Vermillion River Watershed Joint Powers Organization

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DATE: July 14, 2008

TO: Paul Thomas, U.S. Environmental Protection Agency (EPA), Region 5

FROM: Paul Nelson, Scott County Natural Resources Manager, and the Steering Team for the EPA Targeted Watersheds Grant for the Vermillion River Watershed

SUBJECT: Summary of Lessons Learned to Date

The Vermillion River Watershed Joint Powers Organization (VRWJPO) is the co-sponsor with EPA of a Targeted Watersheds Grant focused on finding the best way to stabilize temperature in Vermillion River trout streams. During your recent site visit, you requested that the Steering Team for the project prepare a brief summary of the lessons learned to date in exploring the possibility of a thermal trading market in the watershed.

The best overall comment we received from the Steering Team may be this one, from Prof. Steve Taff, University of Minnesota Department of Applied Economics: "Water quality trading is hard; temperature trading is even harder." Here are a few more specific comments on what we have learned to date:

- **The project's scope has shifted and continues to evolve** as we explore thermal movement and attenuation in the Vermillion River. Much of the work to measure, predict, and assign value to heat impacts is new science. There is no "how-to" manual.

- **Warming and cooling are local phenomena.** Temperature is extremely variable and its origins and impacts are very site specific. In temperature trading, the value of the trade varies depending upon its proximity to the origin of the heat contribution. Markets designed to avoid non-allowable temperature exceedences must be very near to and upstream of the points of expected impact.

- **Finding a workable scale for a thermal trading market is a challenge.** There is a trade-off between maintaining enough market size and freedom and assuring that buyers and sellers will do what they say and trades will achieve the intended outcome.

- **Assumptions made to develop the thermal trading tools/models may limit the use of the tools.** It was easy to visualize the tools that we needed, but difficult to anticipate their shortcomings in answering real-world questions or dealing with uncertainty. For example, the land-use heat contribution model was designed on the basis of a half-inch storm event (an assumption based on research), which is of sufficient sensitivity to capture urban runoff heat contributions (assumed, based on research, to be the land covers most likely to produce acute temperature impacts). The half-inch storm may not be sensitive enough to capture more chronic agricultural land heat contributions.

- **Nondegradation considerations may complicate trading of thermal credits among municipalities.** Cities and townships in the watershed are in process of developing local water plans and submitting them for approval. Proposed trading zones based on subwatersheds do not take into account jurisdictional boundaries, only thermal contributions and impacts. Trading across municipal boundaries may involve violations of local water plans.

- **The complex nature of temperature in streams may preclude simple approaches to trend assessment and compliance detection.** Because temperature is local, monitoring based on regular geographic or temporal intervals may not pick up substantial heat impacts on streams that result from local conditions.

- **Groundwater contributions to stream temperature stability are essential, but not necessarily tradable.** The research shows that the effects of groundwater temperature on the stream reaches is so important that changes in groundwater dynamics outside trading zones may have impacts within trading zones. The tools/models incorporate groundwater hydrology, but the overall conclusion is that groundwater needs to be infiltrated everywhere in the watershed.

- **New developments can't be the sole regulated activity for temperature impacts.** Existing developments, infrastructure (roads, pipelines), agricultural land, and businesses also contribute heat to the watershed.

- **Easements purchased under the trading system should be consistent with long-range community plans**. At the very least, easements should be movable.

- **New trades should be sanctioned only with respect to the most recent model run.** Once sanctioned, a trade is good indefinitely, but untraded credits can change in value with each new run of the model.

- **Economic analysis is necessary for setting up a trading system, but not for running it.** Regular updates of the tools/models would be required.

- **Further study is needed to determine if water volume is a surrogate for heat.** The work to date indicates that volume control regulations already is place may be controlling heat loading as well.

- **Climate change complicates thermal management.** Minnesota's climate projections are for hotter and stormier conditions in the future, both of which can increase heat contributions to the streams. Choosing a range of storm events for projecting thermal loads is difficult.

- **Partners in this project benefit whether a thermal trading program is implemented or not.** The discoveries, tools, and plans developed through this project have benefits to the watershed and broad applicability in other watersheds.

In addition to this summary, we've included a PowerPoint overview of the project that may be helpful to you in your discussions with management and a separate summary (as requested) from the Minnesota Pollution Control Agency. If you have any questions, please contact me at (952) 496-8054 or Katherine Carlson at (952) 891-7086.