Hi Bryan and Scott,

I had a chance to look through the Public Notice draft of the Minnesota River-Mankato TMDL this morning and found two bacteria TMDL tables (Table A-101 (p. A-76) and Table A-104 (p. A-78)) whose Loading Capacity values weren’t updated from the pre-public notice draft to the public notice draft.

Please check on the Loading Capacity Values of these 2 bacteria TMDL Tables to ensure they are accurate.

Other than those minor edits, I have no further questions or comments at this time.

Thank you!

Paul

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Graphics with a red/green scale may be difficult or impossible to decipher by those with red/green color-blindness. Please consider changing your legend colors.

We have inserted this comment in the beginning of the report: “Those with disabilities limiting their ability to access report information may contact the MPCA Watershed project manager to provide alternate formats suiting their needs.” Please let us know if you are having difficulty with any specific graphic, and we will provide you that data in an alternate format.

Please add this statement - it is an extremely important statement and appears in the Lower Minnesota River WRAPS; please it include it in the WRAPS Summary and Executive Summary: "Distinguishing real trends in water quality of streams and lakes is difficult because year-to-year climatic variability typically obscures the more gradual changes from landscape impacts or restoration efforts. In addition, several years of data are needed for trend analysis."

The following statement was added to the WRAPS Trends Overview section. “Statistical trends in stream and lake water quality can be difficult to identify because substantial data sets are required for trend analysis. Furthermore, year-to-year climatic variability can obscure gradual trends.” The authors did not determine that this information was appropriate to include in the summaries since those trends are not included in the summaries.

Why is the definition for altered hydrology different in this report as compared to the Wantonwan River WRAPS? Please choose one definition

We have revised the definition to be consistent between the reports. As explained in the altered hydrology section of the report, altered hydrology can be defined more generally or more specifically. “Altered hydrology in general refers to changes in hydrologic parameters including: stream flow, precipitation, drainage, impervious surfaces, wetlands, stream paths, vegetation, soil conditions, etc. Altered hydrology as an identified stressor more specifically refers to changes in the amount and timing
of stream flow. Both too much and too little stream flow directly harm aquatic life by creating excessive speeds in the water or reducing the amount of water. Altered hydrology also indirectly harms aquatic life because it increases the transport or exacerbates the conditions of other pollutants and stressors including sediment from streambank erosion, nitrogen, and connectivity issues.”

This statement (“the majority of monitored waterbodies are not meeting water quality standards for aquatic life (fishing) and aquatic recreation (swimming), as illustrated in the pie charts”) is not true for lakes, when you combine supporting and inconclusive. Please change the text to: “the majority of monitored streams are not meeting water quality standards for aquatic life (fishing) and aquatic recreation (swimming), as illustrated in the pie charts.

The intent of the statement is to provide a high-level overview of the assessment accounting. Using the word “and” versus the word “or” indicates the sum of waterbodies is considered in this statement. While assessment results for aquatic life in lakes are largely inconclusive, as a whole, this statement is true in that the sum of the impaired water bodies in the graphic (96) comprise a majority (60%) of the water bodies monitored (160). If you exclude the inconclusive counts from the monitored and the assessment results, one further concludes that a vast majority (83%) of the assessed water bodies (115) are impaired.

What does "clean" mean here: (1) "Water quality is not expected to be as clean as it would be under undisturbed..." and (2) “While some agricultural and urban runoff has been reduced using sufficient BMPs, substantial additional BMPs need to be adopted to achieve clean water.”? Natural background conditions can exceed human imposed water quality standards. A better term might be "unaffected" or "pre-settlement"? Please consider defining it further in this text or adding it to the Key Terms.

In an attempt to provide plain language information, the word clean is used to represent support of designated uses (and the relevant parameters). As explained in the Water Quality Standards section, “Water quality is not expected to be as clean as it would under undisturbed, “natural background” conditions. However, water bodies are expected to support designated uses (also known as beneficial uses) including: fishing (aquatic life), swimming (aquatic recreation), and eating fish (aquatic consumption). Water quality standards (MPCA 2015b; also referred to as “standards”) are set after extensive review of data about the pollutant concentrations that support different beneficial uses and include natural background conditions.” On rare occasions, the natural background levels of pollutants
can exceed the water quality standard. When this rare case is discovered, a site-specific standard can be developed that allows for the (higher than typical) natural background levels.

Please change the order of the Intensive Watershed Monitoring, Watershed Pollutant Load monitoring Network, and Citizen Stream and Lake Monitoring Program descriptions to match the order of the Figure 6 legend, or vice versa.

The map was revised with re-ordered legend items.

Please add the limitations of the HSPF model - for e.g., its treatment of wetlands. Please consider adding the statement that was included in the Lower Minnesota WRAPS: “It should be noted that HSPF does not simulate the output of TP from altered wetlands, such as channelized riparian wetlands that exist in many parts of the watershed.

This statement is unique to the Lower Minnesota WRAPS because of the topography of the watershed. From the Lower Minnesota WRAPS background section: “In its final 25 miles, the river spreads out into a braid of backwater areas. During low flow, the lock-and-dammed Mississippi River can create lake-like conditions in the lower reach, favoring the production of algae from excess phosphorus loadings and increased residence time (the time it takes a volume of water to flow through a given system). The algae die, decompose and consume large quantities of dissolved oxygen (DO).” Since there are not similar conditions identified in the Minnesota River – Mankato Watershed it is not appropriate to include this statement.

Please rewrite or remove this statement. “...some are allowed to discharge but must treat and measure discharged pollutants to ensure permit requirements are met...” and “Municipal and industrial wastewater point sources have discharge and monitoring requirements specified in the facility permits to ensure pollutant levels in their discharge support water quality goals.” The term "ensure" implies a guarantee - and both would be too strong a word - WWTF’s can be inundated and find themselves in situations where flooding or other natural or infrastructure failure events force users to bypass the regulated system. This is not completely unusual. Also, this statement conflicts with the following statement from Page 21: “While the overall impact of these point sources on the total pollutant loads is minimal, they can be substantial sources at times of low flow.”

The first sentence you referenced was clarified to: “some are allowed to discharge but must treat wastewater and measure levels of discharged pollutants”. Permitting staff analyze impairments and water quality standards when setting the permit requirements and hence, set permit requirements to support water quality goals. The second statement you referenced was clarified to: “ensure pollutant levels in their permitted discharge support...”. Bypasses and overflows are prohibited (by permit) for wastewater treatment facilities (WWTFs). However, as you point out, extreme weather events and/or equipment failure makes them sometimes necessary to avoid threats to public health and sewage backing up into homes. When a facility does have an unpermitted discharge event, they are required to report and sample the bypass/overflow. Repeated unpermitted discharge events result in compliance schedules/enforcement action to remedy the situation. The final statement referenced is true and consistent: a point source can be a substantial source of a pollutant during a time of low flow because most other sources are not present during low flow. For instance, if a facility is allowed to discharge 1 unit per day (regardless of flow), it is contributing 1% of the load during a moderate flow carrying a load
of 100 units in one day. Under low flow conditions, however, the river may only carry a load of three units in one day, and hence the point source would be a substantial contributor at this time.

