June 11, 2010

TO: INTERESTED PARTIES

RE: South Metro Mississippi Total Suspended Solids Standard

Enclosed for your information is a copy of the Minnesota Pollution Control Agency (MPCA) Citizens’ Board (Board) Item documents for the proposed South Metro Mississippi Total Suspended Solids Standard, and a copy of the Board Agenda. The Board packet includes:

- Proposed Findings of Fact, Conclusions of Law, and Order to Adopt Site-Specific Standards for the South Metro Mississippi River
- A case document that provides the technical basis for the site-specific standards
- Agendas and notes from public meetings that were part of the process used to present these standards to the public
- A fact sheet that was used to share these standards with the public
- Comment letters received on the Draft Metro Mississippi Site-Specific Standards
- Responses to written comments received for this project

The South Metro Mississippi Total Suspended Solids Standard Board Packet may also be viewed on our MPCA Web site at http://www.pca.state.mn.us/about/board/bdagenda.html.

The Board Item will be presented at the MPCA Board Meeting. Please refer to the enclosed Board Agenda for specific location, dates, and times. We encourage your attendance at the Board Meeting. If you have any questions regarding the enclosed Board Item or the specifics of the meeting, feel free to contact Norman Senjem of my staff at 507-206-2655.

Sincerely,

GFR:bt

Enclosures
**MINNESOTA POLLUTION CONTROL AGENCY**

*Regional Division*
*Watershed Unit 1*

**Board Item Cover Sheet**

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<tr>
<th>MEETING DATE:</th>
<th>June 22, 2010</th>
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**TITLE OF BOARD ITEM:** South Metro Mississippi Total Suspended Solids Standard

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<th>LOCATION:</th>
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| TYPE OF ACTION: | Proposed Findings of Fact, Conclusions of Law, and Order |

| RECOMMENDED ACTION: | Approve for Commissioners signature of a Findings of Fact, Conclusions of Law, and Order to adopt a site-specific TSS standard for the South Metro Mississippi River |

**ISSUE STATEMENT:** The Minnesota Pollution Control Agency (MPCA) staff is in the process of completing a Total Maximum Daily Load (TMDL) study for the South Metro Mississippi River from Lock and Dam 1 to Lock and Dam 4. The pollutant of concern is total suspended solids (TSS), and the affected use is aquatic life use support. Staff is proposing a TSS site-specific standard for this segment of the Mississippi River.

**The board packet provides the following:**

1. Proposed Findings of Fact, Conclusions of Law, and Order to Adopt Site-Specific Standards for the South Metro Mississippi River
2. A case document that provides the technical basis for the site-specific standards
3. Agendas and notes from public meetings that were part of the process used to present these standards to the public
4. A fact sheet that was used to share these standards with the public
5. Comment letters received on the Draft Metro Mississippi Site-Specific Standards
6. Responses to written comments received for this project
ISSUE STATEMENT

The Minnesota Pollution Control Agency (MPCA) staff requests that the MPCA Citizens’ Board (Board) approve a site-specific Total Suspended Solids (TSS) standard for the South Metro Mississippi River. The MPCA staff is in the process of completing a Total Maximum Daily Load (TMDL) study for the South Metro Mississippi River from Lock and Dam 1 to Lock and Dam 4. The pollutant of concern is TSS, and the affected use is aquatic life use support. Submersed aquatic vegetation (SAV) is proposed as the primary indicator of aquatic life health.

We are proposing a site-specific standard for this segment of the Mississippi River for TSS, with supplementary monitoring targets for SAV.

The MPCA staff recommends that the Board approve the site-specific standard for TSS in the South Metro Mississippi River.

I. BACKGROUND:

The staff prepared a draft Site-Specific TSS Standard for the South Metro Mississippi River on this project. The public comment period for the site-specific standard began on February 8, 2010, and ended on March 26, 2010.

A. General: MPCA staff is in the process of completing a TMDL study for the South Metro Mississippi River. As part of the TMDL development process, MPCA staff, in collaboration with the Wisconsin Department of Natural Resources (WDNR), Lake Pepin TMDL Science Advisory Panel, and Lake Pepin TMDL Stakeholder Advisory Committee, developed a site-specific standard for TSS associated with goals for SAV. These water quality goals were shared with the public by way of public meetings, press releases, and informational material (see attachments), in addition to a formal public notice period announced in the State Register. Before the TMDL can be finalized, the site-specific standard must be
public noticed and approved by the Board. Subsequent to that approval, the site-specific standard will be sent to the U.S. Environmental Protection Agency (EPA) for their review and approval. This effort marks the first development of a TSS site-specific standard for a river in EPA Region 5. Wisconsin DNR has coordinated with us in development of this standard and intends to use it to interpret their narrative standard for the Mississippi River from Prescott to the Chippewa River, until such time as WDNR undertakes a formal standard-setting process on TSS in rivers.

Minn. R. 7050.0220 subp. 7 allow site-specific modification of a water quality standard. Such modification, which may be initiated by the MPCA or another party, must maintain designated uses of the waterbody, have a scientifically justified basis, meet public participation requirements, and meet with the approval of the MPCA and EPA.

B. Waterbody Description: The South Metro Mississippi River, as defined for this project, extends 64 miles from the confluence with the Minnesota River at River Mile 844 to upper Lake Pepin near River Mile 780. The volume of flow of the Mississippi roughly doubles at the confluence with the Minnesota River, at which point it ceases to meet the state water quality standard for turbidity. Not until the majority of the sediment load from the Minnesota River has settled out in upper Lake Pepin does the Mississippi River once again meet the state turbidity standard. Runoff from an immense and varied watershed, spanning half of Minnesota and a small part of west-central Wisconsin, including the entire Twin Cities Metropolitan Area, affects this stretch of the Mississippi River. However, the majority of sediment that contributes to high turbidity originates in intensively farmed and drained watersheds including the Cannon River, which discharges to the Mississippi River at Red Wing, the Minnesota River Basin, and finally the Crow River which empties into the Mississippi River near Rogers. Sediment yields from agricultural watersheds vary, but on average are roughly twice the rate of largely urban watersheds. High levels of suspended solids impair the Mississippi River by shading the sunlight and reducing the potential for photosynthesis in shallower portions of the river: main channel border, side-channels, and especially connected backwaters on
the floodplain. It is in such parts of the river, primarily from the St. Paul Barge Terminal to upper Lake Pepin, that a high potential for emergent and submergent vegetation exists.

C. Water Quality History and Impaired Waters Listing: Historical accounts of water quality by early explorers indicate a clear river with healthy beds of aquatic vegetation growing in shallower areas. “From St Croix to St. Peter’s (Minnesota River)…The water is clear as crystal, and its bosom is generally covered with water-fowl, from the graceful snow-white swan to the mallard and wood duck.” -- Charles Lanman, July 1846. In the late 1920s, a federal government report indicates that where the Mississippi River broadens out to form Lake Pepin, “the shallow north end and east side of the south end have developed some of the finest areas of duck food plants in this entire region. Here wild celery, sago pondweed, clasping leaved pondweed, or red-head grass, leafy pondweed, bushy pondweed and Elodea or water-weed, which are six of the best submerged duck foods, together with numerous others, are abundant.” F.M. Uhler, General Report of Biological Features of the Upper Mississippi River Wild Life and Fish Refuge. Between the dates of these two reports, sedimentation rates had increased by a factor of three to four times, as measured by sediment core dating techniques, without appearing to impair aquatic life.

The subsequent history of water quality in the South Metro Mississippi River is closely tied to population growth in the Twin Cities Metropolitan Area and intensified farming of the Minnesota River Basin. By 1926, untreated sewage had created a public health nuisance and very poor fish habitat in the Mississippi River. This led to the development of guidelines for water quality and the construction of the Metropolitan Wastewater Treatment Plant in 1938, which resulted in major water quality improvements in the succeeding years. However, as the urban population steadily increased, along with industry, new water quality standards were established in the Clean Water Act of 1972, and pressures for improved water quality increased. In the 1980s, the Metropolitan Council initiated an industrial pre-treatment program for heavy metals, initiated advanced secondary treatment at the Metro Plant, and began the separation of combined sanitary sewers and storm sewers. By the late 1980s and early 1990s, mayflies had returned to the Mississippi downstream of the Metro Plant, signifying much improved water quality. Since then, through
biological removal technology, phosphorus effluent has been reduced from Metropolitan Council wastewater facilities by about 90 percent, and the severity of algae blooms in Lake Pepin appears to be significantly reduced in lower flow years.

At the same time as metropolitan wastewater issues were being addressed, the problem of nonpoint source sediment pollution in the South Metro Mississippi increased sharply between 1940 and 1970, roughly doubling before stabilizing somewhat in recent decades. This period coincides with a time of rapid wetland drainage, full mechanization of farming, increased specialization and conversion of hay and grassland to row crops. Since 1980, sediment loads to the Mississippi River, largely from the Minnesota River basin, have remained fairly constant at or above 1960-70 levels. However, Minnesota River flows and water yield (which takes precipitation into account) have tripled since 1940, as the proportion of sediment originating from field vs. non-field sources (ravines, bluffs and streambanks) has shifted from 65 percent field/35 percent non-field at the beginning of the period to 35 percent field/65 percent non-field currently. Submersed aquatic vegetation has been very sparse in the Mississippi River as a result of higher turbidity levels brought about by high sediment loads, since regular monitoring was initiated by the U. S. Geological Survey (USGS) in 1998. An exception is a resurgence of SAV growth in 2009 following several years of low flow during which turbidity levels remained suppressed.

Four contiguous segments of the South Metro Mississippi River were listed as impaired by turbidity in 2002, based on analysis of the previous 10-year period of monitoring which showed that 10 percent or more of the samples taken exceeded the state standard of 25 nephelometric turbidity units (NTU). Tellingly, the Mississippi River above the confluence with the Minnesota River, and below Lake Pepin, was not listed as impaired. This points to the overwhelming influence of the Minnesota River as a sediment source, and the role of Lake Pepin as a sediment sink, for this portion of the Mississippi River.

While the TMDL study for these river reaches was being conducted, in 2008 the MPCA decided on a specific type of turbidity meter to use as a reference point for the 25 NTU turbidity standard. This meter, which had been used by Metropolitan Council Environmental Services at the Lock and Dam 2 monitoring
site for years, was evaluated with reference to aquatic life use support in the South Metro Mississippi, and
found wanting. No SAV was found to have grown in the Mississippi at the TSS-equivalent of this metric,
which turns out to be 64 mg/L. At this point, the agency decided it was necessary to develop a site-specific
standard for the South Metro Mississippi River.

D. Site-Specific Criteria Selection: Aquatic vegetation is an important component of Upper
Mississippi River pools and strongly influences fish and aquatic life habitat as well as providing food for
waterfowl. Submersed aquatic vegetation is a particularly useful biological indicator to gauge the impacts of
turbidity or TSS since it is sensitive to changes in light availability and is negatively impacted by conditions of
high turbidity or low transparency. Further, SAV has been used to assess water quality conditions and define
restoration goals because it is an important ecological indicator of ecosystem health in freshwater aquatic
systems.

The MPCA, working closely with the WDNR and a group of river vegetation specialists, used four
analytical methods to determine suitable criteria for TSS and SAV in the turbidity-impaired reaches of the
South Metro Mississippi River:

a. Physical: a TSS concentration of 30 mg/L as a long-term seasonal mean provides sufficient light to
support healthy beds of SAV in shallow areas of the Mississippi, at a mean depth of 0.8 meters,
according to criteria developed by the Upper Mississippi River Conservation Committee.

b. Historical: Aerial photographs from 1951 indicate the presence of emergent and submergent aquatic
vegetation in upper Lake Pepin, Wacouta Bay area. John Sullivan of WDNR estimated prevailing
TSS concentrations for this period of time using historical flow data combined with sediment core
estimates of TSS loads. This resulted in an estimate of 34 mg/L TSS for the mid-1950s.

c. Spatial: Mississippi River Pools 4, 8 and 13 are regularly monitored by the USGS’s Long-Term
Resource Monitoring Program. Pool 13, just upstream of Clinton, Iowa, was chosen as a reference
site with similar potential for supporting SAV as Pools 2-3, as both waterbodies are subject to a
similar degree of influence from intensively farmed watersheds, and do not benefit from the role of
Lake Pepin as a sediment sink. In Pool 13, healthy SAV was associated with summer average TSS
concentrations of 31 mg/L. Another benchmark is 44 mg/L TSS at the 90th percentile, which correlated well with main channel border SAV.

d. Since 2006, dry weather has kept TSS levels relatively low at Lock and Dams 3 and 4 in a range of 30 to 40 mg/L. In response, SAV frequency has increased over this period to a range of 15 to 30 percent.

For these four analytical methods, SAV frequency ranged between 15 and 23 percent. The technical advisory group working on the project recommended 21 percent as a suitable target.

The TSS site-specific standard is defined by frequency and duration, unlike the state turbidity standard. The site-specific standard applies to summer which is specified as June through September, and specifies that a summer mean of 32 mg/L TSS must be attained in half or more years over a 10-year period. The SAV found in the Mississippi River can tolerate one or two summers with TSS levels above 32 mg/L as long as the summer mean does not exceed this number on a long-term basis. Several species of plants in the Mississippi River have overwintering structures such as tubers that allow the plant to survive when temporarily deprived of light. Long-term growing season means above 32 mg/L TSS limit production of overwintering structures, as has recently been the case in the Mississippi River from the Minnesota River confluence to upper Lake Pepin.

General review of monitoring data indicates that 32 mg/L TSS as proposed for the site-specific standard is more restrictive than the statewide 25 NTU standard.

Computer model runs of sediment load reduction scenarios that achieve the summer mean of 32 mg/L also indicate such reductions will achieve the target from April to September, which includes spring months with typically heavy sediment loads.

MPCA staff recommends SAV frequency targets for the turbidity-impaired reaches from Navigation Pool #2 to Lake Pepin be established at 21 percent based on an Environmental Mapping and Assessment Program (EMAP) sampling design and 12 percent using a Long-Term Resource Monitoring Program sampling design for the main channel border. A long-term summer average TSS concentration of 32 mg/L is predicted to achieve these SAV targets. Thus, the proposed site-specific standard for the South Metro Mississippi is the
attainment of a summer mean of 32 mg/L TSS in half or more of years monitored over a 10-year period of record, based on combined bi-weekly monitoring at Lock and Dam 2 and 3. The attainment of the proposed standard is predicted to result in an approximate doubling of the frequency of SAV in this portion of the Mississippi River from average frequencies of the past two decades.

E. Public Notice: During the development of TMDLs for Lake Pepin and the South Metro Mississippi River, the impact of TSS on SAV was a frequent topic of discussion at technical forums and stakeholder advisory group meetings from 2005-2009. The Lake Pepin TMDL Science Advisory Panel, chaired by the University of Minnesota Water Resources Center, endorsed the standard in late 2009. A formal public notice period was held from Feb. 8 to March 26, 2010. The public notice was placed in the State Register, publicized in news media, and was mailed to a large list of interested parties. Two public meetings were held: one in Waseca on February 11, and a second in Red Wing on February 23. A total of 19 comment letters were received, responses written and sent, and copies placed on the MPCA Web site.

II. DISCUSSION:

A. Site-Specific Standard Approval Process: The site-specific standard for the South Metro Mississippi River, as described above, is presented to the Board for its consideration and approval. If such approval is granted, the site-specific standard then will be submitted to EPA Region 5, for its consideration and approval. An earlier informal review indicates the EPA finds that the proposed site-specific standard supports designated uses of the South Metro Mississippi River. If the EPA grants final approval, the site-specific standard is adopted.

B. Relation of Site-Specific Standard to Current Triennial Review of Water Quality Standards: If approved, the site-specific standard for TSS in the South Metro Mississippi River will be incorporated as part of the statewide TSS standards following completion of the triennial review process whereby the state turbidity standard is being replaced with a TSS-based criteria (expected in 2011). As now formulated in draft, the revised state TSS standards will be differentiated by region and class of waterbody.
The proposed site-specific standard for the South Metro Mississippi will apply from Lock and Dam 1 to Lock and Dam 4 on the Mississippi River as a subset of the statewide TSS standards.

III. CONCLUSIONS:

Extensive analysis of suspended solids in the South Metro Mississippi River in relation to aquatic life indicates that Minnesota’s current turbidity standard of 25 NTUs provides insufficient protection of this designated use. Four different lines of analysis have been followed by MPCA technical staff, in collaboration with WDNR, MDNR and the USGS Long-Term Resource Monitoring Program in La Crosse to establish suitable criteria for TSS and SAV. These criteria have undergone considerable technical review and a 45-day public review process, and are ready to be proposed as a site-specific standard of 32 mg/L TSS as a June-September mean in half or more summers over a 10-year period of record. Supplemental monitoring targets include 44 mg/L TSS as a 90th percentile of daily values measured over the same time period, and 21 percent frequency of SAV using the EMAP developed by the EPA. The attainment of these goals would mean an approximate doubling of the frequency of SAV in this portion of the Mississippi River from average frequencies of the past two decades, and result in a host of related ecosystem improvements for waterfowl, mussels, macroinvertebrates, and fish.

IV. RECOMMENDATION:

MPCA staff recommends that the Board vote to approve the proposed site-specific TSS standard for the South Metro Mississippi River.

SUGGESTED STAFF RESOLUTION

BE IT RESOLVED, that the Minnesota Pollution Control Agency (MPCA) approves and adopts the attached Findings of Fact, Conclusions of Law, and Order, which conclude that the South Metro Mississippi River TSS Standard analyzed in this issues statement and proposed by MPCA staff, satisfies the conditions of Minn. R. ch. 7050.0220, subp. 7, on the development of site-specific water quality standards. The Commissioner is authorized to execute the Findings of Fact, Conclusions of Law, and Order on behalf of the MPCA.
BE IT FURTHER RESOLVED that the MPCA approves and adopts the attached Findings of Fact, Conclusions of Law, and Order (Attachment 1) in support of its approval of the South Metro Mississippi River Total Suspended Solids standard. The Commissioner is hereby authorized to execute the Findings of Fact, Conclusions of Law, and Order on behalf of the MPCA.
STATE OF MINNESOTA  
MINNESOTA POLLUTION CONTROL AGENCY  

IN THE MATTER OF THE PROPOSAL TO  
DEVELOP A SITE SPECIFIC STANDARD  
FOR THE SOUTH METRO MISSISSIPPI RIVER  
RAMSEY, DAKOTA, GOODHUE COUNTY  
MINNESOTA  

FINDINGS OF FACT  
CONCLUSIONS OF LAW  
AND ORDER  

FINDINGS OF FACT  

Based on the Minnesota Pollution Control Agency (MPCA) staff review, comments and information received during the comment period, and other information in the record of the MPCA, the MPCA hereby makes the following Findings of Fact, Conclusions of Law, and Order:  

Jurisdiction  

1. The MPCA is authorized to enforce and administer all laws relating to the pollution of any waters of the state. Minn. Stat. § 115.03, subd. 1 (a).  
2. The MPCA has authority to establish and alter such reasonable standards for the waters of the state. Minn. Stat. § 115.03, subd. 1(c).  
3. MPCA has specific authority to develop site specific standards:  

7050.0220 SPECIFIC WATER QUALITY STANDARDS BY ASSOCIATED USE CLASSES.  

Subp. 7. Site-specific modifications of standards.  
a. The standards in this part and in parts 7050.0221 to 7050.0227 are subject to review and modification as applied to a specific surface water body, reach, or segment. If site-specific information is available that shows that a site-specific modification is more appropriate than the statewide or ecoregion standard for a particular waterbody, reach, or segment, the site-specific information shall be applied.  
b. The information supporting a site-specific modification can be provided by the commissioner or by any person outside the agency. The commissioner shall evaluate all relevant data in support of a modified standard and determine whether a change in the standard for a specific waterbody or reach is justified.  
c. Any effluent limit determined to be necessary based on a modified standard shall only be required after the discharger has been given notice of the specific proposed effluent limits and an opportunity to request a hearing as provided in part 7000.1800.
4. The South Metro Mississippi River extends from Lock and Dam 1 (River Mile 848) to Lock and Dam 4 (River Mile 753). The turbidity-impaired portion of concern within this stretch extends from the confluence with the Minnesota River (River Mile 844) to upper Lake Pepin (River Mile 775). In its upper reach before the confluence with the Minnesota River, the Mississippi runs through a deep gorge. After four miles, it joins the Minnesota River and cuts through a broad floodplain cut by the Glacial River Warren approximately 12,000 years ago. The meanders and backwater wetlands that previously existed were drastically altered by the construction of lock and dams at river miles 848 (Ford Dam), 815 (Lock and Dam 2 at Hastings), 797 (Lock and Dam 3 near Red Wing) and 753 (Lock and Dam 4 downstream of Wabasha) in the 1930s. The construction of locks and dams has resulted in permanent inundation of the floodplain behind each lock and dam. In relatively shallow areas of the main channel border, side-channels and especially in backwaters of the permanently inundated floodplain, submersed aquatic vegetation (SAV) flourished immediately following construction of the locks and dams, but in recent decades has been very scarce as a result of high levels of turbidity, or cloudiness, preventing sunlight from penetrating deeply enough into the water column to support and maintain photosynthetic activity. As a result, four reaches within the South Metro Mississippi River were placed on the 303(d) list of impaired waters in 2002. A Total Maximum Daily Load (TMDL) study, begun in 2004, revealed the inadequacy of the current turbidity standard for protecting aquatic life designated uses, which led to the current project of developing a site-specific standard for Total Suspended Solids (TSS) that does provide adequate protection of aquatic life.
5. The watershed contributing to the South Metro Mississippi and Lake Pepin covers almost 49,000 square miles, which comprises half of Minnesota and a part of west central Wisconsin. The mean annual sediment load to this reach of the Mississippi is 968,000 metric tons calculated over the period 1985-2006, years included in the modeling study. This is approximately 10 times pre-settlement loading rates, according to Lake Pepin sediment core studies conducted by the St. Croix Watershed Research Station of the Science Museum of Minnesota. Three-fourths of this load originates in the Minnesota River Basin. The Cannon River also is a significant contributor of sediment directly to a turbidity-impaired reach of the Mississippi.
Criteria for Determining Whether to Develop a Site Specific Water Quality Standard

6. The state of Minnesota has promulgated water quality standards for class 2 waters (see https://www.revisor.leg.state.mn.us/rules/?id=7050.0222). The standards provide, among other things, the following:

7050.0220 SPECIFIC WATER QUALITY STANDARDS BY ASSOCIATED USE CLASSES

Subp. 7. Site-specific modification of standards
a. The standards in this part and in parts 7050.0221 to 7050.0227 are subject to review and modification as applied to a specific surface waterbody, reach, or segment. If site-specific information is available that shows that a site-specific modification is more appropriate than the statewide or ecoregion standard for a particular waterbody, reach or segment, the site-specific information shall be applied.
b. The information supporting a site-specific modification can be provided by the commissioner or by any person outside the agency. The commissioner shall evaluate all relevant data in support of a modified standard and determine whether a change in the standard for a specific water body or reach is justified.
c. Any effluent limit determined to be necessary based on a modified standard shall only be required after the discharger has been given notice of the specific proposed effluent limits and an opportunity to request a hearing as provided in part 7000.1800.

