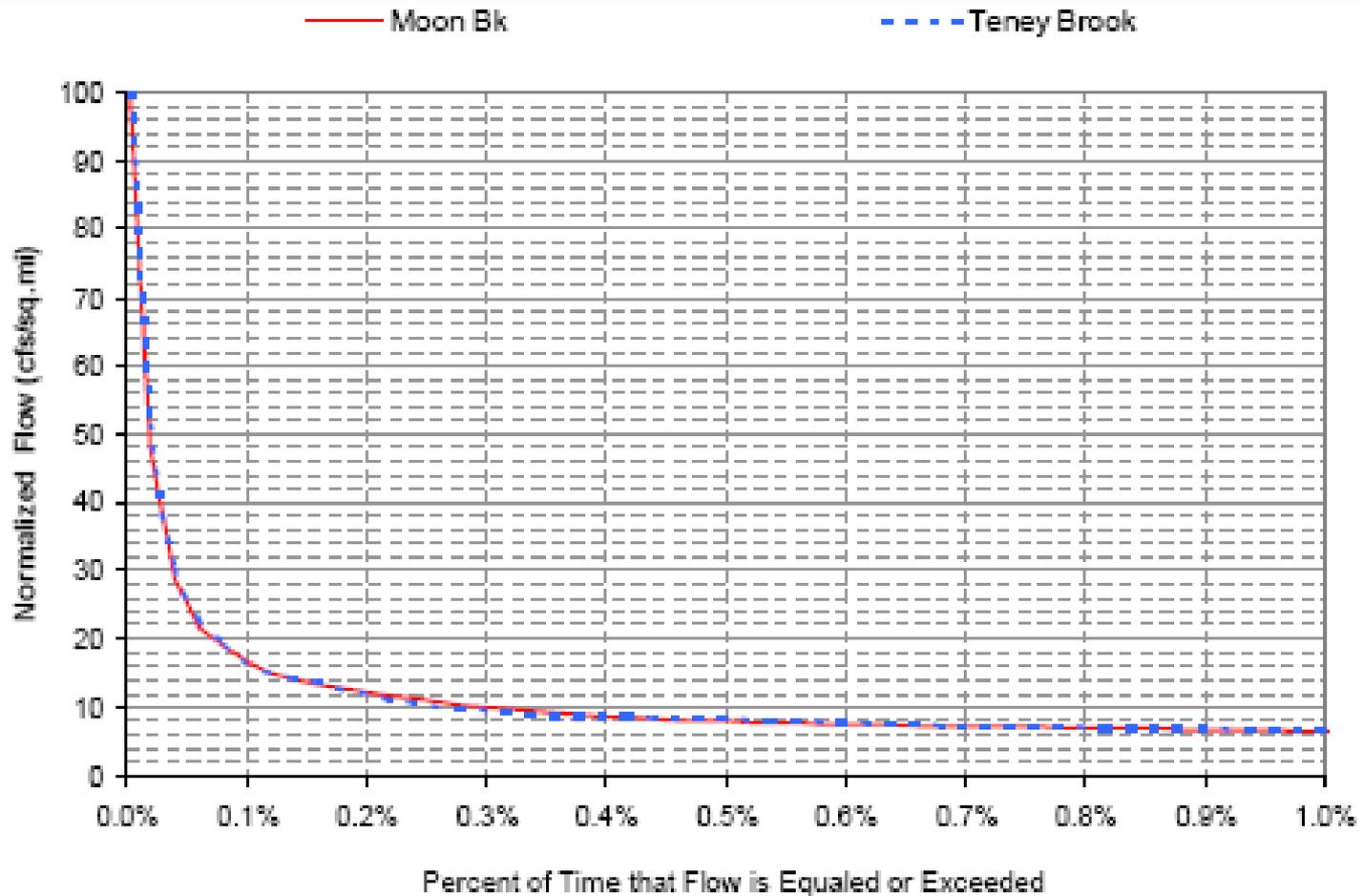
Moon and Tenney Brook flow duration curves with uncertainty indicated.



Issue 2: Flow Duration Curve

- DEC has not calculated or represented the confidence intervals around the Moon Brook and reference stream curves;
- CoR believes that when these uncertainties are included, there will be no statistical difference between the curves along their entire length.

This is the high flow portion of the duration curve from the draft TMDL.



Issue 2: Flow Duration Curve

- Even without confidence intervals or corrections for combined sewer diversions, there is no distinguishable difference between the reference stream and Moon Brook for the critical high flow condition.
- **When all corrections are made and confidence intervals included, we believe the P8-UCM model will show that from a stormwater discharge perspective, Moon Brook *should not be impaired.***

Issue 3: Temperature Impairment

- While there is no evidence to support a designation for stormwater impairment, the CoR believes that an appropriate bioassessment will most likely demonstrate failure to meet VWQS.
- CoR has developed in-stream real-world evidence that the cause is elevated stream temperatures below Combination Pond.