_Please broaden this statement “Overall, drainage is sometimes necessary for crop production and development; however, drainage impacts can be better managed/mitigated to reduce impacts to water bodies." to acknowledge that drainage systems are used by a variety of land uses - not just for agriculture. Drainage protects our roads and highway and parking lot/impervious surfaces land uses through the use of road culverts, roadside drainage ditches, curb and gutter and storm sewer systems. Without drainage infrastructure, our undrained roads would be broken apart and carried by runoff in the freeze-thaw action of the changing of cold seasons. Storm sewer systems used by urban land uses protect private and public properties from being flooded by precipitation events. Private and public drainage systems are highly regulated by several layers of government - counties, townships, watershed districts, cities, and state agencies have engineering standards and technical requirements._

The word “development” has been replaced with “other land uses including urban development”. Ditch systems are shared systems with the ability to affect many people, acres, entities, communities, and resources. Accordingly, oversight and community weigh-in are necessary to manage such complicated systems. Some engineering requirements and considerations are set by statute as summarized in the Minnesota Public Drainage Manual. According to this, drainage authorities should “consider” environmental impacts. However, these considerations provide no regulatory authority to ensure ditches support water quality standards.

_Please rewrite this section to acknowledge some of the important functions that drainage systems provide. It is an extreme oversimplification to say that drainage is encouraged to increase crop production. This statement misses and incorrectly reduces a much larger, often taken for granted, issue - why do we have drainage systems? When roads were built, they introduced dikes to the landscape. In order to move water past these dikes, we have built a sophisticated engineered system of culverts, bridges, and ditches to route water through and around roads, to meter flow, and prevent damage to public infrastructure and private property. Drainage solves problems - it minimizes flood damages, it increases soil health, it controls sediment delivery.... Drainage is not just about increasing crop production._

Multiple drainage needs and historical perspective are already summarized in the referenced paragraph: “While agricultural and urban drainage can negatively impact water resources, the historical perspective and agricultural and infrastructural benefits of drainage are important to recognize. European settlers drained wetlands to settle and farm lands. For decades, the government further encouraged drainage to reduce pests, increase farmable lands, and clear lands for roads and infrastructure. Today, drainage is still encouraged by some agricultural interests to increase crop production. Overall, drainage is sometimes necessary for crop production and other land uses including urban development; however, drainage impacts can be better managed/mitigated to reduce impacts to water bodies.” The dikes introduced to the landscape often prevent rivers from accessing their natural flood plain, which exacerbates current degraded water quality and flood conditions. The “pinch” points that are created by improperly designed bridges and culverts have minor flow metering effects but cause substantial negative impacts to water quality and aquatic life by changing sediment dynamics, accelerating erosion processes, and creating velocity barriers to aquatic life that migrate as a part of their natural life cycle. Drainage increases flows, which exacerbate streambank erosion and smother streams in sediment.
Instead of a highly manipulated, unnatural system, multiple benefits of natural channel design should instead be used to address flooding, water quality, and aquatic life needs. Soil health as defined by the NRCS is “the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans.” Drained soils can be healthy or unhealthy depending on factors such as cover and living roots (cover crops), disturbance (tilleage and chemicals), and diversity (crop rotation). Drainage removes water to make space for air, which is good for crops, but it is not a critical component of soil health nor does it inherently support soil health.

Is there a source for this statement “The drainage networks that replaced prairies and wetlands have created a “short-circuit” in hydrologic conditions and accelerated the delivery of pollutants to water bodies.”? Many drainage systems are designed to do the opposite - roads act as a dikes, holding water back, and culverts meter and control flow, oftentimes holding water in ditches for days, weeks, and months. Wetlands can become nutrient sinks, and in some watersheds, are considered significant contributors of nutrients. Once a pothole is filled (be it with water or with soil), it will flood if excess precipitation is received.

The referenced Department of Natural Resources (DNR) Watershed Characterization Report provides a more in-depth analysis and references. Here is an applicable excerpt, which includes multiple references (Page 35): “In extensively drained landscapes, such as the agricultural Midwestern United States, the connection of isolated basins has inflated total surface water discharge and increased the density of linear drainage networks (TerHaar and Herricks 1989, Haitjema 1995, Magner et al. 2004). Many streams in the region are in disequilibrium due to past and current land-use change with corresponding hydrologic responses, as well as direct channel modifications (Lenhart et al. 2007)... Construction of subsurface tile and surface ditch drainage systems in the early 1900s increased contributing drainage areas, resulting in greater amounts of water delivered to rivers (Leach and Magner 1992, Kuehner 2004, Lenhart 2008). The effects of these suites of changes are cumulative, interrelated, and tend to compound across different spatial and temporal scales (Spaling and Smit 1995, Aadland et al. 2005, Blann et al. 2009). The contribution of subsurface drainage to aquatic ecosystem affects may be difficult to isolate relative to other agricultural impacts (Blann et al. 2009). Cumulatively, these changes in hydrology, geomorphology, nutrient cycling, and sediment dynamics have had profound implications for aquatic ecosystems and biodiversity (Blann et al. 2009).”

See previous response regarding impact of roads and culverts. Based on physics (flow passing through the river and the volume held back at a pinch point), the retention time of pinch point structures is typically in the hours to days time frame in this watershed. Wetlands do have the potential to become nutrient sinks; however, the storage and other multiple benefits (habitat, nutrient use, denitrification, etc.) make them net assets to watershed health. Any storage vessel (wetlands, basins, ponds, soil, etc.) does overflow once filled. However, via evapotranspiration (ET), and infiltration, the capacity of the vessel is renewed. Therefore, creating sufficient storage on the landscape provides an opportunity for more water to ET or infiltrate, preventing some water from reaching rivers and contributing to erosive flows.

Please provide a source for this statement. “Without extensive mitigation of these altered hydrologic parameters, stream flow is negatively altered.” Tile drainage has many positive impacts on water quality and quantity, including stream flow augmentation (increasing baseline flows during periods
when streams would normally go dry, which is specifically listed as a stressor on Page 37), improving soil health, lessening flood potential, and lessening sediment transport. Why are only negative statements about tiling made in this report, and none of the positive impacts included? Please add information on how tile drainage positively affects water quality.