The MPCA Findings with Respect to these Criteria

7. The current water quality standard for turbidity applicable to Class 2B waters is 25 nephelometric turbidity units (NTU). The standard does not specify type of monitoring meter, laboratory analysis, or averaging period for determining compliance with the standard.

8. In 2008, the MPCA made a policy decision to use the NTU type of turbidity meter as a basis for determining compliance with the 25 NTU turbidity standard. The agency also began to use TSS as a surrogate for NTU values, as the former is more consistently measured at monitoring sites throughout the state, and more easily converted to a load for TMDL studies.

9. For the South Metro Mississippi River, 25 NTU correlates with 64 mg/L TSS. The latter was considered as a surrogate for developing a TMDL endpoint. However, analysis of the relationship between this value and aquatic life use support showed it to be unprotective of aquatic life in the South Metro Mississippi River. As the graph below shows, monitoring data on the Upper Mississippi River show that at values of 64 mg/L TSS or greater, no submerged aquatic vegetation (SAV) is found. Since SAV is considered a keystone species for the aquatic ecosystem of the Upper Mississippi River, this is a serious deficiency.
10. The inadequacy of the current 25 NTU statewide standard to protect designated uses in the South Metro Mississippi River is based on site-specific characteristics of the reach. First, this is an intensively monitored reach of the Mississippi River, with ample data showing a correspondence between summer mean TSS concentrations and SAV frequency over time. Second, this portion of the Mississippi occupies a large, permanently inundated floodplain which provides ideal conditions for the growth of SAV: relatively shallow and calm water.

11. Aquatic vegetation is an important component of Upper Mississippi River pools and strongly influences fish and aquatic life habitat as well as providing food for waterfowl. SAV is a particularly useful biological indicator to gauge the impacts of turbidity or TSS since it is sensitive to changes in light availability and is negatively impacted by conditions of high turbidity or low transparency. Further, SAV has been used to assess water quality conditions and define restoration goals in the Chesapeake Bay and elsewhere because it is an important ecological indicator of ecosystem health in freshwater aquatic systems.

12. The MPCA, working closely with the Wisconsin Department of Natural Resources (WDNR) and river vegetation specialists, used four analytical methods to determine suitable criteria for TSS and SAV in the turbidity-impaired reaches of the South Metro Mississippi River:

a. **Physical**: a TSS concentration of 30 mg/L as a long-term summer mean provides sufficient light to support healthy beds of SAV in shallow areas of the Mississippi, at a mean depth of 0.8 meters, according to criteria developed by the Upper Mississippi River Conservation Committee.
b. Historical: Aerial photographs from 1951 indicate the presence of emergent and submersgent aquatic vegetation in upper Lake Pepin, in the Wacouta Bay area. John Sullivan of WDNR estimated prevailing TSS concentrations for this period of time using historical flow data combined with sediment core estimates of TSS loads. This resulted in an estimate of 34 mg/L TSS for the mid-1950s.

c. Spatial: Mississippi River Pools 4, 8 and 13 are regularly monitored by the U.S. Geological Survey’s Long-Term Resource Monitoring Program (LTRMP). Pool 13, just upstream of Clinton, Iowa, was chosen as a reference site with similar potential for supporting SAV as Pools 2-3, as both waterbodies are subject to a similar degree of influence from intensively farmed watersheds, and do not benefit from the role of Lake Pepin as a sediment sink. In Pool 13, healthy SAV was associated with summer average TSS concentrations of 31 mg/L. Another benchmark is 44 mg/L TSS at the 90th percentile, which correlated well with main channel border SAV frequency.

d. Since 2006, dry weather has kept TSS levels relatively low at Lock and Dams 3 and 4 in a range of 30 to 40 mg/L. In response, SAV frequency has increased over this period to a range of 15 to 30 percent.

e. For these four analytical methods, TSS concentration ranged from 30-34 mg/L, and SAV frequency ranged between 15 and 23 percent. The technical advisory group working on the project recommended 32 mg/L TSS and 21 percent SAV as suitable targets.

13. Based on the above, the MPCA proposes for the South Metro Mississippi River a site-specific standard of 32 mg/L TSS as a June-September mean that must be attained in half or more summers over 10 years. Attainment shall be based on combined bi-weekly monitoring at Lock and Dams 2 and 3.

14. The following monitoring targets are complementary to the site-specific standard, and will be used to evaluate attainment of ecosystem goals in the South Metro Mississippi:

   a. 44 mg/L TSS as the 90th percentile of monitoring samples taken from June to September over a period of 10 years. This is proposed as a secondary monitoring target.

   b. SAV frequency of occurrence of 21 percent following an Environmental Mapping and Assessment Program (EMAP)-based sampling design for main channel and side channel borders or 12 percent using LTRMP sampling design for the main channel border only. These are suggested as ecological targets for monitoring programs.

   c. Attainment of these targets will be based on combined bi-weekly monitoring at Locks and Dams 2 and 3 over a period of 10 years.

15. The TSS site-specific standard is 32 mg/L TSS as a June-September mean. The rest of the criteria listed in 13 will be used as supplementary monitoring targets. The standard is defined by frequency and duration, unlike the general, state-wide turbidity standard. The site-specific standard applies to summer which is specified as June through September, and specifies that 32 mg/L TSS should be applied as a long-term, multi-year seasonal mean. The SAV found in the Mississippi River can tolerate one or two summers with TSS levels above 32 mg/L as long as the seasonal mean does not exceed this number on a long-term basis. Several species of plants in the Mississippi River have overwintering structures such as tubers that allow the plant to survive after being temporarily deprived of light. Long-term growing season means above 32 mg/L TSS limit production of overwintering structures, as has recently been the case in the Mississippi River from the Minnesota River confluence to upper Lake Pepin.

16. Research has established that a summer season (June to September) turbidity average of 25 NTUs is not protective of SAV in the turbidity-impaired reaches of the Upper Mississippi River. The proposed TSS standard is more restrictive than the current turbidity standard and will ensure that aquatic life is protected during the summer. Computer model runs of sediment load reduction scenarios that achieve the summer
mean of 32 mg/L also indicate such reductions will achieve the target from April to September, which includes spring months with typically heavy sediment loads.

**Data used in criteria development**

17. Data and methods used to develop the site-specific standard are referenced in: “Submersed Aquatic Vegetation Targets for the Turbidity-Impaired Reach of the Upper Mississippi River: Pool 2 to Upper Lake Pepin,” prepared for the Minnesota Pollution Control Agency Pool 2-Lake Pepin Turbidity TMDL Project: John Sullivan, Heidi Langrehr and Shawn Giblin, Wisconsin Department of Natural Resources, La Crosse, Wisconsin; Megan Moore, Minnesota Department of Natural Resources, Lake City, Minnesota; and Yao Yin, U.S. Geological Survey Upper Midwest Environmental Science Center, La Crosse, Wisconsin. April 2009. This is posted as an attachment to the site-specific standard at:


18. In summary: The current state turbidity standard for Class 2B waters is 25 NTUs. Its purpose is to protect and support aquatic life. Four assessment reaches within the South Metro Mississippi River are listed as impaired with reference to this standard. A TMDL project was initiated in 2004 on this reach of the Mississippi River. In the course of research conducted for this project, it was learned that the current standard fails to protect aquatic life. The MPCA is proposing to replace the current standard with a site-specific standard that does support aquatic life in this part of the Mississippi River. Submersed aquatic vegetation was selected as a key indicator of ecosystem health with a strong relationship to TSS concentration. Cooperating with the WDNR, the MPCA pursued four lines of investigation to arrive at a site-specific standard of 32 mg/L TSS summer average over a long period of record. Attainment of this standard is expected to result in an approximate doubling of SAV from the levels prevailing in the last two decades, to 21 percent frequency of occurrence of SAV following the EMAP monitoring protocol

**Procedural History**

19. There were numerous meetings held to discuss the proposed site specific standard for the South Metro Mississippi River. At a number of the meetings, the numeric goals for the river were discussed at length by the project stakeholder group. The following meetings included agendas that specifically listed water quality goals or site specific standards for turbidity, TSS and SAV as prominent presentation and discussion items:

i. Lake Pepin TMDL Stakeholder Advisory Meetings
      ii. “Expected impacts on backwater fish spawning” – Ron Benjamin, WDNR
   4. August 24, 2006: “Submerged Aquatic Vegetation and Turbidity at the Cedar Avenue Interpretive Center,” – Tom Kerr, U.S. Fish and Wildlife Service
• October 16, 2006: “Turbidity Relationship to Aquatic Vegetation Restoration: Why it Matters,” – Megan Moore, Minnesota Department of Natural Resources.
• October 16, 2006: “TMDL Targets for Turbidity and Trends on the Mississippi River Through Lake Pepin,” – Dennis Wasley, MPCA
• December 18, 2007: “Submersed Aquatic Vegetation and Local Land Use Planning,” Laura Jester, Dakota County Soil and Water Conservation District
• April 16, 2008: “Integrating River Management with Source Reduction for Restored Aquatic Vegetation,” – Scot Johnson, MDNR
• February 24, 2009: “TMDL Targets: Phosphorus, Turbidity, TSS and Submersed Aquatic Vegetation,” Dennis Wasley, MPCA
• February 24, 2009: “Proposed Targets for Submersed Aquatic Vegetation,” – John Sullivan, WDNR
• August 25, 2009: “Introductions and Status of TMDL Process (announced proposed site-specific standards for TSS and eutrophication),” Norman Senjem, MPCA
• August 25, 2009: “Water Quality Standards and Site-Specific Standards” – Mark Tomasek, MPCA
• August 25, 2009: Meeting Mississippi River and Lake Pepin Standards – options and tradeoffs,” Dennis Wasley, MPCA
• Tuesday, February 2, 2010: “Water Quality Status and Standards Update”
  i. “Total Suspended Solids in the Mississippi River,” – Dennis Wasley, MPCA
  ii. “South Metro Mississippi River TSS Water Quality Standard Presentation Preview”, Norman Senjem, MPCA

b. Lake Pepin TMDL Science Advisory Panel Meetings
• December 13, 2005 (sub-group of SAP/SAC with US Army Corps of Engineers): “River Management Methods and Pollutant Source Reductions for the Lake Pepin Watershed TMDL.”
• January 23, 2006: “Goals for Spring Lake Impairment”, Holmberg and De Pinto, LTI
• February 22, 2006: “Proposed Submersed Aquatic Vegetation Modeling Approach,” Joe De Pinto, LTI
• December 14, 2009: “In support of a Site-Specific Standard for Total Suspended Solids and Submersed Aquatic Vegetation in the Mississippi River Pools 2-4,” John Sullivan, WDNR
• January 5, 2010: “MPCA Revised Proposal”
  o “TSS/SAV site-specific standard process”: Norman Senjem, MPCA
  o “Lake Pepin and Mississippi nutrient standards”: Steve Heiskary, MPCA

20. The MPCA made the proposed site specific standard for the South Metro Mississippi River available for public review and comment for a period of 45 days. The MPCA notified the public of the public comment period via (1) The State Register (Monday, February 8, 2010, Volume 34, Number 32, Page1081) [http://www.comm.media.state.mn.us/bookstore/stateregister/34_32.pdf](http://www.comm.media.state.mn.us/bookstore/stateregister/34_32.pdf) and (2) the February 2010 MPCA Waterfront Publication (electronically mailed to approximately 200 subscribers and posted on the MPCA web site). The public comment period was February 8, 2010 to March 26, 2010.
21. During the 45-day public notice period, the MPCA received 19 comment letters:
   - Arlin and Marilyn Albrecht
   - William Barton
   - Dakota County Soil and Water Conservation District (Laura Jester)
   - Mike Denny
   - Friends of the Mississippi River (Trevor Russell)
   - Lake Pepin Legacy Alliance (Mike McKay)
   - Robert Megard
   - Minnesota Corn Growers Association (DeVonna Zeug)
   - Minnesota Environmental Science and Economic Review Board (David Lane)
   - Minnesota Department of Natural Resources (Steve Colvin)
   - Minnesota Soybean Growers Association (Bill Gordon)
   - Minnesota Department of Transportation (Beth Neuendorf)
   - National Park Service (Paul Labovitz)
   - David Ochsner
   - U.S. Fish and Wildlife Service (Tony Sullins)
   - Upper Mississippi River Conservation Committee (Martin Konrad)
   - Phil Vieth
   - Sunny Walker
   - Wisconsin Department of Natural Resources (Dan Baumann)

22. The MPCA prepared responses to comments received during the 45-day public notice period. Comment letters and MPCA responses are attached.

CONCLUSIONS OF LAW

23. The MPCA has jurisdiction to adopt a site specific standard for the South Metro Mississippi River.

24. Due, adequate and timely public notice of the proposed site specific water quality standard was given, and the MPCA staff Responses to Comments was sufficient.

25. The criteria for establishing a site specific standard for the South Metro Mississippi River as set forth in Minn. R. 7050.0220 subp. 7 are satisfied.

26. As the above findings establish, a site specific standard for the South Metro Mississippi River is appropriate and protective of designated uses.

27. Any findings that might properly be termed conclusions and any conclusions that might properly be termed findings are hereby adopted as such.
ORDER

The Minnesota Pollution Control Agency approves the adoption of a site specific standard for the South Metro Mississippi River. This site specific standard shall be forwarded to the U.S. Environmental Protection Agency for its review and approval before being implemented by the Minnesota Pollution Control Agency.

IT IS SO ORDERED

Commissioner Paul Eger
Chair, Citizens’ Board
Minnesota Pollution Control Agency

Date
Minnesota Pollution Control Agency

Total Suspended Solids Site-Specific Standard
South Metro Mississippi River

June 2010 Draft

Submitted to: United States Environmental Protection Agency

Submitted by: Minnesota Pollution Control Agency
The Minnesota Pollution Control Agency (MPCA) has determined that a total suspended solids (TSS) site-specific water quality standard will add needed scientific integrity to the turbidity portion of the Lake Pepin & South Metro Mississippi Total Maximum Daily Load (TMDL) study. The agency also is preparing a site-specific standard for the eutrophication portion of the TMDL study. The Mississippi River and Lake Pepin differ appreciably from typical rivers and lakes in the state. The MPCA is fortunate to have access to extensive monitoring data and modeling capabilities to develop these site-specific standards. Minnesota State Rule 7050.0222 subpart 7 gives the MPCA authority to set a TSS site-specific standard. Here we will briefly discuss our rationale for the site-specific standard. Details are contained in Sullivan et al. (2009) (attached).

Minnesota’s numeric turbidity standard is defined as 25 nephelometric turbidity units (NTU) for 2B and 2C waters. Designated uses of the listed water bodies are as follows: Mississippi River, Metro WWTP to Rock Island Railroad Bridge: 2C, 3B, 3C, 3D, 4, 5, 6; Mississippi River, Rock Island Railroad Bridge to Chippewa River: 2B, 3B, 4A, 4B, 5, 6. MPCA guidance suggests that the meter in use at the time the standard was promulgated (approximately 1970) was most similar to the “NTU” class of meters categorized in the U.S. Geological Survey’s (USGS) turbidity meter classification scheme (USGS, 2004). The NTU meter is the standard type of meter used in turbidity TMDL studies in Minnesota. Metropolitan Council Environmental Services (MCES) has historically used a NTU meter type until 2006 when they switched to a nephelometric turbidity ratio units (NTRU) meter type.

Both types of turbidity meters have been and are being used in the South Metro Mississippi River TMDL study area. MCES turbidity monitoring data focuses upstream of Lock and Dam 2 including major tributaries, but also extends downstream. The USGS has used the NTRU type of turbidity meter for the Long-Term Resource Monitoring Program (LTRMP) since 1992. This program operates between Lock & Dam 2 and Lock & Dam 4. Each meter type provides a markedly different numeric measure of turbidity, making it difficult to compare monitoring data over space and time. For this among other reasons, the MPCA is undertaking to promulgate a statewide TSS standard in the next triennial rule revision to replace the turbidity standard. Like the turbidity standard, the TSS standard will be designed to protect aquatic life. Given the difficulty of working with combined data sets from MCES and LTRMP in the impaired reaches of the Mississippi, together with the prospect of replacing turbidity with a TSS standard in the near future, it seems prudent to develop a site-specific standard for TSS in the turbidity-impaired reaches of the Mississippi listed above, and to utilize this standard as an end point for the turbidity TMDL.

Considerable data are available for establishing a site-specific TSS standard based on aquatic life use support. Data from the LTRMP have been used to establish firm relationships between TSS, light extinction, and the growth of submersed aquatic vegetation (SAV). Healthy growth of SAV, in turn, provides food and habitat for migratory waterfowl, fish and macroinvertebrates while helping to stabilize bottom sediments. Thus, SAV is considered as a “keystone species” undergirding a healthy aquatic ecosystem in the Mississippi. Achieving a desired frequency of SAV brings with it a host of related ecosystem enhancements. The monitoring network for both water-quality (TSS) and vegetation in the Mississippi River is excellent. That is one reason why the TSS site-specific standard for the Mississippi River has been completed before the triennial rule revision. Due to the unique nature of the river and its diverse watershed, it is highly likely that the site-specific standard for the Mississippi River downstream of the Minnesota River confluence will be retained once the triennial standards revision is completed. The MPCA will likely have separate river nutrient standards for similar reaches of the Mississippi River from Navigation Pools 1 through 9, and it seems probable that we would also have separate standards for TSS.

Most rivers in the state do not have the potential to grow extensive SAV. The impounded reaches of the Mississippi River in Minnesota are generally conducive for desirable SAV growth. This is especially true in Navigational Pools 2-9 which contain large areas that do or could produce SAV. The Mississippi River from Lake Pepin to the Minnesota state line is within the Mississippi River National Wildlife and Fish Refuge, and aquatic plant communities represent a critical ecological component of this system. Currently, SAV is quite common below Lake Pepin and relatively sparse upstream of the lake in the turbidity impaired reach. Historic information demonstrates that SAV communities in Navigation Pool 2 were significantly denser in the 1950s (Sullivan et al., 2009). The Mississippi River from the confluence of the St. Croix River to the confluence with the Chippewa River (covered by the Lake Pepin and South Metro Mississippi TMDL) forms a boundary between Minnesota and Wisconsin. Wisconsin has listed the Mississippi River from the confluence of the St. Croix River to the confluence of the Chippewa River as sediment impaired (based on both sedimentation and...
SAV suppression). This reach is contained within the reach of Mississippi River that is listed by Minnesota as impaired by excess turbidity. The MPCA has worked very closely with Wisconsin DNR to develop a site-specific standard that is protective of each state’s designated uses and consistent with other upstream TMDLs that are currently being completed in each state.

The MPCA has had extensive public participation and an active science advisory panel throughout the Lake Pepin and South Metro Mississippi TMDL process during the past five years. A small group of scientists from Minnesota DNR, Wisconsin DNR, and USGS have developed the TSS site-specific standard report for Pool 2 through Upper Pool 4 (Sullivan et. al, 2009). MPCA staff served as a review team for this report. The TSS site-specific standard will officially apply to the Mississippi River from the St. Paul Barge Terminal in Navigation Pool #2 to Lake Pepin. The TSS site-specific standard will complement the existing turbidity standard since each standard will apply to different periods of the year.

The TSS site-specific standard is defined by frequency and duration, unlike the state turbidity standard. The site-specific standard applies to summer which is specified as June through September, and specifies that 32 mg/L TSS should be applied as a long-term, multi-year seasonal mean. The SAV found in the Mississippi River can tolerate one or two summers with TSS levels above 32 mg/L as long as the seasonal median does not exceed this number on a long-term basis. Several species of plants in the Mississippi River have overwintering structures such as tubers that allow the plant to grow when temporarily deprived of light in the lighted (photic) zone. Long-term growing season means above 32 mg/L TSS limit production of overwintering structures, as has recently been the case in the Mississippi River from the Minnesota River confluence to upper Lake Pepin.

Research has established that a summer season (June to September) turbidity average of 25 NTUs is not protective of SAV in the turbidity-impaired reaches of the Upper Mississippi River (Sullivan et al, 2009). The proposed TSS standard is more restrictive than the current turbidity standard and will ensure that aquatic life is protected during the summer. The 25 NTU standard will provide its measure of protection for the remainder of the year.

**Total suspended solids site-specific standard**

The MPCA recommends SAV frequency targets for the turbidity-impaired reaches from Navigation Pool #2 to Lake Pepin be established at 21 percent based on an EMAP (Environmental Mapping and Assessment Program) sampling design and 12 percent using a LTRMP sampling design for the main channel border. A median and 90th percentile summer average TSS concentration of 32 and 44 mg/L, respectively, are predicted to achieve these SAV targets.

A mean of 32 mg/L TSS in half or more summers over a 10-year period is proposed to be the water quality standard. Attainment will be based on combined bi-weekly monitoring at Locks and Dams 2 and 3.

**References**


Submersed Aquatic Vegetation Targets for the Turbidity-Impaired Reach of the Upper Mississippi River Pool 2 to Upper Lake Pepin

Prepared for the Minnesota Pollution Control Agency
Pool 2-Lake Pepin Turbidity TMDL Project

By
John Sullivan, Heidi Langrehr and Shawn Giblin, Wisconsin Department of Natural Resources, La Crosse, WI, Megan Moore, Minnesota Department of Natural Resources, Lake City, MN, Yao Yin, U.S. Geologic Survey Upper Midwest Environmental Sciences Center, La Crosse, WI
Introduction

The Minnesota Pollution Control Agency (MPCA) has identified the Mississippi River reach extending from the mouth of the Minnesota River to Lake Pepin as exceeding the state turbidity criterion for fish and aquatic life (MPCA 2008). Similarly, the Wisconsin Department of Natural Resources (WDNR) has identified the river reach from the mouth of the St. Croix to upper Lake Pepin as having excessive suspended sediment that is negatively influencing submersed aquatic vegetation (SAV) growth as well as contributing to high rates of sedimentation in Lake Pepin (WDNR 2006). The MPCA is working with numerous organizations and the WDNR to develop and implement watershed total maximum daily loads (TMDLs) to address excess turbidity as well as nutrient inputs to achieve state water quality standards in the impaired reach of the Upper Mississippi River (UMR). Information on this TMDL study can be found at the following MPCA web site: http://www.pca.state.mn.us/water/tmdl/tmdl-lakepepin.html.