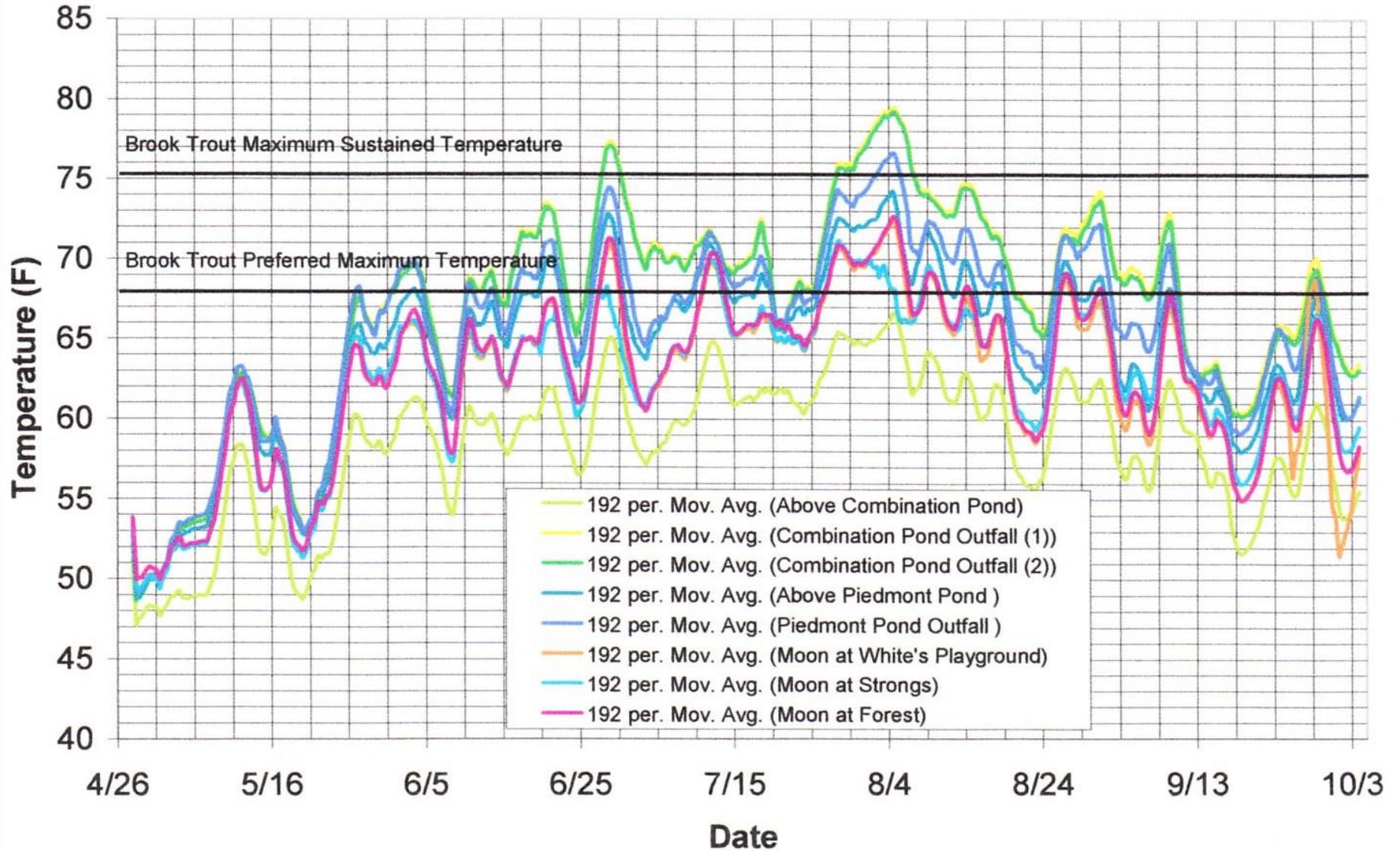
Issue 3: Temperature Impairment

- The evidence for temperature impairment includes:
 - 12-12-05 letter from F&W Commissioner Laroche:

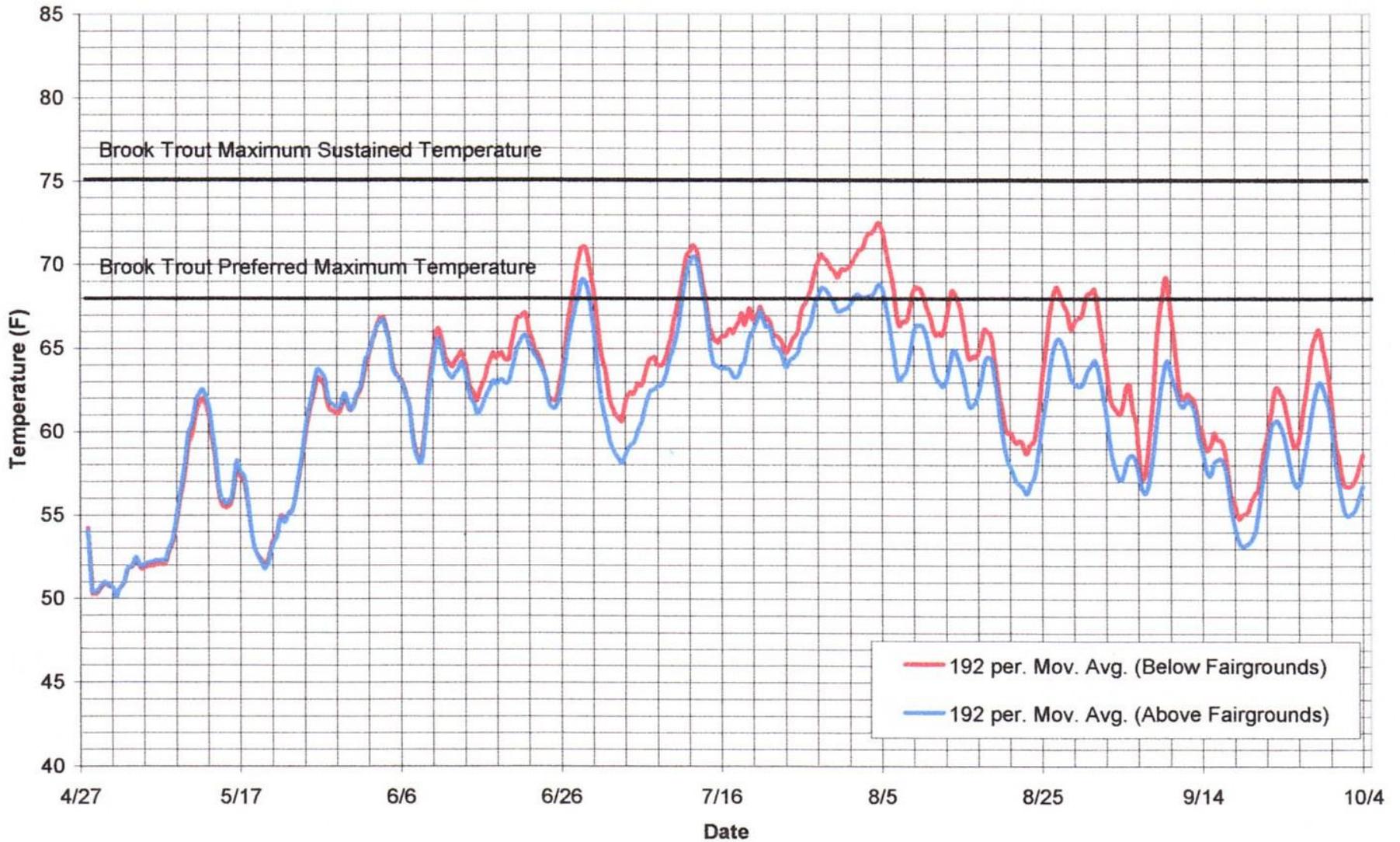
“Elevated summer water temperature downstream of Combination Pond is almost certainly the factor that causes impairment of Moon Brook resulting in the listing as an impaired water.”

- Comprehensive in-stream temperature measurements conducted by CoR between 2005-2007.

Moon Brook Temperature 2007 With 2 Day Trend Line



2007 Mussey Brook Temperature 2 Day Average



Conclusions

- DEC did not follow proper procedures for bioassessment of Moon Brook;
- Flow duration curves with corrected data will support the conclusion that Moon Brook should attain WQS from a stormwater input perspective;
- Evidence indicates absence of certain species due to elevated temperatures resulting from impoundments.

Conclusions

- City of Rutland wants Moon Brook to meet VWQS;
- City of Rutland is convinced the Moon Brook impairment is caused by temperature;
- City of Rutland is not willing to expend or force the expenditure of \$\$\$ to address stormwater runoff because this is not the problem and will not result in attainment of WQS.

Path Forward

1. Develop a Water Quality Remediation Plan to address temperature issues in cooperation with DEC;
2. Redesignate Moon Brook from stormwater to temperature impaired on the 303(d) list;
3. Monitor progress of WQRP efforts over 5 years and adjust as needed.