The negative impacts of tile drainage on stream geomorphology, aquatic life, and pollutant delivery are clearly illustrated within the literature (sources and reasoning are included in the previous two responses). The Sources Overview and Altered Hydrology Source Assessment sections as well as the referenced Stressor ID report provide the information leading up to this conclusion. Dry conditions are certainly exacerbated by short-term weather or longer-term climate change trends. However, altered hydrology components including tile drainage, wetland loss, flow path creation/alteration, and decreased soil organic matter (a key soil health parameter) are a primary driver of excessively low base flow. Tile drainage augments flows, but the augmentation is typically during peak flows and not during periods of low flow. Tile drainage studies completed by the University of Minnesota in Waseca show that 85% of the tile flow occurs in the months of March through July and that one set of drainage plots at the Southern Research and Outreach Center (SROC) showed a 15-year average of 50% of total drainage volume occurring in just seven days. The report does not state that streams would “normally go dry”. The text states that part of the hydrology goal is to increase “dry season base flow where Stressor ID identified low flow as a stressor” and that “decreases in the total annual flow should focus on decreasing peak flows, increasing base flow, and maintaining the dynamic properties of the natural hydrograph, which are important for channel geomorphology, vegetation, and aquatic life. Strategies to accomplish these tasks must increase ET, and store and infiltrate water on the landscape to increase ground water contributions (base flow) to streams during dry periods.” This longer-term storage on the landscape provides the slow release of water through soil pathways, into streams during dry times of year.

Please remove this statement. "Typically, altered hydrology is caused by ditching/channelization and substantial amounts of upstream drain tile." ALTERED HYDROLOGY IS NOT A CODE WORD FOR DITCHING/TILING. According to the Key Terms Altered Hydrology are "changes in hydrologic parameters such as stream flow and precipitation that are caused by changes in climate, drainage, impervious surfaces, wetlands, stream paths, vegetation, soil conditions, etc."

The statement was removed, and the definition of altered hydrology was revised for consistency per your previous comment. Altered hydrology is a change in the amount of and way that water moves through the landscape. This does include ditching and tiling but also includes several other hydrologic parameters.

This is a deceptive statement "As illustrated in the Sources Overview section, 30% to 60% of the landscape is tile drained and 65% of stream miles are altered" please rewrite as: "According to Figure 10, only 28% of the watershed is "likely" tiled; another 35% "may" be tiled.

The statement was revised to: “As illustrated in the Sources Overview section, 28% of the landscape is likely and up to 63% of the landscape may be tile drained (Figure 10), and 65% of stream miles are altered (Figure 12).”

The Developed areas in Figure 5 don’t all seem to be marked as “High” areas in Figure 18 Relative Hydrologic Conditions. Please review this map, and update if necessary.
Figure 18's creation is documented in the referenced appendix. Figure 18 uses 6 spatial data layers/analyses that indicate altered hydrology conditions. These six data layers are then combined into one layer: the value of the polygon in the data layer is multiplied by an assigned weight, and the total per polygon for all six layers is summed. Weights used were: estimated tiled (% of landscape): 5, non-perennial vegetative cover (% of landscape): 5, channelized stream (% of stream length): 7, wetland loss (% of estimated pre-settlement wetlands): 10, road crossings (number per stream length): 20, and impervious surface (% of landscape): 50. The Impervious surface layer (a primary impact from developed areas) is given the highest weight (i.e. weighted to produce the most impact on the score) at 10x the weight of tile and 5x the weight of wetland loss. The second highest weight, stream crossings, also tends to be concentrated in more developed areas. The lack of all developed areas as relatively high hydrologic alteration is a product of this data-driven analysis despite altered hydrology aspects associated with developed areas being given a substantially higher weight than other factors. No changes were made to this analysis or resulting map.

**PLEASE REMOVE AND REPLACE THIS MAP WITH THE ACTUAL REFERENCE MAP.** The map in the WRAPS is not the same as the reference at [https://www.pca.state.mn.us/sites/default/files/wq-cm5-14.pdf](https://www.pca.state.mn.us/sites/default/files/wq-cm5-14.pdf) The WRAPS color shadings are incorrect; there are many watersheds on the original map that are colored light green (for 1.00 - 1.99) that are incorrectly colored yellow (2.5 - 5.0) on the WRAPS map!
While both data sets are from the Watershed Pollutant Load Monitoring Network for the same years, the WRAPS graphic (left) includes all nitrogen sources (TN) while the “original” map (right) includes only nitrite and nitrate. Total Kjeldahl Nitrogen (TKN) is the additional component added to calculate total nitrogen, and this is why the numbers in the WRAPS (TN) map are higher than the numbers in the “original” (NO$_3^-+NO_2^-$) map. The other primary difference between these maps is that the basin sites were omitted from the WRAPS map. Water quality associated with basin sites actually reflect water quality from multiple major watersheds. WRAPS authors deemed that including the major and minor watershed sites only was a better reflection of the scale of data.

Please include information about the Buffer Law and how many acres state law now requires for buffers for this watershed, as the Buffer Law affects an extremely large number of acres compared to other BMP's. Buffer acres can be estimated by reviewing the data from the DNR Buffer map - please make sure that waterways that require double-sided buffers are calculated correctly. "Low habitat scores are mostly due to degraded riparian vegetation and issues related to altered hydrology (stream bank erosion and excess sediment). These factors should be the focus of restoration and protection efforts to meet the goal and 10-year target."

As presented in the Habitat Sources section, 16 of the 28 bio-impaired reaches do show specific habitat issues related to poor riparian vegetation. While compliance to the buffer law does provide better habitat then non-compliance in most cases, degraded habitat may still be a stressor in areas of buffer compliance, particularly in cases where altered hydrology and resulting stream bank erosion and/or sedimentation are key issues. The type of vegetation within a buffer also influences habitat quality: deep rooted, native vegetation provides superior water quality benefits compared to shallow-rooted, non-native vegetation. The counties within this watershed show 80% to 100% compliance (https://bwsr.state.mn.us/where-can-i-find-buffer-maps) and this information is included in the associated TMDL. The 10-year strategies call for 100% buffer compliance and for 5% of stream/ditch miles to have a wider buffer (targeted to most vulnerable habitats, ideally). So, to support water quality goals, additional and/or wider buffers are needed. We did not add information per your request as it is not within the scope of this section. However, for perspective, we did a quick Geographic Information System calculation, and we estimated that less than 3% of the watershed would need to be in buffer, but when current land use is factored in, closer to 1% of the watershed would need to convert from crop production to a buffer.

"From a statewide perspective, the Middle Minnesota River Watershed’s phosphorus concentrations and yields are high (Figure 29) according to WPLMN data." Does this sentence mean that this watershed was compared with watersheds statewide - including the 50% of the state who do not have soils that are unable to support agriculture? That seems unfair. This watershed should instead be compared to watersheds whose soils are able to support agriculture.