Although Minnesota has a numeric criterion of 25 nephelometric turbidity units (NTU) in state water quality standards, there are no specific criteria for suspended sediment or total suspended solids (TSS). Correlation analysis between TSS and turbidity provides a means of establishing a surrogate TSS concentration that is consistent with Minnesota’s turbidity criterion and provides a basis for developing watershed goals for sources of sediment input. Initial evaluations by MPCA for monitoring sites along the Minnesota River, the major source of sediment input to the Mississippi River above Lake Pepin, suggests a TSS surrogate concentration of about 100 mg/L would be roughly equivalent to the state turbidity criterion (Campbell et al. 2008). An evaluation of long term data collected by the Metropolitan Council of Environmental Services (MCES) for the Mississippi River during the summer months at Lock and Dam 3 suggests a TSS–turbidity surrogate concentration of 64 mg/L (Figure 1).
Figure 1. Linear regression of total suspended solids (TSS) versus turbidity based on summer data (June-September) collected by the Metropolitan Council Environmental Services (MCES) at Lock and Dam 3 for years 1990 to 1999.
These surrogate TSS concentrations may not offer adequate protection for the growth and development of SAV based on a comparison to recently proposed light penetration-related water quality criteria for SAV in the Upper Mississippi River by the Upper Mississippi River Conservation Committee (UMRCC 2003, Table 1).

Table 1. Recommended light penetration-related water quality criteria proposed by the Upper Mississippi River Conservation Committee. Derived from Table 1 in UMRCC, 2003.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value*</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Extinction Coefficient (Primary Criterion)</td>
<td>3.42 m(^{-1})</td>
<td>Average growing season light extinction necessary to promote <em>Vallisneria</em> growth and reproduction at 0.8 m depth</td>
</tr>
<tr>
<td>Secchi Disk Depth</td>
<td>0.5 m</td>
<td>Light extinction vs Secchi depth regression, WDNR data for Pools 4-11</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>25 mg/L**</td>
<td>Light extinction vs TSS regression - WDNR data for Lock &amp; Dam 8 &amp; 9</td>
</tr>
<tr>
<td>Turbidity</td>
<td>20 NTU</td>
<td>Light extinction vs turbidity regression - LTRMP data for Pools 8 &amp; 13</td>
</tr>
</tbody>
</table>

* Values should be applied as a growing season average (May 15 to September 15) based on bi-weekly measurements.

** New information collected by the federal Long Term Resource Monitoring Program in Pools 8 and 13 suggest this number should be changed to 30 mg/L (Giblin et al. *in prep*).

Aquatic vegetation is an important component of the UMR pools and strongly influences fish and aquatic life habitat as well as providing food for waterfowl (Janecek 1988, Korschgen 1988, Johnson and Jennings 1998, Rybicki and Landwehr 2007, Knights et al. 2008). SAV is a particularly useful biological indicator to gauge the impacts of turbidity or TSS since it is sensitive to changes in light availability and is negatively impacted by conditions of high turbidity or low transparency (Jackson and Starret 1959, Chambers and Kalff 1985). Further, SAV has been used to assess water quality conditions and define restoration goals (Dennison et al. 1993, Chesapeake Bay Program 2000) because it is an important ecological indicator of ecosystem health in freshwater aquatic systems.

1. Since the WDNR’s impaired waters listing has indicated excessive sediment or turbidity is negatively influencing SAV growth in border waters of the Mississippi River in Pool 3 and upper Pool 4 and there is uncertainty whether Minnesota’s turbidity criterion will adequately protect SAV in the turbidity-impaired reach of the UMR (Pool 2 to Upper Lake Pepin), site-specific water quality criteria as well as river management and restoration activities need to be considered to protect and promote SAV growth in this reach of river. In order to advance and support new water quality criteria development, a review of existing SAV information from the UMR system was conducted as a means of identifying an appropriate SAV target for this turbidity-impaired reach of the UMR. This report provides a summary of SAV information on the UMR, identifies a SAV target, an initial criterion for TSS, and suggested methods for evaluating attainment of these water quality goals.
Methods

SAV frequency of occurrence data from the UMR system was compiled from two sources. The first was the Long Term Resource Monitoring Program (LTRMP) surveys in selected pools of the UMR system available from USGS Upper Midwest Environmental Sciences Center at La Crosse, Wisconsin http://www.umesc.usgs.gov/data_library/vegetation/graphical/ veg_front.html.

Their data represented randomly collected samples from major aquatic areas or “strata” including main channel border (MCB), side channel (SC), contiguous backwater, isolated backwater and impounded (open areas above dams) during mid-summer periods of 1998 to 2007. Most of LTRMP’s SAV data was collected from specific study pools on the UMR (Pool 4, 8, 13 and 26) and the La Grange Pool on the Illinois River (Yin and Langrehr 2005). Additional data were available from LTRMP-sponsored surveys in a few other UMR pools (5, 7, & 11 in 2002 and 12 in 2001).

The second source of SAV information was obtained from WDNR’s and MNDNR’s aquatic vegetation surveys of Pools 1 to 11 funded by USEPA as part of a pilot monitoring project following Environmental Mapping and Assessment Program (EMAP) guidance (US EPA 2008). The EMAP sampling also collected random samples but the surveys were conducted over longer assessment reaches that encompassed multiple pools and concentrated on sampling the main channel and side channel borders or off-channel impounded or backwater areas that were adjacent to these channels. The actual sampling by both methods were identical and utilized multiple rake samples and visual observations around the perimeter of an anchored boat (Yin and Langrehr 2005). A summary of the LTRMP and EMAP vegetation sampling designs is presented in Table 2.

Table 2. Summary of vegetation sampling designs used by the federal Long Term Resource Monitoring Program (LTRMP) and Minnesota’s and Wisconsin’s Environmental Monitoring and Assessment Program (EMAP) on the Upper Mississippi River.

<table>
<thead>
<tr>
<th>Sampling information</th>
<th>LTRMP</th>
<th>EMAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of Record</td>
<td>1998 - 2008</td>
<td>2006-2008</td>
</tr>
<tr>
<td>Sampling Reach</td>
<td>Pool-based. For the Minnesota – Wisconsin border includes: upper and lower Pool 4, Lake Pepin and Pool 8.</td>
<td>USGS hydrologic unit reaches along the Mississippi River (segmented by major tributary inflows). Includes the reach from St. Anthony Falls Lock and Dam (Pool 1) in Minneapolis, MN to LD 11 near Dubuque, IA.</td>
</tr>
<tr>
<td>Aquatic Strata</td>
<td>Main channel border, side channel, impounded, contiguous backwater, isolated backwater and Lake Pepin</td>
<td>Main channel border, side channel, and areas adjacent to these channels</td>
</tr>
<tr>
<td>Randomization Scheme</td>
<td>Random points within a defined grid of each sampling strata within each reach. Grid size 50x50m</td>
<td>Longitudinally stratified random points along defined centerline of channels. Random selection of right or left bank. Random percent distance from 2 m depth to shore.</td>
</tr>
<tr>
<td>Depth Range</td>
<td>0 to 2.5 m</td>
<td>0.2 to 2.0 m</td>
</tr>
<tr>
<td>Bathymetry</td>
<td>Needed to establish sampling grid.</td>
<td>Not required.</td>
</tr>
<tr>
<td>Collection Method</td>
<td>LTRMP vegetation sampling methods. Includes visual observation and rake sampling around an anchored boat.*</td>
<td>LTRMP vegetation sampling methods. Includes visual observation and rake sampling around an anchored boat.*</td>
</tr>
</tbody>
</table>

*Yin and Langrehr 2005
The SAV information described here focused on frequency of occurrence data of all recorded species. Water quality data (TSS) from main channel of the Mississippi River were obtained from a multi-agency database compiled for the UMR (UMRCC, 2002) or; 2. Directly from private, state and federal agencies that maintain monitoring stations on the UMR.

**Results**

**Spatial distribution of SAV**

LTRMP SAV frequency collected during the initial stratified random sampling (SRS) in key (primary) study pools of the UMR system between 1998 to 2003 revealed notable differences between pools as well as between aquatic areas (Figure 2).

![Figure 2. Average percent frequency of occurrence of submersed aquatic vegetation (SAV) measured in Long Term Resource Monitoring Program study pools in the Upper Mississippi River system during mid-summer from 1998 to 2003.](image-url)
The frequency of occurrence of SAV in LTRMP key study pools was highest in lower Pool 4, Pool 8 and Pool 13. SAV was rarely recorded in backwater and impounded strata of Pool 26 and was not recorded at all in the aquatic strata sampled in the La Grange Pool in the lower Illinois River. In general, a gradient in the frequency of SAV exists in each study pool with highest occurrence in isolated backwaters followed by contiguous backwaters, side channels and main channel border with decreasing occurrence in each of these strata (Yin and Langrehr 2005). These authors indicated primary factors influencing this distribution included water clarity, current velocity, water depth and wind fetch. In addition, tailwater areas generally had little SAV due to deep fluctuating water levels with high current velocity. Yin and Langrehr also reported that more than 80% of the variance in SAV frequency of occurrence in study pools could be explained by turbidity and water level fluctuation but these factors explained little of year-to-year variation (Figure 3).

Figure 3. Percent frequency of submersed aquatic vegetation measured mid-summer versus average turbidity and water level fluctuation (standard deviation) measured May 1 to August 31 during years 1998 to 2002 by the Long Term Resource Monitoring Program (Figure 3.2 from Yin and Langrehr, 2005).
Of these two variables, turbidity was believed to be a stronger factor influencing SAV frequency between study pools. Spatial differences in turbidity and water level fluctuation were likely important factors influencing SAV frequency in upper and lower Pool 4 (Figure 2). Water transparency is substantially greater below Lake Pepin due to settling of suspended solids within the lake and water level fluctuations are less in the lower portion of Pool 4, which is closer to the pool’s regulatory dam. This longitudinal change in SAV within a navigational pool has also been found in Pool 8 and 13 (Langrehr and Moore 2008). These longitudinal changes in SAV occurrence within a pool need to be considered when setting goals for turbidity abatement or in-river restoration activities and would be particularly important when evaluating the potential for SAV growth in tailwater areas where seasonal water level changes can be quite high.

**Temporal changes in SAV**

The frequency of occurrence of LTRMP stratified random sampling SAV data was compiled for a 10-year period (1998 to 2007) for LTRMP study Pools 4 (upper and lower), 8 and 13 (Figure 4).
Figure 4. Percent frequency of occurrence of submersed aquatic vegetation (SAV) measured in three aquatic areas (strata) in Pools 4 (upper & lower), 8 and 13 of the Upper Mississippi River by the Long Term Resource Monitoring Program. Average, average-standard deviation and the 10th percentile of SAV frequency excluded data for upper Pool 4.
The data were grouped by the commonly sampled strata (MCB, SC and contiguous backwater or “backwater”) for each of these study areas. Isolated backwaters and impounded strata were not included since these aquatic areas were not sampled in each study pool. Data for Pool 26 and the La Grange Pool on the Illinois River were also not considered due to the absence or low occurrence of SAV in these pools.

In general, temporal differences between years within a given sampling strata were moderate with no clear pattern of increasing or decreasing trends over the 10-year period within the MCB or SC sampling strata. The occurrence of SAV in upper Pool 4 was quite variable in the two channel strata and was absent in some years. In contrast, SAV was found in all backwater strata from each of the study areas during the 10-year period. There did appear to be a general increase in SAV frequency in the backwater strata of Pool 13 over the 10-year period (Figure 4).

The frequency of SAV occurrence in Pools 4 (excluding upper Pool 4 above Lake Pepin), 8 and 13 averaged 70.8, 28.5 and 18.0 percent in the backwater, SC and MCB strata, respectively, over the ten-year period (Figure 4). These differences in SAV frequency within these strata were generally consistent with the previous assessment for the initial LTRMP record for years 1998 to 2003 (Figure 2). The average frequency of occurrence for these three sampling strata provide an initial benchmark for establishing SAV targets for the turbidity impaired reach of Pool 2 to Lake Pepin assuming equivalent turbidity, depth, water level fluctuation, wind fetch and other factors can be attained or provided through reductions of suspended solids input and using in-river habitat restoration projects where feasible.

**SAV correlations between aquatic areas**

Regression analysis of SAV frequency of occurrence of all LTRMP SAV data, grouped by study pool, revealed significant correlations between MCB, SC and backwater sampling strata (Figures 5A-C).
Figure 5. The relationship between backwater and main channel border (A) side channel and main channel border (B) and backwater and side channel (C) submersed aquatic vegetation (SAV) percent frequency of occurrence based on mid-summer sampling conducted by the Long Term Resource Monitoring Program on the Upper Mississippi River 1998 to 2007.
Linear regression models using the frequency of SAV occurrence in MCB as the independent variable explained roughly 60 percent of the variation of SAV frequency in SC or backwater strata. The regression of backwater versus SC SAV frequency revealed a substantially greater correlation ($R^2=90$ percent) using a polynomial model. A closer inspection of the latter model indicated that very little gain in backwater SAV frequency occurs once SC SAV frequency reaches 20 percent. These correlations suggests that if a SAV frequency target was selected for a particular aquatic area (i.e. main channel border) then estimates of the corresponding SAV frequency of occurrence can be made on the other two aquatic areas (SC or backwater).

**SAV frequency of occurrence in Pools 1 to 11**

In the summer of 2006 to 2008, the MDNR and WDNR conducted systemic SAV sampling over a 270 mile reach of the Mississippi extending from Minneapolis, MN (Pool 1) to Dubuque, IA (Pool 11). The sampling design followed a probabilistic approach consistent with USEPA EMAP procedures (Diaz-Ramos et al. 1996). The assessment units were divided into 7 hydrologic assessment reaches that were segmented by major tributary inflows including the Minnesota, St. Croix, Chippewa, Black, Root and Wisconsin Rivers. The sampling design did not utilize the same aquatic strata utilized by the LTRMP vegetation component. Instead, this reach-based sampling concentrated on main channel and side channel borders and off-channel impounded or backwater areas that were adjacent to these channels. In addition, the EMAP design sampled shallower water and a smaller depth range than the LTRMP method, 0.2 to 2.0 m versus 0 to 2.5 m, respectively (Table 2).

The results of the EMAP surveys revealed a substantial difference in the frequency of occurrence of SAV above and below the Chippewa River (Figure 6).
Figure 6. Percent frequency of occurrence of submersed aquatic vegetation measured mid-summer in the Upper Mississippi River from the Twin Cities to Lock & Dam 11 by the Minnesota and Wisconsin Department’s of Natural Resources. This work was supported by U.S. EPA’s Environmental Monitoring & Assessment Program (EMAP) effort for the Upper Mississippi River. Average, average-standard deviation and the 10th percentile of SAV percent frequency excluded hydrologic assessment reaches above the Chippewa River.
SAV frequency of occurrence was less than 16 percent in the three assessment reaches above the Chippewa River during each of the three monitoring years. In contrast, SAV occurrence averaged about 44 percent in the four assessment reaches below the Chippewa River during a similar period. The lowest occurrence of SAV occurred in the Twin Cities reach, which encompasses all of Pool 1 and a short 3.5-mile tailwater reach of Pool 2 above the Minnesota River. This river reach is believed to offer habitat conditions that are less conducive to SAV growth due to a narrow deep flowing channel with generally coarse substrate. Targets for SAV growth should exclude the Twin Cities reach due to natural or anthropogenic factors (impoundment) that limit its development in this reach of river. In addition, the river reach within the St. Paul Area of Pool 2 is heavily influenced by shoreline riprap, barge fleeting and marine terminals, and SAV development within the channel border of this corridor would likely be unattainable due to these irreversible cultural changes. As a result, SAV targets applicable for the Twin Cities reach (Minnesota River to St. Croix River) should apply below these major urban influences.

Comparison of LTRMP versus EMAP SAV surveys

The SAV sampling design for LTRMP and EMAP are based on different approaches and present some challenges when trying to compare these surveys. As discussed previously, the LTRMP design is aquatic area (strata) based within a given navigation pool. EMAP is a reach-based design that focused on collecting samples within or near the MCB and SC borders or areas adjacent to these channels. In addition as noted above, the sampling depth between the two surveys were slightly different (Table 2). These factors need to be considered when making comparisons between the sampling designs.

It was possible to provide a general comparison of the LTRMP and EMAP designs by evaluating the SAV sampling results for lower Pool 4 and Pool 8 where both methods were used during years 2006 to 2008 (Figure 7).
Figure 7. Comparison of percent frequency of occurrence of submersed aquatic vegetation measured mid-summer in lower Pool 4 and Pool 8 of the Upper Mississippi River by the Minnesota and Wisconsin Department’s of Natural Resources Environmental Monitoring & Assessment Program (EMAP) and by the Long Term Resource Monitoring Program (LTRMP) for the main channel border and side channel aquatic areas in 2006 to 2008.
The results of this evaluation indicate that the EMAP data were generally similar to the combined MCB and SC strata of the LTRMP design. The only major deviation occurred in Pool 8 in 2008 where the difference in SAV frequency of occurrence between designs exceeded 20 percent. Main channel border SAV data collected using LTRMP methods were always less than EMAP results, but the general temporal changes by both methods were similar within each pool. The ratio of SAV percent frequency of occurrence of EMAP to LTRMP MCB averaged 1.75 when all data were combined. A similar ratio of EMAP to LTRMP MCB+SC SAV frequency averaged 0.82. These ratios provide an approximate method for comparing the two different SAV monitoring designs. However, the use of the ratios needed to be treated with some caution due to limited amount of data available to make these comparisons.

**SAV frequency of occurrence versus total suspended solids**

The average frequency of occurrence of SAV measured by LTRMP in the MCB in pools of UMR system were compared to the average summer (June-September) TSS concentrations in the respective pools during years when the SAV surveys were completed (Figure 8).

![Graph](image)

Figure 8. Percent frequency of occurrence of submersed aquatic vegetation (SAV) measured mid-summer in the man channel border (MCB) by the Long Term Resource Monitoring Program (1998-2007) versus average main channel total suspended solids concentration during June 1 to September 30th. Total suspended solids data were derived from multiple sources (UMRCC, 2002).
Although there is appreciable scatter in the relationship, some obvious patterns are apparent. Highest SAV frequency occurred in the UMR pools where the average summer TSS concentration was less than 30 mg/L. These results are generally consistent with the revised UMRCC light-related water quality criteria (Table 1), which suggests a summer (May 15 – Sept 15) average TSS criterion ≤ 30 mg/L. A threshold is apparent at summer average TSS concentrations exceeding 60 mg/L where SAV was absent at levels exceeding this value. SAV was not found in the MCBs of Pool 26 and the La Grange Pool of the Illinois River, which exhibited average summer TSS concentrations ranging from 75 to 135 mg/L. It is suspected that these high TSS concentrations would severely limit light penetration or provide substantial particulate material that could settle on SAV plant tissues resulting in severe light limitation. Long term summer average (June-Sept, 1978-08) TSS concentration at Locks and Dams 2 and 3 (combined data) was 47 mg/L (Table 3), which was above the revised UMRCC criterion but below the acute threshold.
Table 3. Submersed aquatic vegetation and total suspended solids (TSS) targets. Underlined values are based on measured EMAP, LTRMP or multi-agency monitoring surveys. Summer average TSS based on the June-September period.

<table>
<thead>
<tr>
<th>Condition/Target</th>
<th>Avg. SAV Frequency</th>
<th>Summer Avg. TSS</th>
<th>Basis/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Conditions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnesota R. to Chippewa R.</td>
<td>13%</td>
<td>~7%</td>
<td>EMAP surveys &amp; MCES TSS data for LD 2 &amp; LD 3 (2006-08)</td>
</tr>
<tr>
<td>Long term historical conditions</td>
<td>~9%</td>
<td>~5%</td>
<td>MCES data for LD 2 &amp; LD 3 (1976-2008) SAV estimated from TSS vs SAV regression and EMAP vs LTRMP relationship</td>
</tr>
<tr>
<td><strong>Proposed Targets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50% of SAV Frequency Chippewa R - LD 11</td>
<td>22%</td>
<td>~13%</td>
<td>TSS predicted from TSS vs SAV regression</td>
</tr>
<tr>
<td>Avg. SAV Frequency of Pool 13 Main Chan. Border</td>
<td>~23%</td>
<td>13%</td>
<td>Avg. SAV &amp; TSS for 1997-2007 SAV derived from LTRMP surveys</td>
</tr>
<tr>
<td>Historic SAV Conditions</td>
<td>~15%</td>
<td>~8%</td>
<td>1951 aerial photographs of upper Lake Pepin and upper Pool 4 TSS levels were estimated from turbidity x TSS regression from Mpls/St. Paul Sanitary District at Above Red Wing site</td>
</tr>
<tr>
<td>UMRCC TSS Criteria</td>
<td>~21%</td>
<td>~12% P</td>
<td>Upper Mississippi River Conservation Committee light-related water quality criteria for SAV</td>
</tr>
<tr>
<td><strong>Recommended Targets</strong></td>
<td>~21%</td>
<td>~12%</td>
<td>Average based on four proceeding targets TSS measured at LD 2 &amp; 3 (combined data)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAV measured from LD 2 to Rush River</td>
</tr>
</tbody>
</table>

1Environmental Monitoring and Assessment Program sampling methods are ~1.75 times LTRMP SAV frequency results for the main channel border.
2Long Term Resource Monitoring Program sampling strata for the main channel border.
*Modified TSS criteria based on Giblin et al. (in prep).
*Predicted from LTRMP MCB SAV vs TSS regression.
Regression analysis indicated the SAV x TSS relationship fit a polynomial model the best (highest $R^2$) and yielded a significant correlation ($R^2 = 0.63$, Figure 8). This model provides an estimate of the expected SAV response in the MCB at varying average summer TSS concentrations. Using the revised UMRCC light penetration-related TSS criterion of 30 mg/L yields an estimated SAV frequency of occurrence of about 13 percent for the MCB. The model can also be used in a reverse direction to establish an average TSS target concentration for the main channel as a function of the desired levels of SAV in the MCB.

SAV target for the turbidity impaired reach of Pool 2 to Lake Pepin

It is difficult to define a clear biological basis for the minimum SAV target for the turbidity impaired reach of river above Lake Pepin. We believe the vegetation target should be better than existing conditions and achieve a state that is ecologically desirable and socially acceptable. Recent EMAP vegetation surveys conducted in the turbidity impaired reach of the river above Lake Pepin during the summers of 2006-08 indicated an average SAV frequency of occurrence of 13 percent. However, these surveys were conducted during a period of reduced river flows, which contributed to lower summer average TSS concentrations (35 mg/L at Locks and Dams 2 and 3) and didn’t provide an accurate assessment of the status of SAV during periods of more typical flows and TSS concentrations. The predicted SAV frequency of occurrence for a longer period of record (1976-2008) was only 9 percent for an EMAP-based sampling design due to substantially greater average summer TSS concentrations (47 mg/L, Table 3).

We evaluated four different approaches for establishing a SAV target. These included SAV targets derived from EMAP-based sampling of a reference reach, LTRMP-based MCB sampling of a reference reach, historic conditions and extrapolation from light penetration-related criteria proposed by the UMRCC. Where applicable, the frequency of occurrence of SAV for EMAP and LTRMP MCB sampling designs was derived and the corresponding TSS concentration estimated based on the SAV versus TSS relationship described previously and illustrated in Figure 8.