Yes, the Minnesota River – Mankato Watershed data was compared to other watersheds data statewide. We find statewide perspective to be important. Furthermore, data from across the state are visually represented. Therefore, the reader can compare data from within agricultural areas.

"Much of the phosphorus leaving agricultural fields is from applied fertilizer and manure, while some is from phosphorus native to the soil." The fact that phosphorus is naturally occurring seems buried in this report. Please provide the amount native to the soil or please provide a reference to this research.
The amount of phosphorus (P) native to the soil does not necessarily indicate the likeliness of P to runoff (or export). Instead, we can compare P export of native prairie to P export from cultivated crops to deduce the relative amount of P export due to agricultural activities. Several ranges of grassland and prairie P export are available in the literature. The MPCA’s Detailed P Assessment (completed by Barr Engineering) cited a large range of P export from grasslands and restored prairies ranging from 0.05-0.22 lb/ac/yr. In a more recent study of native prairie in the neighboring Cottonwood River Watershed, native prairie P export rates ranged from 0.02-0.09 lb/ac/yr (report reference provided in Sources Overview section). Discovery Farms field data (summarized in Appendix 2.2) has measured Minnesota cultivated crop P export rates of roughly 0.5 lb/ac (data and references in Appendix). Furthermore, we know that typical cultivated crop P application rates on Minnesota River Basin farms is typically in the 10’s of lb/ac/yr and that at the major watershed scale, P export is roughly 0.5 lb/ac/yr. This means that farm P export is roughly 10 times greater than native P export; roughly 10 to 20 times more P is applied to a typical farm field than is exported from a farm field, and roughly, the export rate of a farm field is about the same as the P export from the major watershed. Deducing from these ratios, agricultural activities (on what were natively prairie lands) are likely accounting for the majority of P export from farm fields. Although, the particular aspect of the agricultural activities (e.g. fertilizer application, tillage, change in vegetation, change in organic material, etc.) that causes the P export cannot be determined from this. However, based on the ratio of applied P to exported P, fertilizer and manure application are likely causes of this increased P export. Therefore, we have updated the sentence (and Appendix) to say: “Most of the P leaving agricultural fields is likely due to agricultural activities which include fertilizer and manure application (calculations in Appendix 4.2).”

"Internal lake phosphorus loads are not explicitly accounted for in the source assessment. Internal lake loads are a product of excessive, legacy phosphorus contributions from the lake’s watershed, and little of the internal load is natural." If the internal loads are not calculated, then external source contributions will be overestimated and needlessly regulated, without any possibility of improving lake water quality. This is not good. Please include statements on how this information gap can be remedied.

The sentence you quote is followed by: “When planning for lake restoration, however, knowing the magnitude of internal load is important to develop the specific strategies to address the impairment. Planners should consult the TMDL or additional lake modeling or studies to estimate the internal load accordingly.” The source assessment pie charts presented in the WRAPS (including the one you are referencing) compile sources at the major watershed scale. At this high-level scale, internal load of lakes is a minimal component of phosphorus contributions. However, at the lake-scale, internal load is important, and hence why restoration planners are directed to identify the internal load for a lake. Furthermore, the WRAPS is not a regulatory document – it provides a high-level overview of water quality science, summarized from multiple supporting documents, such as the TMDL and model studies, which are linked to in the document to provide more information.

"Streams should have a maximum FWMC of 0.15 mg/L, and lakes should achieve a summer mean of between 0.04 mg/L-0.09 mg/L, depending on the specific lake." Does this sentence mean that this watershed was compared with watersheds statewide - including the 50% of the state who do not have soils that are unable to support agriculture? That seems unfair. This watershed should instead be compared to watersheds whose soils are able to support agriculture.
No, this is not a comparison of lakes statewide. The referenced phosphorus concentrations represent water quality standards for this area. Water quality standards for Northern Central and North Eastern Minnesota lakes and rivers are much lower: as low as 0.05 mg/L for rivers and 0.012 mg/L for lakes. You can find more information on how phosphorus and eutrophication stream standards were developed for the different regions of the state here: https://www.pca.state.mn.us/sites/default/files/wq-s6-18.pdf.

"Individual subwatershed reduction goals were calculated for lakes that required a TMDL. Goals for these subwatersheds ranged from 46 to 83% phosphorus reduction." Are these goals possible, given the internal loading/eutrophication?

Yes, these reductions are possible. In lake restoration, external watershed loads are first addressed by adopting sufficient best management practices (BMPs), and then if needed, internal load can be addressed through various means. WRAPS are meant to provide a summary of watershed information and providing reduction goals as a percentage has merit in conveying the level of effort needed to achieve water quality goals. However, it is important for local implementers to utilize all the data from a TMDL to determine the true extent of effort needed. For example, the 69% reduction called for in the Lake George Subwatershed equates to less than one pound of phosphorus per day reduction needed to achieve water quality goals. Several successful lake restorations have occurred in Southern Minnesota, and three lakes in this watershed are currently meeting the water quality goal.

"altered hydrology has likely increased stream flow" Please add information on the significant geology and geomorphology that has occurred and is occurring in this watershed. The natural sediment movement processes at work are undervalued in this WRAPS report - and this movement is important because we know that sediment transports nutrients. This watershed has a great deal of elevation change. The U of M Fields to Streams states, "About 13,400 years ago the lake began to drain across the moraine. It formed the valley now occupied by Lake Traverse and Big Stone Lake. Glacial River Warren, as it is known to distinguish it from the modern Minnesota River, flowed episodically during the next 2000 years, creating the deep, mile wide valley as it cut through up to 200 feet of glacial sediment and in places, exposed the bedrock. This had a profound effect on the Minnesota River watershed because the newly deepened valley meant that all of the tributaries to the river had to adjust their gradients to match. They are still adjusting to this event today and are not very far along in the process. Every drop of water they get helps them erode more in their effort to adjust to an event that seems like ancient history." In addition, in the DNR's "Historical Landslide Inventory for the Twin Cities Metropolitan Area 2016" states, "Tributaries to the main channel, including the Mississippi upstream of the confluence with the Minnesota, are still actively adjusting to the river incision event of 13,000 years ago. None of the tributary watersheds has reached a stable configuration." The report also identifies the prevalence of natural springs, and their contribution to landslides and stream flow. Please include whether causes of landslides, including springs, lateral pressure, etc. were evaluated for their contributions to streambank erosion. Stream flow is also connected to groundwater. Were groundwater sources evaluated for their pre-settlement and current contributions?

This geologic predisposition to erosion is referenced in the Introduction and Background section: “The Minnesota River valley, carved by the enormous Glacial River Warren, lies hundreds of feet below the upland areas. In the transition between the upland and Minnesota River Valley is an active “nick zone” with steep stream slopes that cut down to reach the much lower elevation of the Minnesota River. This nick zone results in steep, eroding banks, bluffs, and ravines, incising channels that limit floodplain connectivity, and waterfalls in areas where the stream cuts down to bedrock.”
The sentence you quoted is from the Sediment Sources section, which includes a discussion on natural versus accelerated erosion already. The referenced DNR Watershed Characterization report provides additional narrative on nick zones and sediment and geomorphic analysis. The sources of sediment were estimated using available literature and studies, and the narrative does state that some amount of erosion is natural.

“Channel sediment contributions are dominated by streambank, ditch bank, and bluff erosion but also include channel bed, sand bar, and other erosion from areas adjacent to the waterbody. While some amount of channel migration and associated bank/bluff erosion is natural, altered hydrology has likely increased stream flow, contributing to excessive bank/bluff erosion. The Minnesota Department of Natural Resources (DNR 2010) discusses the multiple causes of streambank erosion, including how altered hydrology influences streambank erosion. Ravines occur in locations where a flow path drops elevation drastically. Because of the elevation drop in the Middle Minnesota River Watershed, ravines are common in some areas. While some ravine erosion is natural, often times the natural erosion rate is greatly accelerated when surface and subsurface drainage waters from farms, cities, rural developments, road drainage, etc. are routed down a ravine. In this way, altered hydrology can cause excessive ravine erosion. While some streambank erosion is part of the natural channel evolution process, streambank erosion due to unstable streams is common in the Middle Minnesota River Watershed as discussed in the Minnesota River, Mankato Watershed Characterization Report (DNR 2016). According to this report, most stream instability in the Middle Minnesota River Watershed is from poor riparian vegetation management (loss of habitat), altered hydrology (higher flows due to losses in water storage and ET, and decreased channel residence times due to stream straightening). Sites with good riparian vegetation appeared more resilient than those without dense, deep-rooted vegetation.”

As stated in the DNR study, the sediment movement is natural and will continue. However, this process has been accelerated by changes in the landscape. A study completed by St. Croix Watershed Research Station on sediment in Lake Pepin finds that Lake Pepin is filling in at 10 times its natural rate. Core sampling of the lake sediment shows the rate of sedimentation has increased significantly since settlement of European immigrants (see figure below). At the current rate, Lake Pepin will be completely filled in with sediment within 340 years.
The impact of groundwater and landslides on the bluff erosion rates are not yet well documented within the literature and thus, were not included. The cyclical nature of the WRAPS reports means that new information and data can be integrated through time.

"Of the five stream reaches monitored to assess if temperature is a stressor, two were impaired, and three were inconclusive. Figure 39 illustrates the stream reaches that were assessed for temperature and Table 17 displays those results." Please clarify whether these streams designated "cold water" because of their temperatures or if they were designated "cold water" because trout were found?

Four of the five streams, where temperature was evaluated as a stressor are designated Class 2A “cold water” as defined by Minn. R. 7050.0222. While in the past the MPCA has relied almost solely on the DNR list of designated trout waters to determine if a waterbody was considered “cold water”, when assessments are completed other factors are evaluated. Biological data is the primary source of information used to demonstrate if a cold water use is an existing use. Reviews of fish and macroinvertebrate data focus on the presence or absence and the proportion of cold water species (e.g., trout, sculpin, the amphipod Gammarus, and the small minnow mayfly Baetis tricaudatus). The reviews include assessments of contemporary and historical data. Of particular importance for use designation is the demonstration that the waters currently support or have supported sustained trout reproduction and/or that they have good year-to-year carry over (e.g., stocked trout survive over the winter). Some streams that do not support trout due to barriers, stream size constraints, or poor fish habitat are also designated Class 2A based on the presence of a cold water macroinvertebrate community. Temperature data is also important when reviewing a water for 2A designation. Temperature logger data (i.e., measurements recorded continuously every 15 to 30 minutes) are
especially useful as they provide a more comprehensive estimate of summer conditions and can be used to estimate the percent of the time temperatures are suitable for supporting and maintaining cold water biota. Other physical and chemical characteristics (e.g., habitat, flow, dissolved oxygen, presence of beaver dams, migration barriers) of the waterbody are also used as part of the review to determine the existing use and if Class 2A designation is warranted.

This being said, excessively warm waters can be a stressor to both cold water and warm/cool water (normal) streams. However, because aquatic communities of designated “cold water” or trout streams tend to be stressed at lower temperatures, it is more common to identify excessively warm temperatures in cold-water streams. Additional information is available in the referenced Stressor ID report.

Thank you again for reviewing and commenting on the draft Minnesota River – Mankato WRAPS Report. Changes and edits as indicated above have been made and will be included in the final draft of the report. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
January 6, 2020

Mr. Don De Langhe  
2169 County Road 7  
Marshall, MN 56258  
Delanghe7@gmail.com  

RE:  Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments  

Dear Don De Langhe:  

Thank you for your comments regarding the draft Minnesota River and Greater Blue Earth River Basin Total Suspended Solids Total Maximum Daily Load Study (TMDL), Lower Minnesota River Watershed TMDL and Watershed Restoration and Protection Strategies (WRAPS), Minnesota River-Mankato Watershed TMDL and WRAPS and Watonwan River Watershed TMDL and WRAPS reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft TMDL and WRAPS reports and submit comments. Your comments are restated below followed by responses from the MPCA.  

I am writing this letter in reference to the MPCA’s supposed interest in the reduction of sediment in the Minnesota River by 50% by the year 2050.  

We hope any policies that come out of this goal are not like the typical policies the state and MPCA.  

These policies spend millions of our taxpayer dollars by hiring more staff to do studies and create ridiculous rules and standards. Many of these rules do very little good and often makes things worse. These new tedious rules put a tremendous burden on Minnesota farmers and businesses. So much burden and hardship they are often put out of business or are forced into another state. Forced to states where there is common sense and where state staff want to work with your business instead of treating them like criminals.  

In the last 20 years, Minnesota government agencies, especially the MPCA has turned into such sad organizations. If the state and MPCA truly cared about the state’s waters, they would try to accommodate private parties willing to spend private money to prevent streambank erosion. Rather than accommodating this responsible behavior, private parties are required to spend thousands if not tens of thousands of dollars on paperwork and permitting required by government agencies. These burdensome requirements often discourage private parties from performing any water improvement projects.
If the state agencies cared about water quality, they could have and would have been improving it with the resources that the people of Minnesota have entrusted them with. One resource the state has is road construction and maintenance. Water retention should always be a key factor in road design. Key word being “retention”, not diversion. There have been many diversion projects implemented by state and county agencies that have proven detrimental to water and land quality. Retention structures, without a doubt, would have been the correct solution to manage water but the state and local agencies have not care about water quality. All they cared about was diverting water from cities even if it would destroy nearby farmland and water quality in the process. Another key place where the state could cut sediment in our waters is by using the land the state already owns for water retention. There is a lot of state land which would work well for what is called a dry dam or a wet dam. Some of these structures would also provide great recreation areas.