**EMAP-based reference reach**

EMAP SAV sampling of the river reach extending from the Chippewa River to Lock and Dam 11 was considered to represent a desirable reference since this area is not considered to be impaired by turbidity or TSS and was judged to provide healthy and desirable SAV plant communities. EMAP-based SAV sampling of this reach of river during the summers of 2006-08 yielded an average SAV frequency of occurrence of approximately 44 percent (Figure 6). It was believed that achieving a SAV frequency of occurrence of at least half this value (22 percent) would be a reasonable target for the turbidity-impaired reach above Lake Pepin. This EMAP-based SAV criterion would yield an estimated LTRMP SAV frequency of occurrence of ~13 percent for the MCB and corresponded to an average summer TSS target concentration of 28 mg/L (Table 3).
Table 4. Submersed aquatic vegetation (SAV) targets for Pool 2 to Lake Pepin using Environmental Monitoring and Assessment Program (EMAP) and Long Term Resource Monitoring (LTRMP) surveys.

<table>
<thead>
<tr>
<th>Sampling design</th>
<th>Aquatic areas represented</th>
<th>SAV target percent frequency</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMAP</td>
<td>Main channel, side channel and adjacent aquatic areas</td>
<td>21 Primary targets</td>
<td>Considers an average of four targets: Half of reference (Chip. R. to LD 11) 191 SAV and TSS conditions in upper Lake Pepin LTRMP MCB SAV data for Pool 13 EMAP vs LTRMP MCB comparison¹</td>
</tr>
<tr>
<td>LTRMP</td>
<td>Main Channel Border (MCB)</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>
| LTRMP           | Side Channel (SC)                                             | −18 (Secondary Targets³)     | Regression of SC and MCB²  
SC = (1.27 x MCB) + 2.6 |
| LTRMP           | Contiguous Backwater (BW)                                    | −49                          | Regression of BW and MCB³  
BW = (2.42 x MCB) + 19.6 |

¹Based on EMAP and LTRMP data collected in lower Pool 4 and Pool 8.  
²Based on LTRMP stratified random sampling of multiple pools in the Upper Mississippi River.  
³Expected SAV frequency if primary target is achieved. It does not include within-pool management actions to improve conditions for SAV growth persistence.

**LTRMP-based reference reach**

Pool 13 is the southern-most Mississippi River navigation pool currently sampled for aquatic vegetation by LTRMP. Although SAV is found below Pool 13 in the Mississippi River, its distribution and abundance is generally lower below this pool (Johnson and Hagerty 2008). It is believed that Pool 13 provides SAV conditions that are desirable and provide a reasonable target for the turbidity-impaired reach of the River above Lake Pepin. SAV is common in Pool 13 and neither the bordering states of Illinois nor Iowa consider the waters of this pool to be impaired by turbidity or TSS. The average SAV frequency of occurrence for the MCB of Pool 13 was 13 percent based on LTRMP sampling during 1998 to 2007. An equivalent EMAP-based SAV target would be ~23 percent (Table 3). The average summer TSS concentration in the main channel of Pool 13 was 31 mg/L during this 11 year period based on LTRMP data.

**Historic Conditions**

Black and white photographs of upper Lake Pepin to Red Wing, Minnesota on July 25 of 1951 indicated substantial beds of aquatic vegetation in littoral areas of Lake Pepin, side channels and backwater areas. In addition, notable beds of SAV were visible in these photos. An example photograph of upper Lake Pepin is provided in Figure 9.
Figure 9. Black and white aerial photograph of upper Lake Pepin showing beds of aquatic vegetation (white arrows). The photo was taken July 25, 1951.

Figure 10. Whole-lake sedimentation rate measurements from sediment coring measurements (Engstrom et al. 2009) and estimated sedimentation-derived total suspended solids (TSS) concentrations at Lock and Dam 3 near Red Wing, MN.
These photographs provide a relevant reference to establish SAV and TSS targets since they reflect a desirable historic condition within the turbidity impaired study reach. Although we were unable to establish the actual SAV frequency of occurrence in these photos, we were able to derive historic TSS concentrations from Lake Pepin sedimentation rate measurements (Engstrom et al. 2009) and historical turbidity measurements at Red Wing, Minnesota by early Sanitary District Surveys available from the Metropolitan Council Environmental Services.

Core-derived estimates of TSS concentrations were based on the ratio of whole-lake sedimentation rate measurements for Lake Pepin versus annual average TSS concentrations at Lock and Dam 3 for a similar time intervals (1980-1990 and 1990-1996). Dividing sedimentation rates by this ratio yielded annual average TSS estimates for earlier coring intervals (1900-1975, Figure 10). This analysis indicated decadal annual average TSS concentrations of approximately 22 mg/L at Lock and Dam 3 for the 1950s. A corresponding decadal estimate of summer average TSS for this period was 34 mg/L based on a contemporary ratio of summer (June-September) versus annual average TSS at Lock and Dam 3.

Earliest TSS concentration estimates of the Mississippi River near Red Wing were derived from transparency measurements made in September 1921 by Galtsoff (1924). Galtsoff reported a transparency of about 80 cm in the river above Lake Pepin. This transparency corresponds with an estimated TSS concentration of approximately 16 mg/L based on a regression of TSS versus Secchi depth (r² = 0.575) of data collected by LTRMP in Pool 8 and 13 (Giblin et al. in prep). A similar analysis of Secchi depth and TSS data collected in the river above Lake Pepin revealed a similar TSS value of 13 mg/L (Rob Burdis, MDNR, personal communications). These TSS values compare favorably with sedimentation-based summer average TSS estimate for the 1910-1930 sediment dating interval (plotting point 1920, Figure 10).

Early Whipple-Jackson turbidity measurements of the Mississippi River at Red Wing by Sanitary District Surveys (Minneapolis-St. Paul) provided a more direct estimate of TSS concentrations that may be related to historical SAV conditions. Turbidity measurements were routinely collected during longitudinal sampling of the Mississippi River from Minneapolis to Wabasha, Minnesota (below Lake Pepin). Two to three surveys per month were typically collected during ice-free periods with fewer surveys during winter conditions (Cathy Larson, personal communications). TSS measurements were occasionally made during these surveys and provided a means for deriving turbidity-based estimates of TSS concentrations through regression analysis. The turbidity units are based on silica scale in parts per million. Larson derived the following regression equation based on the available TSS and turbidity measurements during the 1935-1936 period:

TSS mg/L = 0.794 (Turbidity) -0.112, R² = 0.905.

This equation was used to derive estimates of annual and summer average TSS concentrations for 1949-1951 as another means to verify the sedimentation-based TSS measurements described above (Figure 10). The turbidity-based estimates of TSS were found to be comparable to those derived from sedimentation rates and yielded summer and annual average TSS concentrations of 21 and 30 mg/L, respectively for this three year period. For 1951, the year of the reference photo (Figure 9), the summer average TSS was 38 mg/L. This value was used as a potential target (Table 3) since it provided an estimate of summer TSS concentrations present during 1951. However, it should be recognized that the summer averaging period in 1951 (June-September) would have represented SAV conditions occurring before and after this photo was taken. The estimated summer average TSS in 1950 was 21 mg/L, which likely benefited SAV growth observed in the 1951 through the production of SAV propagules during the previous year’s growth period. Therefore the actual TSS levels associated with the SAV depicted in the July 1951 photo may have reflected average summer concentrations ranging from between 21 and 38 mg/L. The selection of the early 1950s as a desirable reference for TSS also provides a target for sedimentation reductions in Lake Pepin. Excessive sedimentation rates along with reduced SAV growth provided the primary basis for identifying sediment impairment in this river reach by Wisconsin (WDNR 2006). Average decadal estimates of whole-lake sedimentation in Lake Pepin during the 1940s and 1950s was approximately 540,000 MT/year and are about 40 percent lower than rates measured during the early to mid-1990s (Engstrom et al. 2009).

UMRCC TSS Criterion: The UMRCC proposed light-related water quality criteria to protect and enhance SAV in the Upper Mississippi River (UMRCC 2003). Although this group provided criteria for summer average light extinction, transparency, TSS and turbidity, a specific frequency of occurrence target for SAV was not provided. The primary light criteria was based on achieving a summer average light extinction coefficient of 3.42 m-1. The corresponding TSS criteria associated with this light extinction coefficient was
initially estimated to be 25 mg/L. However, subsequent analysis by a study carried out by LTRMP in Pools 8 and 13 indicated the TSS criterion was closer to 30 mg/L (Giblin et al., in prep). This modified TSS value, in conjunction with the SAV versus TSS relationships described previously (Figure 8), was used to estimate a SAV frequency targets for the turbidity impairment following EMAP or LTRMP MCB sampling. The corresponding SAV frequency estimates yielded values of 21 percent and 12 percent, respectively, for these sampling methods (Table 3).

**Recommended SAV target and associated TSS criterion**

The MPCA suggests the SAV target for the turbidity impaired reach of Pool 2 to Lake Pepin be based on the average of the four targeting approaches described above and summarized in Table 3. This yields an average SAV frequency of occurrence of approximately 21 percent following an EMAP-based sampling design for main channel and side channel borders or about 12 percent using a LTRMP sampling design for the MCB. These SAV targets are roughly two times existing conditions based on long term historical estimates (1976-2008) from TSS-derived SAV frequencies. To evaluate attainment of these SAV targets, it is recommended that the initial monitoring frequency be based on a minimum of at least three annual EMAP-based surveys over a five year period. To simplify the SAV monitoring design and to make it consistent with the recommended TSS monitoring described below, we suggest the attainment of the SAV target be evaluated by focusing on the river reach extending from Lock and Dam 2 to the Rush River in upper Lake Pepin. Once the target has been consistently achieved, then a re-evaluation of the monitoring frequency can be made.

Achieving the EMAP and MCB LTRMP SAV frequencies can be expected to yield improved SAV frequency of occurrence in other aquatic areas (side channels and backwaters, Table 4), but these would be considered secondary targets since they were not directly linked with main channel TSS concentrations. To achieve the above SAV targets, summer average TSS concentrations will need to be reduced about 32 percent (47 to 32 mg/L) from existing conditions based on the combined monitoring data for Locks and Dams 2 and 3 (Table 3). It is suggested that attainment be based on achieving a median and 90th percentile summer average TSS concentrations of 32 and 44 mg/L, respectively, based on combined bi-weekly monitoring at Locks and Dams 2 and 3. The 90th percentile was derived for main channel summer average data (1998-07) for Pool 13, a desirable reference pool that was used to derive the SAV targets (Table 3). Achieving these TSS criteria will improve the conditions for SAV growth throughout the turbidity impaired reach and result in reduced sediment infilling of Lake Pepin.

**References**


U.S. EPA. 2008. Data collected as part of a cooperative agreement with the U.S. Environmental Protection Agency through its EMAP (Environmental Monitoring and Assessment Program www.epa.gov/emap/) under Grant #CR83323801, which is a cooperative effort between U.S. EPA and the states of Wisconsin and Minnesota. To obtain EMAP vegetation sampling procedures contact Heidi Langrehr, WDNR (heidi.langrehr@wisconsin.gov)


Wisconsin Department of Natural Resources 2006. Wisconsin’s 2006 Impaired Waters Listing Recommendations for the Mississippi River. Mississippi River Team, WDNR, La Crosse, WI.

Total Suspended Solids-Submersed Aquatic Vegetation Minnesota Pollution Control Agency Site-Specific Standard South Metro Mississippi River August 2009 26
South Metro Mississippi Public Meeting Summary

Feb. 11, 2010 at Waseca, Minn., co-hosted by the Minnesota Agricultural Water Resources Coalition.

**Attending:** About 20 people, including farmers and several others from the agriculture community.

**Summary of comments and questions:**

The water monitoring data does not show a strong correlation between total suspended solids and submersed aquatic vegetation. Perhaps more research is needed.

The proposed standard references the level of vegetation in Lake Pepin in the 1950s. Is this standard achievable, given the growth in population and need to grow more food?

How accurate is the model? Are the reductions in sediment loads achievable?

More details are needed on impact of urban stormwater. One study suggests that urban stormwater has far more impact on turbidity than agricultural stormwater.

Given that most sediment is not coming from farm fields, what more can farmers do? As far as erosion from streambanks, ravines and bluffs, more funding is needed to implement practices to reduce this erosion.

**Press coverage of meeting:** Mankato Free Press, The Land Online and Linder Farm Network before the meeting; Agri-News about the meeting.

**MPCA notices:** The MPCA distributed a press release on the public comment period to more than 500 people, including news editors and reporters in Hennepin, Washington, Ramsey, Dakota, Goodhue, Rice, Steele and Sibley counties. The meeting was also noticed in the MPCA WaterFront Bulletin and on the MPCA web site.

Feb. 23, 2010 at Red Wing, Minn., co-hosted by the Lake Pepin Legacy Alliance.

**Attending:** About 70 people, including several area residents.

**Summary of comments and questions:**

Audience members had several questions about:

- Reducing urban stormwater;
- Reducing sediment loads from the Minnesota River;
- Impact of barge traffic;
- Capacity for wastewater treatment plants to make further improvements in discharge concentrations;
- How to implement the proposed standard;
• Relationship between turbidity and eutrophication;
• Process for adopting the standard;
• Specifics of the standard, such as the standard applying only to summer months;
• Cost of the TMDL study; and
• Examples of other TMDLs that have succeeded.

More resources are needed to implement changes so that proposed standard is more than "just talk."

Achieving the standard hinges on flow and on changes in the Minnesota River Basin.

Minnesota has made significant progress in reducing point sources of pollution. What resources and regulations are needed to reduce nonpoint sources of pollution? What does agriculture need to reduce sediment loads and what can the state offer agriculture?

Farmers can’t afford regulations or further changes to reduce sediment loads. Farmers have already adopted reduced tillage practices and made other changes. With a growing population, farmers are under pressure to produce more food.

The Upper Minnesota River is improving because of the conscious efforts of many people. The overall quality of life improves with quality of water. It’s a slow process. Environmental groups, farmers and others can work together to keep improving water quality.

Urban residents need to share some of the burden. Everyone needs to share the responsibility. Individuals need to look at what they can do, such as rain gardens.

Press coverage of meeting: Red Wing Republican Eagle, Minnesota Outdoor News, and Friends of the Mississippi newsletter before the meeting; Red Wing Republican Eagle, Hastings Star-Gazette, and Rochester Post-Bulletin about the meeting.

MPCA notices: The MPCA distributed a press release on the public comment period to more than 500 people, including news editors and reporters in Hennepin, Washington, Ramsey, Dakota, Goodhue, Rice, Steele and Sibley counties. The meeting was also noticed in the MPCA WaterFront Bulletin and on the MPCA web site.
Restoring the south metro Mississippi River

Site specific standards: How to protect unique resources

Water clear enough to grow aquatic vegetation that benefits fish and wildlife is the goal of a water quality standard proposed for the Mississippi River in the south metropolitan area of the Twin Cities.

Scientists from the Minnesota Pollution Control Agency (MPCA) and Wisconsin Department of Natural Resources (DNR) developed the standard after extensive research and with input from a range of interested parties. The standard is specific to the Mississippi River, from Fort Snelling at St. Paul to upper Lake Pepin at Red Wing.

The proposed standard is part of a study of the south metro Mississippi and Lake Pepin portion of the river, called a Total Maximum Daily Load (TMDL). This study measures the level of pollutants in water, identifies their sources, and recommends how to reduce the pollutant levels so the water can meet state water quality standards.

This stretch of the Mississippi is a unique resource, providing ecological, recreational and commercial benefits to the surrounding region. However, the river suffers from high turbidity. In other words, the river has too much sediment, or soil, to meet the state standard for support of aquatic life. The MPCA is proposing a unique standard to protect this unique resource.

This fact sheet will explain:

- The unique features of the river
- The proposed standard for clearer water
- Why the MPCA is proposing a site specific standard
  > Ensuring beneficial uses of the river
  > Allowing for public participation
  > Approval process for adopting the standard
- Destination: Restoration

The MPCA is proposing a standard specifically for this stretch of the Mississippi River, from Fort Snelling to Red Wing, to protect this unique resource. (MPCA graphic)

Stargrass, above, and other submersed vegetation benefit fish and wildlife but need clear water in which to grow. Achieving clearer water and beneficial vegetation is the goal of a standard proposed for the Mississippi River in the south Twin Cities area. (Wisconsin DNR photo)

Public Comment Period: February 8 to March 26, 2010

Public Meetings: For details, go to the MPCA’s web site at www.pca.state.mn.us

Comments: Must be in writing and submitted by 4:30 p.m. on March 26, 2010, to Norm Senjem, MPCA, 18 Wood Lake Drive, Rochester, MN 55904, or norman.senjem@state.mn.us
Unique features of the south metro Mississippi

Economical and ecological base
The Mississippi River is essential to the high quality of life in the Twin Cities area and beyond. As a drinking water source and transportation corridor, it supports the region’s economic base. As an ecosystem, it provides food and habitat for fish, birds and other wildlife.

The ecosystem also supports the economy, as residents and tourists are attracted to boating and fishing on the water along with hiking and biking on many riverside trails.

The river is important to Minnesota for economic, ecological, recreational and cultural reasons. However, the river suffers from high turbidity. In other words, the river has too much sediment, or soil mixed with the water, to meet the state standard for aquatic life.

Immense watershed
The Mississippi River Basin drains all or parts of 31 states and two Canadian provinces. It is the second-longest river in the United States, winding about 2,350 miles from its source in Lake Itasca in Minnesota to its mouth in the Gulf of Mexico.

In Minnesota, nearly half of the state drains to the river, along with small parts of South Dakota, Iowa and Wisconsin. Nearly 50,000 square miles drain to the south metro Mississippi.

Water flows through hundreds of miles of ditches, streams and rivers to the Mississippi, from the glacial lake areas of northern Minnesota; from the rich farmland of western, central and southern parts of the state; and from the fast developing areas around the Twin Cities.

This water drains from farm fields and parking lots, and from all different types of land. It all mixes in the south metro Mississippi, meaning the river here is a blend of water from several geographical areas and different uses of land.

In addition, the river forms the boundary between Minnesota and Wisconsin, requiring the cooperation of both states. Scientists from the two states have worked together to measure the health of the river and plan for its restoration.

Why a site specific standard?
Ongoing pollution study
Recognizing the unique features of the south metro Mississippi, the MPCA, with input from several interested parties and Wisconsin DNR, developed a site specific standard for this water resource.

The site specific standard is an integral part of a pollution study, called a Total Maximum Daily Load (TMDL). For each water body that fails to meet standards, federal law requires that individual states, such as Minnesota, determine the load — or amount — for each relevant pollutant that a water body can accept and still meet standards. This amount is called a TMDL or loading capacity.

Federal and state governments establish standards to protect specific designated uses, such as recreation, fishing, irrigation, and support of aquatic life. In the case of the south metro Mississippi, the purpose of the water quality standard is to support aquatic life. This use includes submerged aquatic vegetation, which requires sunlight for photosynthesis, and sight-feeding fish.

Federal law allows states to set site specific standards for water bodies with conditions that differ from those on which state standards are usually based.

Turbidity: Water made cloudy by total suspended solids (TSS), which are tiny particles of soil and other matter that remain dispersed — or suspended — in water. This cloudiness prevents sunlight from penetrating the water and growing rooted aquatic vegetation and thereby reduces fish and wildlife habitat. The particles also carry nutrients that cause algal blooms.
Proposed standard for clearer water in the south metro Mississippi

<table>
<thead>
<tr>
<th>Current Conditions</th>
<th>Proposed Standard</th>
<th>Outcome Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>47 parts per million</strong> (summer average) of total suspended solids, which is the amount of sediment and other particles dispersed in the water, providing a measurement of the water's cloudiness.</td>
<td><strong>32 parts per million</strong> (summer average) of total suspended solids, which is the amount of sediment and other particles dispersed in the water, providing a measurement of the water's cloudiness.</td>
<td>Double the frequency of occurrence of submersed aquatic vegetation to <strong>21 percent</strong>, meaning if one took 100 river samples, at least 21 of them would include desired vegetation to meet the standard.</td>
</tr>
</tbody>
</table>

Reducing sediment means improving water clarity. The MPCA and Wisconsin DNR believe this site specific standard will lead to an improvement in the aquatic ecosystem of the south metro Mississippi River, with benefits to fish, waterfowl and mussels, along with improved aesthetics and recreation.

Sunlight cannot penetrate cloudy water to grow rooted vegetation. Clearer water allows sunlight to reach and grow desired plants.

Notes: The U.S. Geological Survey and Metropolitan Council Environmental Services provide water monitoring of the Mississippi River. The standard would apply during summer months, as measured by an average of readings at Lock and Dam No. 2 near Hastings and at Lock and Dam No. 3 near Red Wing. Submersed vegetation would occur more in back waters while the main channel would remain clear enough of vegetation, due to its greater depth, to allow boat traffic.

In Minnesota, scientists have found the state-wide turbidity standard for warm water streams to be inadequate to protect aquatic life in the south metro Mississippi River. In addition to its immense watershed size, the Mississippi differs from other rivers in the following ways.

- **Locks and dams:** Structures built in the 1930s to improve navigation created a large increase in shallow backwater habitat in its immense floodplain.
- **Political jurisdiction:** It forms a border between Minnesota and Wisconsin, and is under federal regulation of navigation and related issues. These backwaters are especially suitable for submersed aquatic vegetation.
- **Flow:** The Mississippi at Red Wing is more than twice as large in terms of flow than the next largest tributaries of the Minnesota and St. Croix rivers.

River biologists and natural resource agencies have identified submersed aquatic vegetation as a keystone species to maintain a healthy ecology in the altered river. Scientists have also discovered a close linkage between total suspended solids and desirable species of submersed aquatic vegetation. The MPCA has drawn on this scientific work to establish the basis for a site-specific standard. In setting a site specific standard, states must:

- Ensure that designated uses are met;
- Allow for public participation; and
- Obtain approval from the U.S. Environmental Protection Agency (EPA).

Let’s look at each of those requirements in more detail.

**Ensuring designated uses of the river**

Turbidity — cloudy water — hurts the river’s aquatic ecosystem between the Minnesota River and Upper Lake Pepin. If the MPCA applied the statewide turbidity standard for this reach of the river, it would still fail to support a healthy ecosystem, according to extensive research. Thus, the agency has proposed to follow federal guidelines and set a standard for this specific site.

The MPCA, with input from a stakeholder advisory committee and science advisory panel, is proposing a site specific standard for summer months that would reduce suspended solids in this stretch of the Mississippi by about one-third, leading to double the number of beneficial plants rooted in the river’s bottom.

These plants would attract canvasback ducks and tundra swans as well provide habitat for fish species such as bluegill and large-mouth bass.
Allowing for public participation
A stakeholder advisory committee, made up of people from diverse interested parties, has met several times during the south metro Mississippi and Lake Pepin pollution study period.

Meeting notices, presentations and other information have been posted regularly on the project’s web page at www.pca.state.mn.us/water/tmdl/tmdl-lakepepin.html.

In addition, the MPCA will hold a formal public comment period on the proposed standard from February 8 to March 26, 2010.

The MPCA welcomes comments on the site-specific standard. Comments must be in writing and received by 4:30 p.m. on March 26.

Submit comments to Norman Senjem, MPCA — Southeast Region, 18 Wood Lake Drive SE, Rochester, MN 55904; phone at 507-206-2655 or 800-657-3864; fax at 507-280-5513 ; or email at norman.senjem@state.mn.us.