Minnesota has hundreds of sites where these types of projects could be implemented. There are also hundreds of other sites on private ground which could be used if pursued in an intelligent way. Minnesota also has legacy tax money which could be used to construct these structures instead of being used to bid up land against local farmers.

It could be so easy if our well-paid state employees would use the resources the Minnesotans have given them. We just need the state to use what they already have. What we DO NOT need is economy crushing rules and regulations. What would be beneficial would be to have a list of conservation projects landowners could choose from with serious incentives or tax credits to encourage participation. Please, use your brains and common sense. I would be happy to help, call any time.

The MPCA is required to monitor and assess the waters of the state to understand whether lakes and streams are meeting water quality standards set to protect public health and recreation and to maintain or improve environmental conditions that support fish and other aquatic biological communities. Total Maximum Daily Load (TMDL) reports simply show how much pollution (load capacity) an individual stream or lake can absorb on a daily basis while still meeting State standards for a particular pollutant (e.g. sediment). The load capacity is allocated between different sources such as wastewater treatment facilities (point source) and the landscape (non-point sources). While TMDLs can have regulatory implications, they are almost exclusively addressed through the permitting process for point sources.

The purpose of WRAPS reports is to summarize work done to collect data, assess water bodies, determine stressors to aquatic biology, and develop strategies to restore or protect surface waters at the major watershed scale. These strategies are developed in part by local units of government and do not inherently involve increased regulations. In fact, the vast majority of implementation relies on voluntary adoption of best management practices. Many of the practices identified in the WRAPS reports are eligible for cost-share to reduce the financial burden on individual landowners. The information that goes into TMDL and WRAPS reports is intended to help local conservation staff at the Counties and Soil and Water Conservation Districts prioritize their work in areas that would have the most impact on improving water quality.

The MPCA has become more efficient in the processes described above. In the past, the MPCA assessed water bodies, developed TMDLs, and performed restoration work at a much smaller scale. This required more time and money per water body to complete our mandated requirements. Since adopting the Watershed Approach, the rate and efficiency of our work has increased greatly.
The MPCA agrees water retention, either on the surface of the land or in the soil itself, represents an important strategy for improving surface waters. Many of the strategies in the WRAPS reports are geared toward holding back and/or slowing down the release of water to streams, ditches and lakes. While our agency has little to no influence on road construction and maintenance, we do have an interest in increasing the amount of water retention on the landscape. The information you have on potential sites for water retention can be helpful to local conservation staff especially if you can communicate the importance of water storage practices to landowners.

If changing or adding policies is needed then it is important to have the help of citizens like yourself to consider and discuss the changes needed. To do that we need to work together to find solutions that not only improve water quality but also are acceptable to landowners. It will take the commitment of everyone in the watershed, rural and urban, to accomplish the goal of clean water.

The MPCA will be finalizing the WRAPS reports and submitting revised TMDLs to EPA for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division
January 6, 2020

Amber Glaeser  
Minnesota Farm Bureau  
3080 Eagandale Pl  
Eagan, MN 55121  
amber.glaeser@fbmn.org

RE: Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments

Dear Amber Glaeser:

Thank you for your comments regarding the draft Minnesota River Basin Total Maximum Daily Load (TMDL) and Watershed Restoration and Protection Strategy (WRAPS) reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft reports and submit constructive comments. Your comments are restated below followed by responses from the MPCA.

We recommend that the MPCA acknowledge the efforts of Minnesota farmers and farm organizations toward restoring and protecting water resources.

The MPCA agrees that the farm community has done a great deal to move us in the direction of clean water. The MPCA highlights the amount of conservation efforts of Minnesota farmers in the Reasonable Assurance section in each of the TMDLs. Each report details buffer compliance, Minnesota Agricultural Water Quality Certification Program enrollment, conservation easement acres and number of best management practices installed in each respective watershed. To ensure we highlight the efforts the following sentence has been added to the Executive Summaries of the TMDLs and WRAPS reports: “The farming community has been and continues to be a vital partner to conservation efforts in the Minnesota River Basin. Reducing sediment and nutrient impacts on water resources is important to Minnesota farmers who innovate new practices to improve the sustainability of their farms. Continued support from the State, local governments, and farm organizations will be critical to finding and implementing solutions that work for individual farmers and help achieve the goal of clean water.”

We encourage the agency to complete a more comprehensive analysis of the relationship between precipitation and runoff, recognizing that landform (geology) is a primary driver of runoff and strongly influences current land use.

The Minnesota Department of Natural Resources Ecological and Water Resources Division has completed comprehensive analyses of the hydrological conditions in many of the watersheds in the Minnesota River Basin. This information was used in the WRAPS and TMDL documents. The MPCA acknowledges that geology has a significant role in the amount of precipitation that ends up as runoff. Soils containing large fractions of clay or silt absorb less water than sandy soils and thus produce higher runoff ratios. Topography has a strong control over runoff ratio. Watersheds with steep slopes tend to shed more water and infiltrate less due to rapid runoff. These areas will have high runoff ratios. Relatively flat areas underlain by coarse sandy soils generally have the lowest runoff ratios as most of
the precipitation soaks into the ground. These natural factors affecting the runoff ratio are stable and should not change much over time. However, human alterations of the landscape have affected the runoff ratio and these changes can be seen in variations in runoff and the runoff ratio over time. The DNR analyses have shown significant change in the amount of precipitation ending up as runoff in many watersheds of the Minnesota River Basin. One method to evaluate runoff is the double mass curve which allows for a comparison between precipitation and stream discharge. When this data is plotted, a straight line indicates consistency in the relationship while a break in the slope suggests a change in the relationship. Many southern Minnesota stream gauges have data back to the 1930s so both wet and dry periods have been evaluated. Many sites show a relationship from the 1930s to the late 1970s and a separate relationship from 1980s to present. This change indicates other factors are influencing the amount of runoff entering the streams and rivers in the Minnesota River Basin. Below is the double mass curve for the Minnesota River at Jordan, which provides a good representation of the Minnesota River Basin.

We recommend that the MPCA consider the role of tile drainage in improving soil health and water storage.