Approval from the U.S. Environmental Protection Agency
After responding to public comments and making any revisions to the proposed standard, the MPCA will forward the standard to the U.S. EPA for review and approval. If the EPA approves, then the proposed standard will go into effect for the south metro Mississippi. The next step will be for MPCA to work with scientific advisers and stakeholders to complete the turbidity study, including a plan to implement changes to improve water quality to meet the standard. That study will have an additional public comment period.

Destination: Restoration
As the Twin Cities and other communities grow, so do their areas of hard surfaces. Rain water running off roofs, sidewalks, parking lots and streets can carry sediment and other pollutants to the Mississippi River. Stormwater from farmland upstream is also a source of sediment. Extensive research has established that the bulk of sediment in the south metro Mississippi comes from the Minnesota River, where an additional pollution study is being conducted.

The challenge will be to work with urban areas as well as communities and partners in the Minnesota River Valley to reduce the amount of sediment in both the Minnesota and Mississippi rivers.

Restoring the Mississippi will require the efforts of residents, businesses and landowners from throughout Minnesota. This restoration will have a ripple effect, resulting in cleaner water in the hundreds of streams and rivers flowing to the Mississippi.

Sustenance: In its entirety, the Mississippi River and its floodplain sustain a diverse population of living things, including:
> 50 communities that rely on the river for drinking water;
> 260 species (at least) of fishes;
> 40 percent of the nation’s migratory waterfowl and 60 percent of all North American birds use the river or its basin corridor during their spring and fall migrations;
> 38 documented species of mussel;
> 50 species of mammals; and
> 145 species (at least) of amphibians and reptiles.
March 9, 2010

Norman Senjem  
MPCA – Southeast Region  
18 Wood Lake Drive SE  
Rochester, MN  55904

Dear Mr. Senjem:

Our home is located at the head of Lake Pepin, so we’ve been able to observe changes over a long time. The growth of the mud flat island where the lake starts became very alarming several years ago. Our question was, “Can anything be done about the sediment that is filling the lake?”

We consulted with Mike McKay, who agreed to find out. We were very pleased to learn that the MPCA and other pertinent government entities have devoted significant resources to understanding the problem and what to do to “fix” it. Along with several other residents from Wacouta, we formed the Lake Pepin Legacy Alliance in order to inform first, ourselves, then others, as to what we can do to alleviate this very serious situation.

We support the approval by the MPCA of the proposed site-specific standards for TSS and SAV proposed for the Mississippi River, Navigation Pools 2-4, which would require a 50 percent reduction in sediment load. We urge the MPCA to complete and approve the Total Maximum Daily Load report as swiftly as possible so that concrete steps can begin to meet the standards.

We appreciate the good work that you and your department have done and look forward to its implementation.

Sincerely,

Arlin and Marilyn Albrecht
March 2, 2010

Mr. Norman Senjem
Minnesota Pollution Control Agency – SE Region
18 Wood Lake Drive SE
Rochester, MN 55904

RE: Support for the proposed South Metro Mississippi TSS Site Specific Standard

Dear Norm,

I am writing this letter on behalf of the Dakota County Water Resources Department as well as the Dakota County Soil and Water Conservation District in support of the proposed site specific standards for total suspended solids and submerged aquatic vegetation in the Mississippi River from its confluence with the Minnesota River to the upper reaches of Lake Pepin.

When achieved, we believe these standards will be protective of the aquatic life use classification in this stretch and will improve water quality substantially. We appreciate the prescriptive nature of these standards; they are easy to understand and easy to measure.

Additionally, these standards match the 15-year targets recently set by the Citizen Advisory Group (CAG) for the Mississippi Makeover Project; a project coordinated by Dakota County. The CAG met four times over the course of a year to identify indicators of successful restoration in this area. Their chosen indicators included water clarity and aquatic vegetation. A separate technical advisory committee worked to determine how the CAG’s indicators translated into quantifiable targets. When completed, the CAG agreed on the following:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>8-year target</th>
<th>15-year target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Clarity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSS (June – Sept avg; L&amp;D 2 and 3 avg)</td>
<td>39.5 mg/l</td>
<td>32 mg/l</td>
</tr>
<tr>
<td>Secchi (June – Sept avg @ L&amp;D 3)</td>
<td>43 cm</td>
<td>47 cm</td>
</tr>
<tr>
<td>Secchi (June – Sept avg in Lake Pepin)</td>
<td>74 cm</td>
<td>80 cm</td>
</tr>
<tr>
<td>Aquatic Vegetation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAV % frequency of occurrence (EMAP)</td>
<td>15%</td>
<td>21%</td>
</tr>
<tr>
<td>Species richness (max number of species)</td>
<td>10 species</td>
<td>11 species</td>
</tr>
</tbody>
</table>

We look forward to working with the PCA and other agencies on restoring the river Mississippi River through land and river management activities and projects. Thank you for the opportunity to comment.

Sincerely,

Laura Jester
Watershed Conservationist

Cc: Brian Watson, Dakota County SWCD District Manager
    David Swenson, Dakota County Water Resources Department Director
    Mark Zabel, Dakota County Surface Water Unit Supervisor
March 17, 2010

Norman Senjem
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

Subject: Draft South Metro Mississippi Total Suspended Solids Site Specific Standard

Dear Mr. Senjem:

The Upper Mississippi River Conservation Committee was created in 1943 and includes natural resource managers from Illinois, Iowa, Minnesota, Missouri and Wisconsin with a goal of promoting cooperation between conservation agencies on the Upper Mississippi River. The Committee is comprised of technical sections in fisheries, wildlife, water quality, law enforcement and recreation water use with ad-hoc sections focusing on mussels, vegetation, recreation and education.

Members of our organization have considerable technical knowledge with respect to the preservation and wise utilization of the natural and recreational resources of the Upper Mississippi River. A key objective of our organization is to provide recommendations to governing State bodies that promote wise environmental stewardship of the River. It is with this latter objective that we wish to support MPCA’s proposed total suspended solids (TSS) site specific standard for the Mississippi River reach extending from the mouth of the Minnesota River to upper Lake Pepin.

Our Water Quality Technical Section has discussed and evaluated the basis of the proposed standard at the 66th Annual UMRCC meeting in Dubuque, Iowa on March 16th. This evaluation has found the standard is sound and is based on substantial monitoring data and research efforts conducted under the federal/state Long Term Resource Monitoring Program (LTRMP) and recent Environmental Monitoring and Assessment Program (EMAP) efforts conducted by the Minnesota and Wisconsin Departments’ of Natural Resources. Further, the proposed TSS criterion is consistent with the Section’s previous recommendations concerning the adoption of water quality criteria to protect and sustain submersed aquatic vegetation in the Upper Mississippi River (UMRCC, 2003). The proposed TSS standard will be more protective than Minnesota’s current turbidity standard and will contribute to improved aquatic life use especially as it relates to submersed aquatic vegetation and the fisheries and wildlife resources that are dependent upon these important plant communities.
The proposed site specific TSS standard will also result in reduced sediment infilling of Lake Pepin, which threatens the longevity of this large natural riverine lake. Sedimentation problems in the Upper Mississippi River backwaters have been frequently identified by UMRCC member resource agencies as a major environmental threat facing the river. The water quality of the Mississippi River changes markedly below Lake Pepin due to this lake’s ability to naturally trap and retain sediments. Efforts to prolong the life of Lake Pepin will also have direct influence on the quality of the river for an extensive reach below this lake.

The UMRCC supports the adoption of your site specific standard for TSS and the associated submersed aquatic vegetation criterion for the Pool 2 to upper Lake Pepin reach and the monitoring basis to assess compliance with these criteria. We believe the site specific standard will result greater protection of aquatic life use for a reach of river that has had sediment-related impairments. We believe the proposed standard is based on sound science and provides an appropriate target for the turbidity/sediment Total Maximum Daily Load (TMDL) that is currently being developed for this reach of the Upper Mississippi River.

Sincerely,

[Signature]

Martin Konrad
Chairman
Upper Mississippi River Conservation Committee

Cc:

Gaylen Reetz, MPCA
Todd Ambs, WDNR
Thank you for soliciting input for the Lake Pepin TMDL Project, site specific standard and restoring the south metro Mississippi River. (http://www.pca.state.mn.us/publications/wq-iw9-12a.pdf)

I am not in favor of allowing the new standard of 32 NTU average if the standard does not also require meeting the MPCA statewide standard of 25 NTU in no more than 10% of the samples also. In combination the two standards may be beneficial, throwing out the existing standard for an average will be detrimental. Abandoning the Statewide standard would risk accepting lower quality in one of our most important waters. I do not want to give away the control of high flow sediment excursions that are the bulk of the problem according to the modeling comments. Basing a reduced standard on any modeling is a risky approach. I do not accept that much risk for our waters. The clean water act is 38 years old. The time for taking risks and relying on notoriously unreliable modeling is long past. Minnesota should at the least adhere to it’s established statewide standards and take the steps needed to meet those standards.

Upper Mississippi River-Lake Pepin Water Quality Model Introduction page 4: "The MPCA lists a water body for turbidity if it exceeds 25 NTU in more than 10% of the monitoring samples. Therefore, the preliminary turbidity target applied in the modeling analyses was 25 NTU in less than 10% of the monitoring samples for flows up to the 90th percentile (i.e., up to 31,400 cfs at St. Paul). A site-specific criterion of a long-term median summer (June-September) average of 32 mg/L TSS has been proposed to support the promotion of submerged aquatic vegetation (SAV) from Pool 2 to Upper Lake Pepin (Sullivan et al., 2009)."
The largest contributor to sediment load for all of SE MN waters is the erosion from streambanks. Runoff from ag fields has been minimized, but the erosion from the previous 100 years is laying in the flood zone now. Most streams and rivers have substandard vegetation protecting their banks such as Box Elder (the worst cover of all). If an aggressive campaign were launched to replant stream and river banks with high quality native grasses (like cordgrass and switchgrass), the erosion and amount of suspended solids could be reduced significantly.

I also believe stormwater ponds are part of the problem. They may settle out sand, but not clay particles; and much of this clay is from the pond itself. So instead of a 'wet' pond, these stormwater ponds should be 'dry'. They should fill up during a rain event, and then slow release the water; taking several days to a week to do so. In the dry periods, native vegetation would grow in the pond area to filter the water and absorb excess nutrients.

Lastly, I think runoff in the agricultural areas could be slowed down to reduce the erosion power of high-running streams. It might seem insignificant, but if each culvert in the right of way had a stand-pipe that could back water up and release it slowly, the speed of the runoff could be diminished quite a bit. The stand-pipe would have a maximum height that would not cause the backed up water to overflow the driveway it protects. I would think the price for such a pipe would be fairly small per culvert.

Thanks for listening.

Mike Denney

Mike Denney [denney@us.ibm.com]

"Everybody should believe in something, I believe I'll go fishing"- thoreau
Dear Mr. Senjem,

I am writing on behalf of Friends of the Mississippi River and our members with comment on the proposed Mississippi River Site Specific Standards now open for public comment.

Friends of the Mississippi River (FMR) is a non-profit organization founded in 1993 with a mission to protect, preserve and enhance the Mississippi River and its watershed in the Twin Cities metro area and beyond. With over 1,500 members, 18 active board members, and 16 staff - FMR is a leading citizen organization working to protect and enhance the Mississippi River in the Twin Cities metropolitan area.

The Mississippi River

The Mississippi River is essential to the high quality of life in the Twin Cities area and beyond. As a drinking water source and transportation corridor, it supports the region’s economic base. As an ecosystem, it provides food and habitat for fish, birds and other wildlife. As a recreation amenity, boating, fishing and riverside trail use are integral aspects of our quality of life. The health of the Mississippi River is an important economic, ecological, recreational and cultural asset.

While the Mississippi River remains an iconic big river — one that serves as a drinking water source, economic engine and critical ecosystem — it is also a troubled resource threatened by excess turbidity. This turbidity harms aquatic life and inhibits the growth of vegetation that would otherwise prevent riverbank erosion, provide aquatic habitat, and help remove excess nutrients from the river.

Unfortunately, current statewide turbidity standards, if applied to this South Metro reach of the river, would fail to adequately protect the river’s designated uses. As such, FMR concurs with the MPCA that a Site Specific Standard (SSS) is both appropriate and necessary for this reach of the river. The Site Specific Standard sets a clear limit on allowable turbidity levels and is an important first step toward a Clean Water Act-compliant Mississippi River.
The Proposed Standard
FMR believes that the current proposed South Metro Mississippi Site Specific Standard sets a clear river restoration goal based on sound science and rigorous research developed by leading state and national experts.

The proposed Mississippi River standard for summer months (32ppm TSS at Lock and Dam No. 2 and No. 3) represents an approximately 1/3rd reduction from the current seasonal average TSS (47ppm TSS). The achievement of the proposed TSS standard will ensure the continued survival of Lake Pepin, the upper portion of which will otherwise vanish in 85–90 years; and the entirety of which will otherwise vanish in under approximately 300 years.

In addition, the proposed TSS standard will allow enough light penetration to enable meaningful submerged aquatic vegetation growth – the second component of the proposed Site Specific Standard. The proposed submerged aquatic vegetation frequency standard (21 percent) would represent an approximate doubling of current main channel border vegetation. This increase in beneficial vegetation will attract waterfowl and aquatic species essential to a healthy river ecosystem.

FMR agrees with MPCA and project staff, along with the general consensus of the stakeholder advisory group, that the proposed standard is a scientifically valid and appropriate standard for the South Metro Mississippi River. We applaud the excellent work of MPCA staff in the development of this standard.

Achievability
It is FMR’s position that the proposed standard is achievable at a fair cost with proven pollution reduction strategies.

Urban watersheds, particularly in the Twin Cities metropolitan area, are already embracing a wide range of stormwater pollution prevention strategies. Watershed and municipal volume control standards, existing TMDLs and restoration programs, MS4 permit minimum control measures, and residential stormwater mitigation practices have the potential to achieve meaningful long-term stormwater runoff reductions on the scale necessary to achieve the proposed Site Specific Standard.

Agricultural practices like conservation tillage, wetland restoration, and stream setbacks are increasingly common practices in high-contributing sub-watersheds. Implementation of vegetated stream buffers in shore impact zones, when combined with other practices like conservation drainage, ravine restoration and stream bank armoring, make dramatic reductions in runoff pollution achievable in rural watersheds.

For the last decade, the MPCA and others have monitored the West Fork Beaver Creek, a small tributary of Hawk Creek near Renville, Minnesota. During this period, the watershed has experienced a 50% reduction in suspended sediments and a 25% reduction in Phosphorous. This
progress was made through the targeted conversion of about 3% of the land area into perennial streambank vegetation, along with wetland restoration activity.

It is FMR’s position that reductions in urban and agricultural TSS contributions to the South Metro Mississippi River can be achieved under existing regulatory frameworks with scientifically proven and cost-effective techniques.

**Conclusion**
The approval of the proposed South Metro Mississippi River Site Specific Standard is an opportunity Minnesota cannot afford to miss. This long overdue standard represents an important step toward protecting the Mississippi River, and reflects the public’s clearly demonstrated desire to protect and preserve our cherished water resources.

The approval of this standard is an investment in the long-term vitality of our Mississippi River and the economic, ecological, recreational and cultural asset it represents. FMR, on behalf of our 1500 members, wishes to submit our strong endorsement of the proposed Site Specific Standard.

Best wishes,

Trevor A. Russell

Watershed Program Director
Friends of the Mississippi River
360 North Robert Street, Suite 400
Saint Paul, MN 55101
Phone: (651) 222-2193 extension #18
Fax: (651) 222-6005
Email: trussell@fmr.org
March 24, 2010

Norman Senjem
MPCA-Southeast region
18 Wood Lake Drive SE
Rochester MN 55904

Mr. Senjem:

The Lake Pepin Legacy Alliance (LPLA) was formed a year and a half ago as an ad hoc citizens group to provide a way for local residents on both sides of the lake to support needed policies and actions to clean up the Mississippi and save Lake Pepin from premature death. Experts have told us the lake is filling with sediment at 10 times the natural rate. Signs of that process are apparent to those of us who live in Wacouta Bay, where hardly any rooted plans grow any more because there’s too much mud in the water to allow the sun to shine through.

We are encouraged by the news that the MPCA is setting a water quality standard specifically designed to bring the South Metro Mississippi River back to life, with respect to aquatic vegetation. The Alliance supports the higher standard of 32 parts per million of TSS but is not content to wait. Members want local governments in the Mississippi River Watershed to enforce existing laws now. The Alliance supports the goal of the MPCA to make the water from Fort Snelling to Lake Pepin clear enough to grow aquatic vegetation that benefits fish and wildlife.

The LPLA believes the time is now to get on with real implementation. Protracted debate on standards will only delay the process. We need to focus on “reasonable assurance” of sediment reductions from the Minnesota River without making the standards so rigid that the effort loses the middle ground. We urge support for the expeditious approval of the MPCA, and subsequently the US EPA, of a proposed site specific standard for TSS and SAV proposed for the Mississippi River, Navigation Pools 2-4. Next, we need to push for the expeditious completion and approval of the TMDL report that will prescribe the needed reductions in sediment from the Minnesota River, Cannon River, urban runoff, the Upper Mississippi River and other sources. Following TMDL approval, we must move forward with specific implementation activities simultaneously with the development of a comprehensive implementation plan that includes enforcement of existing regulations that result in real milestones and ultimate responsibility assigned to an agency.
The harsh reality simply stated is that the equivalent of one 12-yard dump truck load of sediment is dumped into the South Metro Mississippi River every eight minutes, year around – and most of it is settles out in Lake Pepin. The upper lake, north of Frontenac, will be gone before this century ends if current rates of sedimentation persist. The rest of the lake will last another 200-300 years before becoming a big marsh with a navigation ditch down the middle.

Lake Pepin is a natural treasure. Above and beyond its monetary worth, there are treasured landscapes, cultural history and recreational assets that are priceless. Restoring and protecting Lake Pepin requires bold new approaches and renewed commitment to controlling pollution, protecting and restoring habitats, conserving lands and improving the management of natural resources.

Respectfully submitted,

Michael McKay, Executive Director
Lake Pepin Legacy Alliance
Box 392
Red Wing MN 55066
Date: 23 March 2010

To: Norman Senjem  
MPCA-Southeast Region

From: Robert O. Megard  
Member, Science Advisory Panel, Lake Pepin Modeling Project  
Professor Emeritus  
Department of Ecology, Evolution and Behavior  
University of Minnesota  
Telephone: 651 626 3827  
Email: megar001@umn.edu

Subject: Site-specific TSS standard for the South Metro section of the Mississippi River

MPCA has proposed two sampling sites for the purpose of evaluating compliance with the TSS standard (32 mg / liter) proposed for the South Metro section of the Mississippi River. However, average TSS concentrations at these two sites are significantly less than he average for the South Metro section of the river. Data from more sites therefore must be used to evaluate compliance with the standard.

An analysis of data obtained during the past three decades (Table 1) shows that average summer TSS concentrations at the two proposed sites, located at either end of Navigation Pool 3, are biased measures of the summer average in the South Metro section of the river, which includes Pool 2, Pool 3, and upper Pool 4. Averages at these sites are biased partly because of the locations of the sites, and partly because the length of Pool #3, which is 9 miles long, is only about 1/3 the length of the South Metro section (61 miles). The long-term average (45 mg / liter) in Pool #3 is 8% less than the long-term average (49 mg / liter) for the South Metro section, which extends 31 miles upstream and 10 miles downstream from Pool 3 (Table 1).

Because of the bias, the proposed compliance protocol gives an optimistic assessment of water quality in half of the South Metro section. The bias is optimistic because most of the TSS enters the Mississippi River at the upstream end of Pool 2, and the concentration decreases as the river flows toward Pool 3. The average concentration (54 mg / liter) in Pool 2 has been 20% higher than in Pool 3 (45 mg / liter) during the past three decades (Table 1). I suggest adding two sites upstream in Pool 2 (St. Paul and Inver Grove) and 1 site downstream in Pool 4 (Minnesota Channel Inlet to Lake Pepin). This would give an array of 5 sites located 9, 18, 32, 51 and 61 miles downstream from the source of most of the TSS. It will provide much stronger statistical support for the standard and also will expand the environment for SAV farther upstream.

Data have been collected from all of these sites by Metropolitan Council Environmental Services for decades. There is every reason to expect that their sampling program will continue in the future, so the protocol I propose is not an added financial burden. Data from a larger number of sampling stations over such a long time will be a firm baseline reference for evaluating compliance with the standard.

The critical importance of selecting adequate criteria for evaluating compliance with a TSS standard is illustrated in Fig.1, where the curve indicates that summer TSS at Lock and Dam #2 has decreased about 50% during the past 5 years; summer TSS at this sampling site is now compliant with proposed standard. However, summer TSS was also at or below the proposed standard for several summers about 20 years ago.
Table 1. Average concentration of total suspended solids (mg TSS / liter) at 18 sampling stations in the section of the Upper Mississippi River between Ft. Snelling and the outlet of Lake Pepin (Navigation Pools 2, 3 and 4), based on 2571 samples collected during 31 summers (Jun, Jul, Aug, Sep, 1976 – 2007) by Metropolitan Council Environmental Services. Samples collected in Pool 3 (highlighted in red) are proposed by MPCA to be used to evaluate compliance with the proposed TSS standard in Pools 2, Pool 3 and upper Pool 4.

<table>
<thead>
<tr>
<th>Location of Sampling Station</th>
<th>Distrance From Ft. Snelling</th>
<th>Average TSS</th>
<th>Average Pool 4</th>
<th>Average Pool 3</th>
<th>Average Pool 2</th>
<th>Average Pools 2, 3 &amp; upper Pool 4</th>
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</thead>
<tbody>
<tr>
<td>L.Pepin Outlet</td>
<td>764</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Reads Landing</td>
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<td>83</td>
<td>12</td>
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<tr>
<td>Lower Lake Pepin</td>
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<td>Middle Lake Pepin</td>
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<tr>
<td>Upper Lake Pepin MN Channel Inlet to Lake Pepin</td>
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</tr>
<tr>
<td>Lock and Dam No. 2</td>
<td>816</td>
<td>32</td>
<td>51</td>
<td>51</td>
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<tr>
<td>Near Nininger</td>
<td>817</td>
<td>31</td>
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</tr>
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<td>Grey Cloud Island</td>
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<td>Inver Grove</td>
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<td>St. Paul</td>
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<td>Average TSS</td>
<td></td>
<td>36</td>
<td>24</td>
<td>45</td>
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</tr>
</tbody>
</table>

Metro Council Environmental Services
Lock and Dam #2, summers 1976 - 2007)

FIGURE 1
March 26, 2010

Norman Senjem, Southeast Regional Office
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

Re: Total Suspended Solids – Submersed Aquatic Vegetation Site-Specific Standard, South Metro Mississippi River (Public Notice Draft January 2010)

Dear Mr. Senjem:

The following comments are offered on behalf of the Minnesota Environmental Science and Economic Review Board (MESERB). MESERB is a joint powers board of cities, public utilities commissions, and sanitary sewer districts dedicated to ensuring that regulations affecting wastewater treatment are reasonable and based on sound science.