Soil health as defined by the Natural Resources Conservation Service (NRCS) is “the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans.” The MPCA relies heavily on other entities such as NRCS and the Minnesota Soil Health Coalition to provide information on soil health. Neither entity describes the need for tile drainage to improve soil health. NRCS describes four key principles: keep soil covered as much as possible; disturb the soil as little as possible; keep plants growing throughout the year; and diversify as much as possible. The Minnesota Soil Health Coalition details ways to improve infiltration “The quickest way to improve soil infiltration is to try and mimic the historical landscape conditions; soil covered the entire growing season with green diverse cover, large and small ruminant mammals roaming the landscape, and little to no soil disturbance. Sounds impossible in production agriculture to mimic mother nature, but it can easily be achieved by applying reduced tillage practices like no-till/strip-till, diverse cover crop rotation, designated field roads to controlling traffic on crop fields and use multi species cover crops, just to name a few.” Drained soils
can be healthy or unhealthy depending on factors such as cover and living roots (cover crops), disturbance (tillage and chemicals), and diversity (crop rotation). Drainage removes water to make space for air, which is good for crops, but it is not a critical component of soil health nor does it inherently support soil health.

In regards to water storage, The University of Minnesota publication Fields to Streams describes the effect of tile drainage best—“The actual impact of adding to an existing subsurface drainage system is complex and varies widely”. The MPCA acknowledges precipitation has and continues to increase in the Minnesota River Basin. However, the delivery of that precipitation to surface waters has been accelerated through land use conversion (both rural and urban) and artificial drainage (both rural and urban). Discovery Farms data (see below) shows at a field scale that on average, annual total water runoff from a tiled field, exceeds runoff from a non-tiled field.

Under a limited number of conditions tile drainage can aid in creating the “sponge effect” of soil. However, even in these limited cases the effect is short lived and overall, based on the studies cited in the reports and data from Discovery Farms, indicate that drain tile leads to more precipitation ending up as runoff in the stream and not stored on the landscape.

The MPCA recognizes the importance of subsurface drainage to crop production, especially in a wetter climate. We hope that we can find ways to mitigate the effects of increased precipitation and increased drainage through working land practices, such as soil health and reduced tillage and other water storage
practices. It will be key for local resource professionals to work individually with producers to find the options that best fit their operations. The MPCA believes finding areas of agreement and building partnerships with organizations such as the Minnesota Farm Bureau will be critical to achieving the ultimate goal of restored water.

We encourage the MPCA to work with BWSR, farmland owners and county officials to expand use of the Multi-purpose Drainage Management program.

The MPCA recognizes the importance of drainage for crop production in the Minnesota River Basin and supports the concept of multi-purpose drainage management (MDM). Many of the practices highlighted in the Board of Water and Soil Resources fact sheet on MDM are also identified as important practices in the WRAPS documents.

We invite the MPCA to join us in our efforts by supporting research and outreach activities relating to farming practices and water quality.

Maintaining agricultural production while finding innovative approaches to reduce the delivery of pollutants to the state’s waters is consistent with MPCA’s vision of a healthy Minnesota River Basin. The MPCA appreciates your efforts and the credibility your organization has with crop producers in Minnesota. The MPCA would welcome the opportunity to partner with your organization on research, outreach and planning to further our common goals.

The MPCA will be finalizing the WRAPS reports and submitting the revised TMDLs to the Environmental Protection Agency for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

This document has been electronically signed.
January 6, 2020

Dr. Satish Gupta  
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RE: Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments

Dear Dr. Gupta:

Thank you for your comments regarding the draft Minnesota River and Greater Blue Earth River Basin Total Suspended Solids Total Maximum Daily Load (TMDL) Study, Lower Minnesota River Watershed TMDL and Watershed Restoration and Protection Strategies (WRAPS), Minnesota River-Mankato Watershed TMDL and WRAPS, and Watonwan River Watershed TMDL and WRAPS reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft TMDL and WRAPS reports and submit comments. Your comments have been restated below in bold italics followed by the MPCA’s response.

These comments apply to all the above reports. These comments are meant to review the underlying science that forms the basis of TMDL and WRAPS reports that MPCA has developed for the Minnesota River, the Blue Earth River, the Lower Minnesota River and the Watonwan River. These comments are not meant to point out a specific mistake in the text or in simulation numbers.

The TMDL reports are a federally required component of the Clean Water Act administered by the Environmental Protection Agency (EPA). TMDL reports define the maximum amount of pollution that can enter a water body on a daily basis without violating State water quality standards. These TMDLs use observed water chemistry, observed flow, modeled flow (when observed flow data sets are inadequate), and widely accepted tools (BATHTUB model for lakes; duration curves for streams) to estimate pollutant load capacities. TMDLs also provide a summary of general watershed information and potential implementation activities to address reasonable assurance requirements (activities will lead to achieving water quality standards). Information or research related to water quality standards can be submitted through the Triennial Standards Review process (https://www.pca.state.mn.us/water/2017-triennial-standards-review).

The WRAPS reports use TMDL information, biological data, stressor identification findings, model output, Discovery Farms (https://discoveryfarmsmn.org/) data, and other relevant watershed information to summarize impairments, pollutant sources, water quality goals, and restoration and protection strategies. The MPCA and other State agencies work closely with local conservation professionals to identify strategies to improve water quality based on studied best management practice (BMP) efficiencies, model scenarios, and by considering the host of social constraints. In general, WRAPS reports pull together as many lines of scientific evidence as possible to ensure reasonable strategies. Each iteration of a WRAPS report provides an opportunity to update information and adapt strategies.
The scientific process necessitates multiple perspectives and analyses. Scientific findings are often the result of conflicting theories that are tested time and time again, sometimes with varying results. In this way, the critical eye of the scientific community and the robust body of work created around a topic help the scientific understanding of the topic evolve. This being said, we appreciate the critical and often contradictory analyses you offer. While we do not necessarily agree with some of your findings and interpretations, we appreciate that the challenges you put forth ultimately help the collective scientific understanding on these topics and further check assumptions.

1. **River banks are the major source of sediments in the Minnesota River and its tributaries (Thoma et al. 2005; Kessler et al. 2012).**

Given the full context of your comments, the MPCA believes you consider bluffs and not stream banks to be the main source of sediment in the Minnesota River Basin (MRB). MPCA agrees near channel sources, which include bluffs, stream banks, and ravines, are often a major source of sediment. However, the MPCA disagrees that bluffs are the primary source in all situations. In fact, many of the sediment impairments addressed in the TMDLs in question are located in reaches with zero bluff contribution as they are found in headwaters and areas above the nick zone. Sediment sources in these areas are dominated by stream banks and overland sources. Specific contributions by source type change by watershed (see table below from the Minnesota River and Greater Blue Earth TSS TMDL Report) due to a variety of factors. The MPCA uses monitoring, modeling, stressor identification and the DNR’s geomorphic work to analyze and estimate sources. For example, the Le Sueur River Watershed Sediment Budget (Gran) estimated that 40% of the sediment came from bluff collapse; 28% of the sediment came from upland field erosion; 22% came from channel widening (bed and bank), and 10% came from ravine incision. These estimates are for the outlet of the Le Sueur, so bluff contributions are an important factor. However, focusing solely on bluffs as the sediment source ignores the sources causing impairments in the majority of reaches within the watershed.