MESERB’s 39 joint powers board members represent over half a million Minnesotans, and over 175 million gallons per day of wastewater treatment capacity. At least 24 of our joint powers board members would be affected by the proposed standards. MESERB has not formally commented on any matters relating to the Lake Pepin Total Maximum Daily Load (TMDL) since October 2004; however, a MESERB member has served on the Science Advisory Panel since that time. In addition, members and staff have attended various Stakeholder Advisory Committee meetings and annual forums.

The proposed approach marks a substantial change from the MPCA’s earlier proposals that would have established phosphorus, chlorophyll-a and turbidity standards for Lake Pepin. This new approach seems responsive to the concerns expressed by Science Advisory Panel members, and MESERB applauds the Agency for listening to these concerns. As our Minnesota River members can certainly attest, turbidity issues in that river as well as the Mississippi are substantially due to nonpoint source runoff and the proposal to address turbidity first is an important step in putting the focus on nonpoint sources.

As noted in the proposed standard, the MPCA anticipates developing a site-specific eutrophication standard for Lake Pepin in concert with statewide numeric nutrient standards for rivers and streams.
MESERB's support for the proposed TSS/SAV standard should not be taken as an endorsement of numeric nutrient standards for riverine systems as a whole. Further, as expressed in MESERB correspondence with the MPCA dated September 26 and November 6, 2008 and April 17, 2009, MESERB has grave concerns about the propriety and usefulness of numeric nutrient standards for flowing waters where the scientific record is replete with information about local variation and confounding factors. While a site-specific standard for Lake Pepin may indeed prove appropriate, this does not necessarily extend to broadly applicable standards elsewhere.

MPCA's response to this concern may be that it lies outside the realm of the present proposed site-specific standard, but MESERB submits that it does not. It is common knowledge that the Lake Pepin TMDL project currently under way will be based on this new standard; in fact, this standard is being proposed because of that study. Since these site-specific standards are the foundation upon which future water quality planning will be based, it is perfectly appropriate for the MPCA to consider and respond to this concern as we move forward.

Thank you for the opportunity to offer these comments. If you have any questions or would like to discuss these matters further, I may be reached at 507-281-6190 x3006 or dlane@rochestermn.gov.

Yours truly,

MINNESOTA ENVIRONMENTAL SCIENCE AND ECONOMIC REVIEW BOARD

David C. Lane

David C. Lane, Environmental Coordinator, Rochester Water Reclamation Plant
MESERB President

cc: MESERB members
Steven W. Nyhus, Flaherty & Hood, P.A., Attorney for MESERB
March 24, 2010

Norman Senjem, Lower Mississippi Basin Coordinator
Minnesota Pollution Control Agency, Southeast Region
18 Wood Lake Drive SE
Rochester, MN 55904

RE: Public comment period for Draft Total Suspended Solids-Submersed Aquatic Vegetation Site-Specific Standard – South Metro Mississippi River.

Dear Mr. Senjem:

The Minnesota Department of Natural Resources supports the site-specific standards proposed by the Minnesota Pollution Control Agency for total suspended solids (TSS) and submersed aquatic vegetation for the South Metro Mississippi River component of the Lake Pepin TMDL. These standards are based on the best available science and extensive monitoring information and represent the cumulative knowledge of technical experts from state and federal resource agencies and universities. These standards reflect our understanding that improvements in water clarity, by reducing TSS, will increase the frequency of occurrence and abundance of submersed aquatic vegetation. This will in turn improve habitat for fish and wildlife, and increased water clarity will positively affect user perceptions and aquatic recreation. We believe these standards are attainable and constitute a critical step in restoring the health and designated uses of the Mississippi River.

Members of the MDNR Mississippi River Team have participated on the Technical and Stakeholder Committees associated with the Lake Pepin-South Metro Mississippi River TMDL studies. They have also been active participants with the Mississippi Makeover project that involves stakeholder participation in establishing indicators and targets for mussels and fish. In addition, data is now being collected to establish future targets for waterfowl. These indicator targets will guide our restoration efforts both within the Mississippi River floodplain and the larger watershed areas.

A continuing concern for this Department is the rate of sediment infilling of Lake Pepin. Although a site-specific standard will not be promulgated for the sedimentation of the lake, this has been an adjunct conversation throughout the development process for the TMDL. The MPCA has stated that the achievement of the site-specific standard (32 mg/liter suspended solids) will reduce the rate of lake infill by half. This will be a very significant outcome in view of projections for the lake that were developed as part of a
lake sediment study (Engstrom et al. 2009)\textsuperscript{1} that projected that sediment infill will eliminate the upper one-third (7 miles) of the lake within a century, and the entire lake in 340 years. These projections were originally published in 2000 so a decade has passed and lake lifetimes are reduced by 10 years. This means that if the site-specific TSS standard were being met at this time, the upstream 7 miles of lake would be gone in 180 years. Many of the backwater lakes and sloughs upstream from Lake Pepin will be filled in at an even more accelerated rate.

We request that, as the site-specific TSS standard is incorporated into the final TMDL study report, the significance of the lake infill process be discussed and aggressive implementation schedules recommended for TSS reductions. The Implementation Plan should emphasize an adaptive management approach where the TSS standard is not only met, but all reasonable efforts are made to accomplish further reductions as opportunities are identified.

We appreciate the opportunity to participate in this TMDL initiative, and to provide comment on the site-specific standard.

Sincerely,

\hspace{1cm} \\
Steven Colvin
Environmental Review Supervisor
Division of Ecological Resources

c. Joseph Kurcinka, DNR Central Region Director
   Jan Wolff,
   Tim Schlagenhaft,
   Jack Enblom

March 26, 2010

Norman Senjem
MPCA - Southeast Region
18 Wood Lake Drive SE
Rochester, MN 55904

Mr. Senjem:

The Minnesota Soybean Growers Association (MSGA) and the Minnesota Corn Growers Association (MCGA) request that the MPCA conduct a public informational meeting on the proposed site specific TSS standard for the South Metro Mississippi River.

A public hearing is required to allow the consideration by MPCA of relevant facts necessary in the development of such water standard as currently proposed by MPCA.

Matters of concerns
The undersigned petitioners find that the proposed TSS standard has been developed with inadequate consideration of available historic data.

The undersigned petitioners find that the proposed TSS standard inadequately incorporates natural background considerations as required by the Clean Water Legacy Act (MS 114D.15, subdivision 10).

The undersigned petitioners find that the proposed TSS standard has been developed with inadequate public involvement as required by the Clean Water Legacy Act (MS 114D.35, subdivisions 1-3).

Justification for public informational meeting
A public informational meeting is required to allow stakeholders to participate in and observe the standard development process.

Issues to be addressed during public informational meeting
The undersigned petitioners request the MPCA address the legal requirements of standards development.

The undersigned petitioners request the MPCA address their approach to evaluating natural background conditions.

Request for information
Pursuant to the Minnesota Government Data Practices Act (MS 13.01) the undersigned petitioners request MPCA provide an opportunity at the earliest convenient date to inspect and review the following data connected with the development of the proposed TSS standard.

1. All contracts relating to the Lake Pepin TMDL, subsequently the South Metro Mississippi River TSS Standard project.

2. All contracts and documents relating to the Wisconsin DNR involvement with the Lake Pepin TMDL, subsequently the South Metro Mississippi River TSS Standard project.

3. All documents, final or drafts, regarding scope of work for the TMDL.

4. All documents regarding the Lake Pepin TMDL workplan, including final and draft documents.
5. All documents regarding the South Metro Mississippi River TSS Standard project workplan, including final and draft documents.

6. All technical, scientific and monitoring data, including electronic data (e.g. spreadsheets and data stored in electronic media) compiled or used to arrive at the proposed standard, or compiled or used to support conclusions by others, but referred to in the Lake Pepin TMDL.

7. All technical, scientific and monitoring data, including electronic data (e.g. spreadsheets and data stored in electronic media) compiled or used to arrive at the proposed standard, or compiled or used to support conclusions by others, but referred to in the South Metro Mississippi River TSS Standard project.

8. All documentation of the process by which historic photos were considered and evaluated in connection with the Lake Pepin TMDL and subsequent South Metro Mississippi River TSS Standard project.

9. Software utilized to analyze electronic data, including any software used to conduct modeling used in the Lake Pepin TMDL.

10. Software utilized to analyze electronic data, including any software used to conduct modeling used in the South Metro Mississippi River TSS Standard project.

11. Any and all documents including staff memorandums, emails or other correspondence relating to the Lake Pepin TMDL at any stage.

12. Any and all documents including staff memorandums, emails or other correspondence relating to the South Metro Mississippi River TSS Standard project at any stage.

13. Copies of any EPA or MPCA guidance documents utilized in developing the proposed standard.

In accordance with Minn. Stat. 13.03, Subdivision 3, the petitioners further request that the MPCA designate one or more individuals to explain the meaning of all data that is produced.

We respectfully request that the MPCA provide the information herein requested at the earliest convenient opportunity. Please contact Steve Commerford at 507-359-4429 to make the necessary arrangements.

Respectfully,

Bill Gordon, Director
Minnesota Soybean Growers Association
151 St. Andrews Ct, Suite 710
Mankato, MN  56001

Devonna Zeug, President
Minnesota Corn Growers Association
738 First Ave East
Shakopee, MN 55379
March 26, 2010

Mr. Norman Senjem
MPCA – Southeast Region
18 Wood Lake Drive SE
Rochester, MN  55904

RE:  South Metro Mississippi River TMDL Site-Specific Standard

Dear Mr. Senjem:

The TMDL proposes a site-specific TSS standard for the South Metro Mississippi River. The TMDL states that the proposed standard will likely “be retained once the triennial standards revision is completed.” It seems then that this is a precursor to future proposed rules (7050). Therefore, in the spirit of compliance with MS 174.05 Sub 2, the Department of Transportation is submitting these comments regarding the impact upon the State’s transportation system. In general, we believe that the establishment of this site specific standard will result in Mn/DOT needing to undertake extraordinary measures in order to meet future TMDL requirements enforced through the NPDES Permits (Construction and MS4 stormwater).

The current proposal is 32mg/l TSS as a long term, multiyear seasonal mean. The regression equation found in Figure one shows that 32 mg/l TSS corresponds to a turbidity value of about 12 NTU. MN Rule 7050 specifies a turbidity standard of 10 NTU for cold water fisheries (trout streams). In no way does the south Metro Mississippi River resemble a cold water stream. Undertaking measures to transform a highly altered large river system to meet standards more appropriate for trout streams is questionable. As stated earlier, we believe this will result in the need for Mn/DOT to undertake extraordinary measures at substantial costs to meet this water quality goal.

MPCA indicates that sediment contributions from the Minnesota River are high and a separate TMDL is being developed for the Minnesota River. It is unclear how all this is going to tie together. Please elaborate on this. Until the Minnesota River loading is under control, how and why will stringent standards on this particular segment of the Mississippi River make any difference?

Is the Lake Pepin TMDL finalized yet? How will this TMDL tie in with that one?

Will Wisconsin adopt the same standard so there is equivalency on both sides of the river?

Will violation of the site-specific standard be based on exceeding the median, or the 90th percentile value?
Thank you for the opportunity to comment on this TMDL. We look forward to your response.

Sincerely,

Beth D. Neuendorf, PE
Mn/DOT Metro District Water Resources Engineer

cc  Wesley Saunders-Pearce, Mn/DOT OES
    Nick Tiedeken, Mn/DOT OES
    File
March 24, 2010

Norman Senjem
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

Dear Mr. Senjem:

The Minnesota Corn Growers Association’s (MCGA) appreciates this opportunity to comment on behalf of nearly 6,000 farmer members on the draft South Metro Mississippi Total Suspended Solids Site Specific Standard. Minnesota farmers are active clean water advocates, eager to engage in a productive discussion at every level from the determination of designated uses and standards to the identification of pollution sources and restoration activities.

Issue #1- Duplication of Standards
The notice of proposed standard states that

- The MPCA is undertaking promulgation of a statewide TSS standard in our next triennial rule revision to replace the turbidity standard. (page 1)

We support this transition from the current turbidity standards to a TSS approach. However, the proposed standard also states that

- The TSS site-specific standard will complement the existing turbidity standard since each standard will apply to different periods of the year.” (page 2)

and that

- The 25 NTU standard will provide its measure of protection for the remainder of the year. (page 3)

The latter two statements are in conflict with the first statement. Is it the Agency’s intent to replace the turbidity standard or will it be kept in place? We strongly encourage the Agency to complete the transition and abandon the current approach to turbidity due to the difficulty in comparing turbidity measurements and applying them in a TMDL.
Issue #2- Coordination with Other TMDLs
Is it the intent of the Agency in the statement below to apply summer average TSS standards in ongoing TMDLs upstream? If so, this change in approach should be incorporated into each TMDL early in development. Currently, these TMDLs are based on TSS values determined to equate to the 25 NTU (nephelometric turbidity units) turbidity standard, which may be an inappropriate (unattainable) goal for some water bodies. Stakeholders should be engaged in discussion of the appropriateness and application of the standard in each of these upstream projects, including the Minnesota River turbidity TMDL.

*The MPCA has worked very closely with Wisconsin DNR to develop a site-specific standard that is protective of each state’s designated uses and consistent with other upstream TMDLs that are currently being completed in each state.* (page 2)

Issue #3- Establishment of Targets
We encourage the Agency to consider economic impacts and climate effects in addition to social acceptability and ecological desires in setting vegetation targets, particularly given the difficulty in defining a clear biological basis for such targets. As noted in the report, depth and flow are also important factors affecting the establishment of submerged aquatic vegetation.

*It is difficult to define a clear biological basis for the minimum SAV (submerged aquatic vegetation) target for the turbidity impaired reach of river above Lake Pepin. We believe the vegetation target should be better than existing conditions and achieve a state that is ecologically desirable and socially acceptable.* (page 21)

Thank you for the opportunity to provide comments on this draft. Feel free to contact the MCGA office for further discussion.

Best regards,

DeVonna Zeug, President
Minnesota Corn Growers Association
March 23, 2010

Mr. Norman Senjem
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

Dear Mr. Senjem:

Thank you for the opportunity to submit comments on your agency’s proposed site-specific standard for Total Suspended Solids (TSS) and Submerged Aquatic Vegetation (SAV) for the “South Metro Mississippi River,” south of its confluence with the Minnesota River. Given that the proposed standards would apply to over 30 miles of the 72-mile Mississippi National River and Recreation Area (MNRRA), we are keenly interested not only in the outcome of this standards process, but also in the outcome of overall efforts to improve the Mississippi’s water quality.

We support the proposed standard and its goal of establishing conditions under which SAV can exist to the extent necessary to restore a healthy riverine ecosystem. This proposal appears to be moving toward the Clean Water Act’s requirement that waters be able to support their designated uses (in this case, aquatic life).

We will continue to monitor progress on improving the Mississippi’s water quality throughout the entirety of our park, and will remain committed to the overall Lake Pepin TMDL project, including the implementation planning process. As you know, we, along with many others who value the Mississippi River, are eager to see policies adopted and concrete actions taken to improve the health of this great resource.

If you would like to discuss our comments further, do not hesitate to contact me at 651-291-3030 extension 222 or paul_labovitz@nps.gov.

Sincerely,

Paul Labovitz
Superintendent
Dear Norman,

My wife and I heard Tim Schlagenhaft last night and were distressed to hear about the increased turbidity and sedimentation in Lake Pepin. Having grown up in Wabasha, the river and the lake have been huge part of my boating experience. Retired in Wabasha I am once again enjoying the river and lake, but now with my children and grandchildren. I think it's imperative to get a plan in place with time lines and objectives to achieve the 32mg/L goal. Obviously State and Federal funding will be limited so other approaches will have to be included in the plan, i.e. field trips that clearly show the damage being done to Lake Pepin and the river; lectures and the like in schools and with PTA groups as the young people will suffer the greatest consequences if the water quality in both river and lake deteriorate.

Regards,

Dave Ochsner
225 Lawrence Blvd. #201
Wabasha, MN 55981
United States Department of the Interior
FISH AND WILDLIFE SERVICE
Twin Cities Field Office
4101 American Blvd E.
Bloomington, Minnesota 55425-1665

Mr. Norman Senjem
Minnesota Pollution Control Agency
18 Wood Lake Drive SE
Rochester, MN 55904

Dear Mr. Senjem,

This letter constitutes U.S. Fish and Wildlife Service’s (Service) comments on the Draft South Metro Mississippi Total Suspended Solids Site Specific Standard for total phosphorus, total suspended solids, and submersed aquatic vegetation (SAV) for the turbidity impaired reach of Mississippi River Pool 2 to Lake Pepin.

Minnesota Pollution Control Agency recommended the following site specific standards in February 2010:

- Median of summer average TSS concentrations of 32 mg/L;
- 90th percentile of summer average TSS concentrations of 44 mg/L;
- Frequency of SAV should be 21 percent or greater as measured by Environmental Mapping and Assessment Program sampling design.

Lake Pepin and the Upper Mississippi River, in general, are of high importance to the Service’s goals of conserving its trust resources – endangered species, migratory birds, nationally significant and interjurisdictional fisheries, and Service-owned lands. The Service’s Upper Mississippi River National Wildlife & Fish Refuge (Refuge) begins at the mouth of the Chippewa River, just downstream of Lake Pepin, and provides habitat for a large percentage of the migratory birds in the Mississippi Flyway. Sediment that flows out of Lake Pepin adversely affects submersed aquatic and emergent vegetation that provides essential food and cover for fish and migratory birds on the refuge. In addition, the endangered mussel, Higgins eye (Lampsilis higginsii), has recently been reintroduced into several locations in Pools 2-4 and also occurs in downstream reaches.

The Service urges Minnesota Pollution Control Agency to adopt the recommended site specific standards as quickly as is feasible and to initiate implementation of conservation measures at the watershed and landscape scales as soon as is practicable. The recommended site specific standards are based on the best available science and were developed after an extended review process. We recognize that the standards may be modified in the future in response to new scientific findings and to adapt to changing conditions.
If you have any questions or concerns about the Service's position on the proposed site specific standards, please feel free to contact me or Phil Delphey of this office at (612) 725-3548.

Sincerely,

[Signature]

Tony Sullivan
Field Office Supervisor

cc: Kevin Foerster, Upper Mississippi River National Wildlife & Fish Refuge, Winona, MN
Tex Hawkins, Upper Mississippi River National Wildlife & Fish Refuge, Winona, MN
Pam Thiel, La Crosse Fish and Wildlife Conservation Office, Onalaska, WI
Norman
This is to inform you that I feel there is a critical need to address the problem with sediment in the Mississippi between the mouth of the Minnesota river and lake Pepin. I have spent a lot of time on the river around Hastings and I can attest to the fact that Spring Lake is filling in and statistics show that most of the sediment is coming from the Minnesota river. This situation needs to be corrected. The control of the sediment from the Minnesota river needs to be in the hands of a larger government body than the individual counties along the Minnesota river for things to improve. Funding needs to be provided and regulations on drainage needs to be strengthened to improve this situation. Soil particles being washed down the river for the benefit of agriculture is a ridiculous situation.
Sincerely, Philip Vieth
Mailing address is Philip Vieth
1516 Eddy St.
Hastings Mn. 55033
February 22, 2010
To: Norman Senjem
Re: Comments on Mississippi River Water Quality Improvement Plan

Dear Mr. Senjem:

As you are aware, results from a nationwide study of river basins conducted by the US Geological Survey recently revealed that Lake Pepin contains the highest percentage of sexually mutated smallmouth bass (73%) of all areas studied. Obviously something in the water has confused the glandular systems which control the physical development and reproductive functions of these creatures. To be identified, any substance capable of causing damage of this nature in such record proportions would have to meet three distinct criteria. First it would need to be an endocrine disruptor, secondly it would need to be a substance regularly introduced into the environment in massive amounts over a prolonged time period, and thirdly it would need to have the capability of being easily transported into waterways. The specific material which meets all of these criteria is atrazine.

Plans to improve water quality anywhere in America should include efforts toward a complete ban of atrazine as has been accomplished in the EU. The benefits of such action would prevent further harm to fishes and other aquatic life. And, because atrazine has become one of the most commonly detected contaminants in drinking water, it would serve to protect human health as well.

The attached fact sheet, published by Land Stewardship Project, does an excellent job of summarizing the rationale for banning atrazine. It expresses very thoroughly the input I wish to offer in regard to this subject. Please take time to read and share its contents with those who will eventually be drafting the water quality improvement plan.

Fresh, pure water is unquestionably the most valuable of Earth’s resources, far too precious to be contaminated for the sake of weed-free crops and manicured lawns. Without it, life itself cannot exist, and its preservation should a top priority. No one, for any reason should be allowed to contaminate it to any degree and the scope of your plan to improve Mississippi River water quality must include this concept as a primary goal.

Thank you for the opportunity to provide input toward this urgently needed project.
A popular weed killer

Since it was first registered in 1958, Atrazine has become one of the most widely used corn herbicides in the U.S. Its relatively low cost and ability to kill broadleaf weeds without harming corn plants have made it popular with Midwestern farmers for decades. It is sprayed on about 75 percent of U.S. corn and sorghum acreage. An estimated 76.4 million pounds of atrazine are applied annually. Usage on corn accounts for 86 percent of that total use. Atrazine kills weeds on contact, and can also stay in the environment for several months after application, providing residual killing power that prevents weed seeds from germinating. Atrazine is one of the reasons Syngenta, its primary manufacturer, saw its profits rise 75 percent in 2008.

Unfortunately, over the years atrazine has become a major environmental contaminant, and has been connected with health problems in humans, fish and amphibians. As a result, it is embroiled in a controversy over efforts on the part of government and the private sector to suppress regulation and research related to this herbicide.

Atrazine a common contaminant

Atrazine is one of the most commonly detected pesticides in U.S. ground and surface water. A monitoring program conducted by the Environmental Protection Agency in 10 states between 2003 and 2005 found that 94 of 136 public water systems tested had atrazine concentrations above the three parts per billion federal drinking water standard in their untreated water for at least one 90-day period. Between 1998 and 2003, seven million people were exposed to atrazine in their treated drinking water above state or federal health-based limits.

The U.S. Geological Survey analyzed water samples from over 180 stream sites and 5,000 monitoring wells and found that atrazine was present in streams in agricultural areas about 80 percent of the time, and in groundwater in agricultural areas about 40 percent of the time.

Because of its ability to be taken up into the atmosphere and travel hundreds of miles, atrazine has shown up in areas far from farm country, such as the Boundary Waters Canoe Wilderness Area in northern Minnesota. In fact, atrazine was detected in nine out of 10 lakes sampled recently in Minnesota.

A risk to the environment

Because atrazine is a type of herbicide that remains stable in the environment for a relatively long time—months, and in some cases, years—it poses a persistent risk to the environment and wildlife, particularly animals that spend a lot of time in the water. Research conducted by the University of California-Berkeley’s Tyrone Hayes shows that exposing frogs to as little as 0.1 parts per billion of atrazine causes severe health problems, including inducing a kind of chemical castration. Atrazine’s effects can be indirect: In 2008 scientists reported a correlation between high amounts of atrazine in Minnesota ponds and wetlands, and high populations of a type of flatworm that infects frogs. A study released in May 2008 showed zebrafish exposed to atrazine for 48 hours at concentrations similar to what’s found in water containing farm chemical runoff were twice as likely to be feminized.

A human health risk

There is mounting evidence that atrazine is an endocrine disrupter, a chemical that interrupts hormonal activity in animals, and possibly humans, causing severe problems at extremely low levels. Research has suggested a correlation between exposure to atrazine and low sperm quality among men, and that low levels of atrazine (two parts per billion) affect human cell development.

Restricting its use

As a result of these concerns, use of the chemical has been restricted in some parts of the U.S. and around the world. In Wisconsin, widespread contamination of private wells by atrazine prompted officials there to adopt the “Atrazine Rule” in 1991. The rule limits how atrazine can be used in Wisconsin and prohibits its use in areas where atrazine contamination is found in groundwater above the federal standard of three parts per billion. There are now around 100 prohibition areas in the state covering more than 1.2 million acres. Among other things, the “Atrazine Rule” limits atrazine application rates between April 1 and July 31. Studies since 1991 have shown that atrazine concentrations in Wisconsin wells has declined significantly. The Wisconsin Department of Agriculture, Trade and Consumer Protection updates its atrazine rules annually, based on existing regulatory standards and new groundwater test results.

Wisconsin’s atrazine regulations are considered some of the most stringent in the Midwest. Iowa restricts atrazine application rates to half the federal label rate in around two-dozen counties. Minnesota has a program of voluntary use limitations when surface water or groundwater contamination exceeds a level of concern. Because of groundwater contamination problems and concerns about atrazine’s impact on humans and wildlife, the Europe Union has declined to renew permitting of atazine, in effect banning its use there. The U.S. EPA re-registered the pesticide in 2006, but during the registration process acknowledged there were concerns related to atrazine’s effect on amphibians.

Continued on reverse page…
...Continued from front page

**Syngenta’s bullying tactics**

Syngenta, which is one of the largest agrichemical firms in the world, has gone to some extraordinary lengths to make sure their best-selling herbicide avoids even minimal regulation in this country. As the *Washington Post* described in a special report, a main reason the EPA has not restricted use of the herbicide is because a Washington, D.C., lobbyist named Jim J. Tozzi used the “Data Quality Act” to challenge the accuracy of studies showing problems with atrazine. The Data Quality Act, which was slipped into a 2000 omnibus spending bill without debate or comment, has been used primarily by industry to challenge the basis for regulations. Conveniently, Tozzi, who has worked closely with Syngenta, drafted the Data Quality Act himself.

In closed meetings that excluded independent scientists and environmental groups, officials with Syngenta and the EPA worked out an agreement to avoid tighter regulations of atrazine, according to the *Washington Post.*

In addition, CropLife, a lobbying group that represents chemical companies like Syngenta, recently pushed for an amendment to the 2008 Farm Bill that would have prevented conservation money from going to state programs that help farmers transition from atrazine to a less toxic herbicide. The amendment eventually failed.

**A suppression of science**

Tyrone Hayes, a respected endocrinologist at the University of California–Berkeley, was originally hired by Syngenta to review studies related to atrazine. Hayes and Syngenta parted company when his research showed that the herbicide had severe health impacts on frogs. Officials from the company personally attacked Hayes and questioned the integrity of his research. In 2004, Hayes was dis-invited from giving a keynote at a Minnesota Pollution Control Agency conference after concerns were raised his presentation on atrazine research would offend Minnesota Department of Agriculture (MDA) officials.

In Minnesota, hydrologist Paul Wotzka discovered the dangers of studying atrazine the hard way. For 16 years, Wotzka was a highly-respected hydrologist working for the state, doing cutting-edge research on pesticides such as atrazine. His research showed that atrazine levels were rising in places like the middle branch of the Whitewater River in southeast Minn., despite claims by the MDA that voluntary efforts to reduce atrazine applications in vulnerable areas were working.

In March 2007, Wotzka was asked to testify before a legislative committee about his research. When he sought permission to testify, his supervisors turned him down. On May 8, 2007, the hydrologist was fired. In the spring of 2007, Wotzka filed a federal whistleblower lawsuit, claiming that his First Amendment right to free speech had been violated.

**What you can do**

- The Land Stewardship Project will be working during upcoming legislative sessions to promote more policies that further study and regulate this controversial herbicide. Contact our Policy Program at 612-722-6377 or bking@landstewardshipproject.org for more information on how you can help.

- If you are a farmer who uses herbicides on corn, see LSP Fact Sheet No. 18 for details on how to reduce or eliminate atrazine use.

**Sources**

22. Land Stewardship Project. 2007

This fact sheet is brought to you by the members and staff of the Land Stewardship Project, a private, nonprofit organization devoted to fostering an ethic of stewardship for farmland and to seeing more successful farmers on the land raising crops and livestock. For more information, call 612-722-6377 or visit www.landstewardshipproject.org.
March 25, 2010

Norman Senjem  
Minnesota Pollution Control Agency  
18 Wood Lake Drive SE  
Rochester, MN 55904

Subject: Draft South Metro Mississippi Total Suspended Solids-Submersed Aquatic Vegetation Site-Specific Standard

Dear Mr. Senjem:

Our department has reviewed your proposed site-specific total suspended solids (TSS) standard for the Mississippi River reach extending from the mouth of the Minnesota River to upper Lake Pepin and would like to offer our support for the proposed standard.

Wisconsin shares a common boundary with Minnesota in a portion of the designated site-specific reach extending from the mouth of the St. Croix River to upper Lake Pepin on the Mississippi River. Our department has also identified this reach of the Mississippi river to be impaired by sediment, which is contributing to negative impacts on submersed aquatic plant growth as well as excessive sediment in-filling of Lake Pepin. Your actions to address this problem through the adoption of a site-specific standard for TSS as well as the development of Total Maximum Daily Load (TMDL) study to address sources of excessive TSS loads to this reach of the Mississippi river will be critically important in mitigating the sediment related impairments identified in this river reach by our two states.

Staff from our Mississippi River Unit and La Crosse Field Station have worked with the vegetation specialist from the Minnesota DNR and the USGS Upper Midwest Environmental Sciences Center and members of your agency to develop the technical support document for the site-specific standard. The proposed TSS standard is based on improved protection of submersed aquatic vegetation (SAV), which is widely recognized to be an important component of aquatic life in the Upper Mississippi River. The basis of this standard relies on years of extensive research and monitoring data collected by the federal Long Term Resource Monitoring Program as well as the recent EPA-sponsored SAV monitoring conducted as part of the Environmental Monitoring and Assessment Program by our two states.

The proposed standard will apply during summer periods, which is the critical period for SAV growth and development. Monitoring procedures for determining compliance with the proposed TSS and SAV are clearly defined and should offer a sound basis for evaluating the effectiveness of sediment reduction efforts identified and implemented in the TMDL.

Finally the proposed site-specific standard has been reviewed by stakeholder groups, river researchers and interested citizens, and has received favorable support. Our department will plan to use similar TSS and SAV criteria for the evaluation of narrative water quality standard exceedances in the sediment impaired river reach and

dnr.wi.gov  
wisconsin.gov
will consider the adoption of an equivalent site-specific water quality standard for this reach of river during our next triennial standard review. We would like to thank your agency for taking the lead for this new standard and your efforts at addressing sediment-related impairments in our boundary waters of the Mississippi River.

Sincerely,

[Signature]

Dan Baumann, P.E.
Water Leader, WCR

Cc: Gaylen Reetz, MPCA

eCC: Todd Ambs, WDNR AD/8
    Russ Rasmussen, WDNR WT/2
    Jim Baumann, WDNR WT/2
    John Sullivan, WDNR La Crosse
April 26, 2010

Arlin and Marilyn Albrecht
30567 Lakeview Avenue
Red Wing, MN 55066

Dear Mr. and Mrs. Albrecht:

Thank you for your comment letter of March 9, 2010, in support of the proposed site-specific standard for Total Suspended Solids and Submersed Aquatic Vegetation in the South Metro Mississippi, including upper Lake Pepin, where you make your home. As one of the original founders of the Lake Pepin Legacy Alliance and current board members, your support is very significant. As you point out, you are bearing the brunt of the sedimentation of the upper lake, with the growth of mud flat islands in recent years.

The Minnesota Pollution Control Agency (MPCA) appreciates your support and encourages your continued involvement as the MPCA progresses to develop a Total Maximum Daily Load study and implementation plan to achieve a 50 percent reduction in sediment sources, which is necessary to achieve the proposed standard.

Sincerely,

[Signature]

Norman Senjem
Planner Principal
Rochester Office
Regional Division

NS:ml
June 7, 2010

Mr. Bill Gordon, Director  
Minnesota Soybean Growers Association  
151 St. Andrews Court, Suite 710  
Mankato, MN  56001

Mrs. Devonna Zeug, President  
Minnesota Corn Growers Association  
738 First Avenue East  
Shakopee, MN  55379

Dear Mr. Gordon and Mrs. Zeug:

Thank you for your letter, dated March 26, regarding the proposed, site-specific total suspended solids (TSS) standard for the South Metro Mississippi River. You made two requests: one for information and another for a public informational meeting from the Minnesota Pollution Control Agency (MPCA).

The request for information was the topic of discussion at a May 6, 2010, meeting between the MPCA, representatives of the Minnesota Soybean Growers Association (MSGA) and the Minnesota Corn Growers Association (MCGA), and Warren Formo that took place at the MSGA headquarters located in Mankato. We had a productive conversation about the process that the MPCA is following to develop a site-specific standard for TSS for the South Metro Mississippi River, and how this relates to Total Maximum Daily Loads (TMDLs) planned for the South Metro Mississippi and Lake Pepin. The meeting concluded with an agreement that Warren Formo would examine materials available on the MPCA’s website that address key questions about the proposed TSS Standard. I left behind a hard copy of the proposed, site-specific standard and followed up by sending Mr. Formo the information he requested. The MPCA has not received additional requests for information since shortly after the meeting, and so it is our understanding that the May 6 meeting and follow-up communication has satisfied your request for information.

Your second request was for a public information meeting on the site-specific standard. This was briefly discussed, but not resolved, at our May 6 meeting, and the MPCA has not heard from either the MSGA, the MCGA, or Mr. Formo, regarding this request, since then. The MPCA believes that the matters of concern expressed in the request for a public meeting have been addressed over the past several years and, more recently, through a large number of stakeholder meetings and technical forums. In addition, the legal processes for establishing a site-specific standard and the technical basis for the TSS standard will be covered in an upcoming MPCA Citizen’s Board meeting on June 22, 2010.
Mr. Bill Gordon  
Mrs. Devonna Zeug  
Page 2  
June 7, 2010

The Clean Water Legacy Act citations in your request for an informational meeting pertain to TMDL studies, not development of water quality standards. The topic of natural background, which you cite as a critical question, has been exhaustively discussed in Stakeholder Advisory Committee meetings for the Lake Pepin TMDL and the Minnesota River Turbidity TMDL, in addition to public forums. This also applies to the current turbidity standard, the use of TSS as a surrogate for turbidity, and the relationship between TSS and aquatic life in the Mississippi River. Over the past year, as the MPCA has moved to develop a site-specific standard for TSS, rather than use it as a turbidity standard surrogate, the proposal was shared with the Stakeholder Advisory Group in August 2009. At this meeting, the MPCA also laid out the legal authority and administrative process for developing a site-specific standard. The proposed standard was also discussed by the Science Advisory Panel (SAP) in two meetings that were held in November 2009 and January 2010. Subsequent to this meeting, the SAP wrote a letter to the MPCA endorsing the proposed standard and urging the MPCA to proceed promptly with finalizing the standard, conducting the TMDL, and developing an implementation plan. The proposed standard was brought back for discussion to the Stakeholder Advisory Committee on February 2, 2010, before the public notice period began. The date of this meeting was delayed for several weeks while we worked with Mr. Warren Formo to find a date that was suitable for agricultural stakeholders. In addition to all of these meetings that began in 2004, the MPCA held two public open house meetings, issued news releases and fact sheets, and made the proposed standard available on the MPCA website to all interested parties.

Considering all of these factors, the MPCA denies the request for a separate informational meeting on the proposed site-specific TSS standard for the South Metro Mississippi River.

Sincerely,

[Signature]

Norman Senjem  
Planner Principal  
Rochester Office  
Regional Division

NS:emc
April 26, 2010

Mr. Paul Labovitz, Superintendent  
National Park Service  
Mississippi National River and Recreation Area  
111 East Kellogg Blvd. Suite 105  
St. Paul, MN 55101-1256

Dear Mr. Labovitz:

Thank you for your March 23, 2010, letter of comment on the proposed site-specific standard for Total Suspended Solids and Submersed Aquatic Vegetation in the South Metro Mississippi River.

As you point out, this reach of the river covers a significant portion of the Mississippi National River and Recreation Area. We appreciate your involvement in stakeholder discussions leading up to the promulgation of this standard, and your supportive comments in favor of the proposed standard.

As the Minnesota Pollution Control Agency (MPCA) moves ahead with a Total Maximum Daily Load study and development of an implementation plan to achieve the proposed standard, the MPCA welcomes the continued participation of the National Park Service as a key stakeholder.

Sincerely,

[Signature]

Norman Senjem  
Principal Planner  
Rochester Office  
Regional Division

NS:ml
April 26, 2010

Mr. Dave Ochsner
225 Lawrence Blvd. #201
Wabasha, MN 55981

Dear Mr. Ochsner:

Thank you for your letter of comment on the proposed standard for Total Suspended Solids and Submersed Aquatic Vegetation for the South Metro Mississippi River. The support of local residents and users of Lake Pepin and the Mississippi River for achieving the proposed standard of 32 mg/L is encouraging.

I would suggest that, if you have not done so already, you visit the Lake Pepin Legacy Alliance Web site at http://www.lakepepinlegacyalliance.org/ which represents concerned citizens, such as yourself, who want to make sure that the appropriate actions are taken to meet the proposed standards. Your ideas on field trips and education seem quite consistent with their strategy of engaging residents in the difficult, long-term process of reducing sediment loads to the Mississippi River.

Sincerely,

[Signature]
Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Mr. David C. Lane, President
Minnesota Environmental Science and Economic Review Board
Rochester Water Reclamation Plant
301 - 37th Street Northwest
Rochester, MN 55901

Dear Mr. Lane:

Thank you for the March 26, 2010, comment letter on a proposed site-specific standard for Total Suspended Solids (TSS) and Submersed Aquatic Vegetation (SAV) in the South Metro Mississippi River. As you note, the Minnesota Pollution Control Agency’s (MPCA) decision to proceed with the promulgation of this standard on its own, rather than in concert with site-specific eutrophication standards for Lake Pepin, was taken early this year following endorsement by the Lake Pepin TMDL Science Advisory Panel. The MPCA does not foresee significant implications for wastewater treatment facility permit limits resulting from this standard, as the suspended sediment sources are overwhelmingly from nonpoint sources, and most wastewater facilities discharge limits are 30 mg/L TSS, below the proposed standard of 32 mg/L TSS.

Although you express support for the proposed TSS standard, you also express serious reservations about river nutrient standards that are under development by the MPCA. This concern lies outside the realm of the proposed site-specific standard. However, because the TSS standard and Lake Pepin study are so closely linked, as you note, the MPCA will briefly respond to this concern as follows:

The MPCA will develop a Lake Pepin eutrophication standard as part of the river nutrient standards under development in the current triennial review of water quality standards. This is in large part because the Lake Pepin TMDL study showed that algae levels in Lake Pepin are heavily influenced by riverine algae production upstream, particularly in the lower Minnesota River, the Mississippi River between Anoka and Lock and Dam 1, and the lower part of Navigation Pool 2 near Spring Lake. Thus, it is not realistic, nor would it be effective, to attempt to deal with Lake Pepin eutrophication by setting standards for phosphorus and chlorophyll in the lake alone.

In addition, as you are probably aware, the Clean Water Act, which Minnesota administers within its borders, requires that water quality standards be established to protect designated uses of waters of the state. The United States Environmental Protection Agency has informed states that this protection requires the development of nutrient standards for rivers and streams. The MPCA is using the best science available to develop nutrient standards for streams and
welcomes the participation of MSERB in a forthcoming public comment period on draft standards for nutrients in rivers and streams of Minnesota.

Lastly, much of the science for setting the TSS/SAV standard was developed independently of the modeling conducted in the Lake Pepin TMDL. The model has been most useful to inform us of what reductions would be required to meet the proposed TSS/SAV standard. In addition, algae are a portion of TSS, so it was necessary to use the model to examine reductions in total phosphorus, due to its impact on algal abundance.

Sincerely,

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Mr. Michael McKay, Executive Director
Lake Pepin Legacy Alliance
Box 392
Red Wing, MN 55066

Dear Mr. McKay:

Thank you for your March 24, 2010, comment letter on the proposed site-specific standard of 32 mg/L Total Suspended Solids for the South Metro Mississippi River. As you point out, achieving this standard through sediment load reductions upstream would greatly reduce the immediate problem your group is confronting; that is, the in-filling of upper Lake Pepin. As a group representing residents who are immediately affected by the impaired condition of the Mississippi River, your endorsement of the proposed site-specific standard and encouragement to move rapidly toward completion of the Total Maximum Daily Load study and its implementation, is very significant.

The Minnesota Pollution Control Agency agrees with you that Lake Pepin is a natural treasure that needs to be protected, and welcomes your participation in the South Metro Mississippi River TMDL process and subsequent development of a plan to implement its prescriptions for a cleaner Mississippi River and Lake Pepin.

Sincerely,

[Signature]

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Mr. Steven Colvin, Environmental Review Supervisor
Division of Ecological Services
Minnesota Department of Natural Resources
500 Lafayette Road
St Paul, MN 55155-40

Dear Mr. Colvin:

Thank you for your March 24, 2010, comment letter on the proposed site-specific standard for Total Suspended Solids and Submersed Aquatic Vegetation on the South Metro Mississippi River. The Minnesota Pollution Control Agency (MPCA) agrees that the proposed standards are based on excellent science and a rich data set, and will serve as goals toward significant ecological improvements in turbidity-impaired reaches of the Mississippi River upstream of Lake Pepin. The MPCA also agrees that achieving the proposed standard has important collateral benefits for reducing the rate of in-filling of Lake Pepin by half.

Once the proposed standard is approved by the U.S. Environmental Protection Agency and a Total Maximum Daily Load study has been approved with load allocations defined for meeting the standard, the MPCA will coordinate the development of an implementation plan to work toward achieving TMDL allocations. While the MPCA expects that most implementation will occur at the major watershed scale, there are opportunities to support and augment this activity with broader-based strategies and policies, with a view to achieving water quality standards in the Mississippi River as soon as is practicable. As ever, the MPCA is open to suggestions from the Department of Natural Resources about how this may best be accomplished.

I would like to take this opportunity to thank your department for the involvement of staff, including Jack Enblom, Scot Johnson, Rob Burdis, Megan Moore, Tim Schlagenhaft, and others whose contributions to the development of the standard are much appreciated.

Sincerely,

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Trevor A. Russell
Friends of the Mississippi River
360 North Robert Street, Suite 400
St. Paul, MN 55101

Dear Mr. Russell:

Thank you for your March 26, 2010, comment letter on the proposed site-specific standards for Total Suspended Solids and Submersed Aquatic Vegetation on the South Metro Mississippi River. Coming from an organization that serves as a watchdog and guardian of the Mississippi River, the strong support for the proposed standard expressed in your comment letter is a significant and welcome endorsement. The Minnesota Pollution Control Agency (MPCA) appreciates your frequent attendance of stakeholder advisory committee meetings, public information meetings, and frequent inquiries about the proposed standard. You have also shown keen interest in participating in the steps to be taken following final approval of the standard; i.e., developing a Total Maximum Daily Load study and implementation plan. We value your participation and encourage you to continue.

Your comments on achievability of the standard are well taken, and the MPCA agrees that land-use changes and in-river work that is needed to stabilize eroding bluffs and banks can be undertaken with existing authorities and funding levels. Change will not happen overnight, but Minnesota possesses the resources, scientific understanding, and programmatic framework to make steady progress toward the goals that the MPCA and stakeholders are setting for the Mississippi River.

Thank you again for a strong endorsement of the proposed standard from Friends of the Mississippi River, on behalf of your 1500 members.

Sincerely,

[Signature]

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Ms. Beth D. Neuendorf, P.E., Metro District Water Resources Engineer
Minnesota Department of Transportation
395 John Ireland Blvd.
St Paul, MN 55155

Dear Ms. Neuendorf:

Thank you for your March 26th comment letter on the site-specific standard for Total Suspended Solids (TSS) and Submersed Aquatic Vegetation (SAV) on the South Metro Mississippi River. You raise a number of questions, to which I will attempt a response.

It is true that Figure 1 indicates that 32 mg/L TSS as a long-term summer mean corresponds to about 12 nephelometric turbidity units (NTU) as a long-term summer mean. It is also true that cold-water trout streams are protected with a water quality standard of 10 NTU. However, the Minnesota Pollution Control Agency (MPCA) has not applied this standard as a long-term summer average in the case of trout streams. It is applied as a 90th percentile standard, meaning that if more than 10 percent of samples exceed 10 NTU, the stream is classified as impaired. The TSS standards under development as a replacement of the NTU-based standard for Minnesota streams also reference the 90th percentile for assessing attainment. Actually, if the MPCA applies the same approach to the South Metro Mississippi, setting the 90th percentile of the current standard of 25 NTU as a target, slightly lower load reductions will be needed to achieve this target as are required to meet the proposed long-term summer mean 32 mg/L TSS target.

As far as impacts on the Department of Transportation go, this will be determined in the Total Maximum Daily Load (TMDL) study that will follow adoption of the TSS standard. The MPCA’s current approach with MS4s and construction stormwater is to assign a categorical Waste Load Allocation (WLA) to cover all MS4s and all construction sites, and to implement the WLA through a set of Best Management Practices (BMPs) deemed to accomplish a 25 percent reduction from a zero BMP baseline.

To address your second question, a number of TSS TMDLs are in the process of being conducted in the Minnesota River. A current project combines 18 impairments on the Minnesota River main stem and the mouths of major tributaries into a single project, and is approaching completion. Another major set of turbidity TMDLs is being conducted on the Greater Blue Earth River Basin, the source of much of the sediment in the Minnesota River. The load reduction requirements to meet these TMDLs are considerably more stringent than the requirements of the South Metro Mississippi River, which benefits from dilution, first from the Upper Mississippi.
Ms. Beth D. Neuendorf  
Page 2  
April 26, 2010

River, and further downstream by the St. Croix River. However, because completing a TMDL does not in itself add regulatory authorities to deal with currently unregulated sources, i.e., those not covered by a National Pollutant Discharge Elimination System permit, there is no way of guaranteeing that specified nonpoint source load allocations will be achieved. In the TMDL, the MPCA will attempt to provide reasonable assurance that load allocations will be achieved by citing greatly increased state funding levels for water quality improvement and use of existing authorities on nonpoint source pollution.

The Lake Pepin TMDL, which addresses nutrient enrichment, also must be preceded by the development of a site-specific standard specifying target levels of chlorophyll-a and total phosphorus. The MPCA has recently decided to develop this standard, together with the development of river nutrient standards state-wide, as it has become clear through the research process that the trophic state of Lake Pepin is heavily influenced by algae production upstream. This is part of the triennial review of water quality standards, which is expected to conclude in 2011. Once the standard for Lake Pepin is adopted, the TMDL to establish allocations for point and nonpoint sources can move forward once again. The Lake Pepin TMDL will take into account reductions in sediment-attached phosphorus specified in the South Metro Mississippi TSS TMDL, and determine what additional point and nonpoint source reductions will be needed to meet the newly-developed standard.

The MPCA has worked very closely with the Wisconsin DNR to develop the 32 mg/L TSS criterion, which applies to the portion of the Mississippi shared by the two states between Prescott, Wisconsin, and the confluence with the Chippewa River. The Wisconsin DNR currently is promulgating nutrient standards, but has agreed to use the criteria developed for TSS and SAV as numeric translators for their narrative water quality standard, until such time as they promulgate standards specifically for TSS and SAV.

In answer to your final question, compliance with the proposed standard will be based on meeting a long-term summer mean of 32 mg/L TSS in the majority of summers over many years, or 44 mg/L as a 90th percentile value. To date, the median value has been more restrictive than the 90th percentile value.

I hope this helps to answer your questions. Should you require further details, please call me at 507-206-2655, and I will either attempt to answer your questions myself or refer you to a research scientist.

Sincerely,

[Signature]

Norman Senjem  
Principal Planner  
Rochester Office  
Regional Division

NS:ml
April 26, 2010

Mr. William Barton
533 Cretin Avenue South
St. Paul, MN 55116

Dear Mr. Barton:

Thank you for your March 24, 2010, email commenting on the proposed site-specific standards for Total Suspended Solids (TSS) and Submersed Aquatic Vegetation (SAV) for the South Metro Mississippi River. You expressed concern that the proposed standard would be less protective of water quality than the present turbidity standard of 25 nephelometric turbidity units (NTUs). This is a legitimate concern. I will attempt to address it as directly as possible, while noting some of the administrative and technical difficulties that the Minnesota Pollution Control Agency (MPCA) has encountered in arriving at this proposed standard.

First, to clarify, the new standard is expressed as 32 mg/L Total Suspended Solids (TSS), not 32 NTUs, as your email states. Because many different kinds of turbidity meters and laboratory analyses have been used over the years, turbidity, expressed as NTUs, was found to be a confusing and unreliable measure of the real issue – the degree to which suspended solids shade the river bed and, thus, inhibit photosynthesis necessary for healthy rooted vegetation, especially SAV in main channel border areas, side channels, and backwaters of the Mississippi River. Thus, the MPCA and the Science Advisory Panel for the South Metro Mississippi River TMDL chose TSS as a better measure to use.

River scientists from the Departments of Natural Resources in Wisconsin and Minnesota, and federal agencies, such as the Fish and Wildlife Service, decided on a summer average of 32 mg/L TSS for the South Metro Mississippi River. The standard is expressed as a long-term average, meaning that TSS levels must remain at or below 32 mg/L at least half of the summers over a long-term record. Because river scientists customarily use summer means to evaluate water quality and ecological health, the MPCA conformed to this averaging period in specifying the proposed TSS standard. However, to answer your question, the TSS load-reductions needed to achieve the proposed standard are virtually identical to those that would be needed to meet the 90th percentile of 25 NTU over the period of record.

To make a fair comparison of the two approaches – 25 NTU and 32 mg/L – it is necessary to hold constant the averaging period used. If this is done, using a summer average, the preferred river scientist approach, 32 mg/L is far more protective of aquatic life than 25 NTU, a point made in Sullivan’s paper attached to the standard. The proposed standard is predicted to roughly double the frequency of SAV in the impaired reach, whereas a summer mean of 25 NTU offers
almost no protection. If we achieve the 32 mg/L goal, we project that the Mississippi River at Lock and Dam 2 would be less than 17 NTUs 90 percent of the time during the June-September period.

We have found that the April-September period is very similar to the June-September period in terms of TSS statistics, such as mean and 90th percentile for the Mississippi River. For instance, the current (1985-2006) average TSS at Lock and Dam 2 from April-September is 56 mg/L, while the June-September average is 54 mg/L. This was based on data from the baseline scenario. We know that the Best Management Practices that will be initiated to protect the June-September period will also be effective throughout the year. Also, upstream tributaries that need to meet turbidity TMDLs will be focused on the open water monitoring season, since these TMDLs have not identified a critical summer season.

I hope these remarks have clarified the issue you raise, at least somewhat. Should you desire further clarification, feel free to call me at 507-206-2655. If I can’t answer your questions, I will direct you to a staff member who can.

Thanks again for taking the time to comment.

Sincerely,

[Signature]

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Ms. Laura Jester, Watershed Conservationist
Dakota County Soil and Water Conservation District
4100 220th Street West, Suite 102
Farmington, MN 55024

Dear Ms. Jester:

Thank you for your comment letter of March 2, 2010, in support of the proposed standard for Total Suspended Solids and Submersed Aquatic Vegetation in the South Metro Mississippi River. Your coordination of the Mississippi Makeover project has provided extensive local and expert review of the proposed standards over the past two years.

In addition, your development of complementary ecosystem indicators and associated targets is helping to link the proposed standard, and subsequent Total Maximum Daily Load project, to a more complete set of ecosystem restoration objectives that is unique on the Mississippi River.

The Minnesota Pollution Control Agency looks forward to your continued involvement with local citizens in moving forward with Mississippi Makeover, and continuing to ground this large project in a local grass-roots movement for comprehensive restoration of the Mississippi River, its floodplain, and corridor.

Sincerely,

Norman Senjem
Planner Principal
Rochester Office
Regional Division

NS:ml
April 26, 2010

Mrs. DeVonna Zeug, President
Minnesota Corn Growers Association
738 First Avenue East
Shakopee, MN 55379

Dear Mrs. Zeug:

Thank you for your March 24, 2010, comment letter on a proposed site-specific standard for Total Suspended Solids (TSS) and Submersed Aquatic Vegetation (SAV) in the South Metro Mississippi River. The Minnesota Pollution Control Agency (MPCA) appreciates your statement on the interest farmers have in engaging in the process of water quality standard determination and the identification of pollutant sources and appropriate restoration activities. You also raise three specific issues, which merit a response.

The first issue, duplication of standards, points to the transitional period in which the MPCA finds itself. At present, the MPCA operates under the current turbidity standard of 25 nephelometric turbidity units (NTU). While the MPCA was drafting the proposed site-specific TSS standard, staff thought it prudent to state that the existing standard would apply to the months of the year not covered by the proposed standard. However, recent analysis by MPCA staff indicates that the load reduction scenarios that would be applied to meet the proposed site-specific TSS standard from June to September would also meet this standard in April and May. Thus, our current intention is to simply replace the old 25 NTU year-long standard with the proposed seasonal TSS standard, as your letter suggests.

The second issue, coordination with other TMDLs, is a subject of discussion within the MPCA. Coordination with Wisconsin has worked quite smoothly, as Minnesota and Wisconsin worked closely together to establish the proposed TSS standard. The only difference is that in Minnesota it will soon be adopted as a site-specific standard, whereas in Wisconsin it will be used to interpret its narrative water quality standard until Wisconsin formally promulgates TSS standards statewide, at which point the standard will also be incorporated in its state rule. You correctly point out that other turbidity TMDLs upstream of Lake Pepin and elsewhere in Minnesota have been undertaken based on the 25 NTU turbidity standard. The MPCA’s experience with the Mississippi River is somewhat unique, in that the MPCA has access to an extensive, long-term, data set that clearly shows linkages between river health, as indicated by Submersed Aquatic Vegetation (SAV) abundance, and various measures of water transparency. All of the Mississippi River studies are based on long-term seasonal mean values. To meet the newly proposed standard, the summer mean target of 32 mg/L will need to be met in at least half the years. over a long-term record. One or two years above this level will not signal an exceedance of the standard because the target species have survival mechanisms, such as tubers, that allow them to withstand higher levels of TSS for limited periods. Also, the target species, SAV, primarily in shallower, quiet parts of the Mississippi River – basically, channel borders, side channels, and floodplain backwaters that are permanently inundated to a depth of one yard, or 30:

In other southern Minnesota streams, the MPCA is lacking data that clearly link different levels
of TSS to biological health. Thus, it is not clear what type of averaging period is appropriate for TSS in all southern Minnesota streams. So far, the MPCA is considering the 90th percentile as the best alternative where no site-specific criteria are available, meaning that the TSS criterion could be exceeded by no more than 10 percent of samples from April to October.

To summarize the MPCA’s response to issue 2, the MPCA and Wisconsin Departments of Natural Resources have coordinated quite closely and agree on a common set of criteria for the portion of the Mississippi River shared as border by the two states. The MPCA’s coordination with upstream TMDLs in Minnesota is an ongoing process. The MPCA expects it to be frequently the case that load allocations established to meet water quality standards in upstream tributaries will be more restrictive than those needed to protect the South Metro Mississippi River. These load allocations will be influenced by local factors and the dilution of the Mississippi River with water from the northern Mississippi and St Croix, which currently are well below the standard set for the South Metro Mississippi River. The MPCA has conducted several studies of sediment source in recent years, so that load apportionment among watersheds and sources will be based on common data sets and research methodologies, which is an important aspect of coordination.

On issue 3, establishment of targets, you request that the MPCA consider economic impacts and climate effects in setting vegetation targets. To take these one at a time, the term “socially acceptable” is meant to include economic effects – both market and non-market values. There are two ways in which the proposed standards do take economic impacts “upstream” into account. First, it does so by acknowledging that the Mississippi River reach in question is heavily impacted by the Western Cornbelt Plains ecoregion and, thus, merits a target that is distinct from the Mississippi River downstream of Lake Pepin, where most of the sediment has settled out and water is much more transparent. The standard being considered for this reach of the Mississippi River is 25-30 mg/L, versus 32 mg/L for the South Metro Mississippi River. Secondly, the target is a long-term summer average, meaning that the summer average TSS value must be 32 mg/L at least half of all summers. This means that occasional wet periods that push the average above the proposed criterion of 32 mg/L are expected and allowed, as long as the long-term average remains below that level. Records of flow and precipitation since 1940 indicate that such periods do not last for more than a few years.

I hope that these responses answer your concerns. Should you have further questions, do not hesitate to call me at 507-206-2655.

Sincerely,

[Signature]

Norman Senjem
Planner Principal
Rochester Office
Regional Division

NS:ml
April 26, 2010

Doctor Robert O. Megard  
1439 Hythe Street  
St. Paul, MN  55108

Dear Dr. Megard:

Thank you for your March 23, 2010, comment letter on the proposed site-specific standard for Total Suspended Solids (TSS) for the South Metro Mississippi River. You propose suggestions for monitoring to evaluate compliance with the standard, and further suggest that the standard is being achieved at Lock and Dam 2.

In selecting the proposed monitoring sites for turbidity/TSS compliance, sampling sites were biased toward the ends of Pools 2 and 3. Pool 3 is actually 18 miles long, not 9 miles, as you state in your memo. There was no intention that these sites would reflect the metro reach average. Rather, the sites were selected as monitoring points that would be useful for the proposed submersed aquatic vegetation target. Lateral concentration gradients of TSS and other parameters exist in the Mississippi River downstream of major tributary inputs, such as the Minnesota and St. Croix Rivers. Mixing is most complete at the Lock and Dams, since all channels are forced together into a rather narrow channel at the Lock and Dam. We feel that these sites have less bias than mid-pool sites and represent more of an “average” concentration for the thalweg of a given pool.

Moreover, the average TSS of the five sites you suggested (Inlet to Pepin, Lock and Dam 3, Lock and Dam 2, Grey Inver Grove, and St. Paul) versus the two that are proposed (Lock and Dams 2 and 3), yielded averages of 49.4 and 48 mg/L TSS summer mean, respectively. Even if each of the five sites don’t cover exactly the same period of record or have similar sample size, it would appear that the two monitoring approaches are roughly similar. Additional monitoring programs, including MPCA, WNDR, and USGS have also collected data at Lock and Dams 2 and 3. We will review all available and applicable data during our assessment process.

It should be noted that the recent decline in summer average TSS at LD2 (and elsewhere) during the past few years was flow-related (low flows), similar to what was observed during the late 1980s. The goal of the turbidity TMDL is to lower the TSS concentrations during periods of moderate to higher flows to provide improved conditions for submersed aquatic vegetation growth during more typical flow conditions. We expect summer average TSS during low flow years to be lower than 32 mg/L, instead of just meeting the standard as you suggest.

Sincerely,

[Signature]

Norman Senjem  
Planner Principal  
Rochester Office  
Regional Division

NS:ml
April 26, 2010

Mr. Philip Vieth  
1516 Eddy Street  
Hastings MN 55033

Dear Mr. Vieth:

Thank you for your email comments on the proposed standard for Total Suspended Solids and Submersed Aquatic Vegetation in the South Metro Mississippi River. As a resident of Hastings concerned about the river that runs past your home town, the Minnesota Pollution Control Agency (MPCA) takes your concerns seriously.

The concerns you express are well-grounded in science. It is true that most of the sediment responsible for the impairment of the Mississippi River is coming from the Minnesota River. The MPCA estimates that the load of sediment from the Minnesota River needs to be cut in half in order to achieve the proposed water quality standard. This is a very challenging goal to achieve and, no doubt, will require the combined efforts of local, state, and federal levels of government and the engagement of the many land owners where the bulk of the sediment originates. These issues will be addressed after the standard has been formally approved, first by the MPCA Citizens’ Board, and then by the U.S. Environmental Protection Agency (US EPA). Next, a Total Maximum Daily Load document will be prepared for public notice. This document establishes sediment load allocations for major tributaries and other sources.

Once the TMDL document is approved by the US EPA, work will begin on an implementation plan spelling out how the load allocations in the TMDL will be achieved. By participating in the Mississippi Makeover Project, you are already helping to prepare part of the overall implementation plan; the part dealing with in-river and near-river restoration measures. You are welcome to offer suggestions on how to reduce upstream load reductions from the Minnesota River, as the process continues.

The MPCA appreciates your concerns and welcomes your continued engagement in the process of restoring the South Metro Mississippi River.

Sincerely,

Norman Senjem  
Principal Planner  
Rochester Office  
Regional Division
April 26, 2010

Mr. Dan Baumann, P.E., Water Leader
West Central Region
Wisconsin Department of Natural Resources
101 South Webster Street
Box 7921
Madison, WI 53707-7921

Dear Mr. Baumann:

Thank you for the March 25, 2010, letter of comment on Minnesota’s proposed site-specific standard for Total Suspended Solids and Submersed Aquatic Vegetation on the Mississippi River from the confluence with the Minnesota River to upper Lake Pepin.

The Minnesota Pollution Control Agency is very fortunate to have had excellent coordination with the Wisconsin Department of Natural Resources throughout the development of this standard, with John Sullivan from your La Crosse office playing an especially crucial role in developing the technical support document.

It is also encouraging that you are confirming Wisconsin’s intention to use Minnesota’s proposed standard, or something very similar, to interpret your narrative water quality standard for the shared reach of the Mississippi River from Prescott to upper Lake Pepin. Let us hope this is followed by further steps toward improved consistency between our states’ approaches to monitoring, assessment, and standards development along our shared Mississippi River.

Sincerely,

[Signature]

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Mr. Tony Sullins, Field Office Supervisor
Twin Cities Field Office
U.S. Fish and Wildlife Service
4101 American Blvd. East
Bloomington, MN 55425-1665

Dear Mr. Sullins:

Thank you for your letter of comment in support of the proposed site-specific standard for Total Suspended Solids and Submersed Aquatic Vegetation in the South Metro Mississippi River. As you point out, excess sediment is a concern upstream of Lake Pepin, where the endangered Higgins Eye Mussel has been recently re-introduced, and downstream, where water quality and aquatic vegetation are affected by the quality of water flowing out of Lake Pepin.

The Minnesota Pollution Control Agency appreciates your confidence in the solidity of the science underlying the proposed standard, and would like to take this opportunity to thank you for your regular participation in stakeholder meetings leading up to this point through Gary Wege, now retired. We look forward to your continued participation in the development and implementation of a Total Maximum Daily Load study and implementation plan to achieve the standard once it is approved by the U.S. Environmental Protection Agency.

Sincerely,

[Signature]

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Mr. Martin Konrad, Chairman
Upper Mississippi River Conservation Committee
Iowa Department of Natural Resources
502 East Ninth Street
Des Moines, IA 50319

Dear Mr. Konrad:

Thank you for your March 17, 2010, letter of comment on Minnesota’s proposed site-specific standards for Total Suspended Solids and Submersed Aquatic Vegetation (SAV) on the Mississippi River from Lock and Dam 2 to upper Lake Pepin. Having participated in the Upper Mississippi River Conservation Committee over the years, I appreciate the depth of scientific knowledge and professional commitment of its members to improving the ecological health of the nation’s greatest river. The Minnesota Pollution Control Agency attaches considerable weight to the UMRCC’s endorsement of the proposed standard following careful review by the Water Quality Technical Section at its March 16th meeting in Dubuque.

In many ways, the standard is an outgrowth of work initiated through the UMRCC, especially its development of light-related criteria for SAV and its contribution to ongoing discussions of sediment-related impairments by the Upper Mississippi River Basin Association. The UMRCC’s continued support for the Long-Term Resource Monitoring Program will help to provide a continuing base of information for assessing progress toward the proposed standard. I look forward to participating with the UMRCC at future meetings.

Sincerely,

[Signature]

Norman Senjem
Principal Planner
Rochester Office
Regional Division

NS:ml
April 26, 2010

Mike Denney [denney@us.ibm.com]

Dear Mr. Denney:

Thank you for your email comments on the proposed site-specific standard for Total Suspended Solids and Submersed Aquatic Vegetation in the South Metro Mississippi River. Although your comments are mainly regarding the sources of the problem in southeastern Minnesota and your proposed solutions, rather than on the standard itself, your ideas appear to be well considered. Stream bank erosion is a major source of sediment to the Mississippi River, as well as southeastern Minnesota tributaries. As you suggest, replanting the stream corridors with high quality native grasses would help to armor the banks against erosion with their massive root systems. Also, resizing road culverts could help to slow the rate of runoff to streams, and will be considered in the solutions to the problem after the standard is approved.

As for your comments on storm water ponds, removing clay particles from suspensions is very difficult. Clay particles are small and range from 0.5 to 4 microns in diameter, while the larger silt particles are between 4-62 microns in diameter. In contrast, sands range from 62-2000 microns and settle out of suspension much faster. Sedimentation is highly dependent upon the pond volume and the distance between the inlet and outlet. It can take days to settle the small clay particles, while most sediment basins cannot be constructed so large as to afford long water resident times (hours versus days). In contrast, most natural Minnesota lakes have relatively long residence times, on the order of one to five years.

http://stormwaterbook.saff.umn.edu/

"Weiss et al. (2007) reported that on average (±67% confidence interval), dry ponds in the United States retain 53% (±28%) of total suspended solids and 25% (±15%) of total phosphorus. The U.S. EPA (1999) reported typical ranges of 30%-65% for total suspended solids and 15%-45% for total phosphorus in dry ponds. On average (±67% confidence interval), wet ponds in the United States retain 63% (±32%) of total suspended solids and 52% (±23%) of total phosphorus (Weiss et al. 2007). The U.S. EPA (1999) reported typical ranges of 50% to 80% for total suspended solids and 15% to 45% for total phosphorus in wet ponds."

Thanks once again for offering your ideas on reducing sediment loads to our rivers.

Sincerely,

Norman Senjem
Principal Planner
Rochester Office
Regional Division
April 26, 2010

Marchforth-92@earthlink.net

Dear Ms. Walker:

Thank you for your email comments of February 22, 2010, addressing your concerns about sexually mutated fish in Lake Pepin and possible ties to Atrazine levels in the Mississippi River. While your comments do not directly relate to the requested public comments on the suspended sediments and site-specific turbidity water quality standard being proposed for the Mississippi River at Lake Pepin, pesticide detections and aquatic life protection are important issues that the Minnesota Pollution Control Agency (MPCA) is addressing in other contexts. The Lake Pepin research and response to turbidity impairment will have indirect benefits in reducing pesticides and other toxics, as many are transported into surface waters on soil particles and organic matter.

The MPCA is currently involved in a special registration review project on Atrazine that more closely relates to the concerns you have raised. The Minnesota Department of Agriculture is the lead state agency in Minnesota on pesticide monitoring and registration.

In short, from the special review report, the MPCA and the Minnesota Department of Health have key roles in Atrazine management, as well. For the MPCA, we implement water quality standards (WQSs) for Atrazine that protect aquatic species and human health. The MPCA has had WQSs for Atrazine in Minn. R. ch. 7050, since 1996. The WQSs protect beneficial uses of surface water, from drinking water to aquatic life communities. The MPCA stands by these WQSs, but continues to follow the evolving science and latest scientific findings from the United States Environmental Protection Agency (US EPA). Past monitoring for pesticides on the Mississippi River and other streams in Minnesota have not lead to impaired waters listings that require TMDLs, as is the case for turbidity.

For more information and contacts in WQSs:
http://www.pca.state.mn.us/water/standards/index.html

US EPA Atrazine Reviews and Open Comment Period:
http://www.epa.gov/oppsrrd1/reregistration/atrazine/atrazine_update.htm

The MPCA has also been funding studies to examine endocrine-disrupting chemicals (EDCs) and effects on aquatic organisms, including in the Mississippi River. The report you are referencing with a high percentage of male fish with markers of endocrine disruption is just one historical study conducted in the state. More recent examination of even more fish, more species, and more sites on the Mississippi River did not find gonadal intersex changes in male fish, but did still find evidence of exposure to environmental estrogens (based on induction of
vitellogenin). The MPCA works closely with the US EPA to continue to study these issues and identify the chemicals behind EDC effects.

More information on these topics is available at:

The Minnesota Water Resources Center of United States Geological Survey at  

MPCA publications on EDC monitoring at  
http://www.pca.state.mn.us/water/edc.html

US EPA's Endocrine Disruptor Testing and Screening Program at  
http://www.epa.gov/scipoly/oscenido/

If you have more questions on the Atrazine WQSs or the special registration review, please contact Angela Preimesberger in the Water Quality Standards Unit, at the MPCA. Her email address is angela.preimesberger@state.mn.us or 651-757-2656.

Thank you again for sharing your concerns with the MPCA.

Sincerely,

Norman Senjem  
Principal Planner  
Rochester Office  
Regional Division

NS:ml