<table>
<thead>
<tr>
<th>Source</th>
<th>Chippewa</th>
<th>Hawk–Yellow Medicine</th>
<th>Redwood</th>
<th>Cottonwood</th>
<th>Watonwan</th>
<th>Blue Earth</th>
<th>Le Sueur</th>
<th>Minnesota River–Mankato</th>
<th>Lower Minnesota</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upland</td>
<td>36%</td>
<td>37%</td>
<td>28%</td>
<td>20%</td>
<td>28%</td>
<td>22%</td>
<td>24%</td>
<td>28%</td>
<td>17%</td>
</tr>
<tr>
<td>Cropland</td>
<td>31%</td>
<td>31%</td>
<td>24%</td>
<td>19%</td>
<td>23%</td>
<td>19%</td>
<td>22%</td>
<td>27%</td>
<td>12%</td>
</tr>
<tr>
<td>Feedlot</td>
<td>–</td>
<td>–</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Pasture</td>
<td>&lt;1%</td>
<td>–</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Natural a</td>
<td>&lt;1%</td>
<td>1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Urban (MS4)</td>
<td>–</td>
<td>–</td>
<td>1%</td>
<td>&lt;1%</td>
<td>–</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>4%</td>
</tr>
<tr>
<td>Urban (Non-MS4)</td>
<td>4%</td>
<td>5%</td>
<td>2%</td>
<td>1%</td>
<td>4%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Near-channel</td>
<td>64%</td>
<td>63%</td>
<td>72%</td>
<td>80%</td>
<td>72%</td>
<td>78%</td>
<td>76%</td>
<td>72%</td>
<td>83%</td>
</tr>
<tr>
<td>Wastewater point sources</td>
<td>0.3%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>&lt;0.1%</td>
<td>0.1%</td>
<td>&lt;0.1%</td>
<td>&lt;0.1%</td>
<td>0.1%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>
2. Bank erosion rates have remained stable since European settlement. However, the number of bank failings have increased with time (Kessler et al. 2013), most likely due to changing climate (Gupta et al. 2015).

Several lines of evidence clearly show that bank erosion and sediment supply from the MRB have greatly increased since European settlement. Historical aerial imagery shows substantial widening; Lake Pepin sediment cores indicate higher sediment loading; historical notes and measurements illustrate narrow streams that could easily be “jumped” over by children; Minnesota Department of Natural Resources (DNR) geomorphic measurement and analyses show substantial widening and changes; personal observations of those living on the river note substantial recent erosion and widening.

The DNR has determined that few rivers in the MRB are stable (river stability is defined as “a river’s ability, in the present climate, to transport the flows and sediment of its watershed, over time, in such a manner that the channel maintains its dimension, pattern, and profile without either aggrading or degrading” (Rosgen 1996, 2001a, 2006)). For instance, recent DNR geomorphic cross-section analysis work shows substantial erosion rates in the Watonwan River Watershed (https://www.pca.state.mn.us/sites/default/files/wq-ws3-07020010d.pdf). Predicted erosion rates take into account bank height, surface protection (cover present and root density), degree of incision (bankfull height vs bank height), bank angle, bank materials, and near-bank stress (e.g. how tight is the bend, is the thalweg/deepest part of the channel against the eroding bank). A bank survey of Judicial Ditch 1 (JD1) predicted 0.42 feet of erosion per year, but the actual measured bank erosion from 2012-2013 was 1.53 feet per year, a substantial annual change for the six foot high bank. A study bank within the North Fork Watonwan River predicted an erosion rate of 0.25 feet per year, but the actual measured bank erosion from 2012-2013 was 0.67 feet per year (DNR cross section information is included below).

The drivers of increased stream bank erosion include climate, but also include other changes to hydrology such as drainage and vegetation (evapotranspiration). The rate, timing, and delivery of precipitation have increased fluvial erosion processes. However, land use change plays a major role in how precipitation is routed resulting in greater upland, bank, bluff, and ravine erosion. The rate and sources of erosion will continue to change as land use practices change: through city infrastructure projects, agricultural practices, and drainage system maintenance and improvement.
3. **Much of the river bank sloughing and bank failure are caused by seepage, freezing and thawing, and wetting and drying processes (Figures 1 and 2).**

Given the full context of your comments, the MPCA believes your reference here to banks is actually regarding bluffs. We agree that seepage, freeze/thaw, and wetting and drying processes play a role in bluff erosion and sediment loading. However, channel (including bank) and ravine erosion are very significant near channel sediment sources in the basin. The processes of seepage, freezing, and thawing are less of a factor with both of these sources as they are driven by fluvial erosion processes.
4. **Tile drainage does not increase streamflow** (Figure 3). Gupta et al. (2018) have also shown no change in watershed connectivity and storage capacity due to the presence of tile drainage or installation of ditches. The reason is that small pores in the soil determine how much water is stored in the soil and how fast the water leaves the landscape and those pores have not changed much because of the installation of tile drains and ditches in the landscape (Figures 4 and 5).

We agree this is an area of debate but maintain that tile drainage impacts watershed hydrology. While the exact impact of field-scale drainage at the major watershed outlet-scale is not yet settled, several sources confirm subsurface drainage impacts hydrology at different scales.

1. The University of Minnesota Extension agricultural drainage webpage ([https://extension.umn.edu/agricultural-drainage/how-agricultural-drainage-works#frequently-asked-questions-1362415](https://extension.umn.edu/agricultural-drainage/how-agricultural-drainage-works#frequently-asked-questions-1362415)) describes hydrology changes at the field scale in this question and statement: *Does subsurface drainage cause more water to leave the field compared to undrained conditions?*

   While not true for all cases and locations, in general, subsurface drainage may cause 10% to 15% more water to leave the field than agricultural land with surface drainage only. This number is based on drainage simulation models, as variations this small are difficult to measure in the field due to high seasonal variability.

2. Discovery Farms Minnesota (DFM) ([https://discoveryfarmsmn.org/](https://discoveryfarmsmn.org/)) field scale information shows an increase in the total runoff from fields with subsurface drainage compared to fields with only surface runoff (see below). DFM information shows that a greater percent of precipitation leaves through the tile line in a subsurface drained agricultural setting.
3. Drainage improvements are done to increase the drainage coefficient (in/hr), effectively removing more water in less time. At the drainage system management scale, engineers’ reports for proposed drainage improvement projects show that the peak flow through drainage systems can increase by 3 to 10 times for the same storm event (depending on slope, tile size, and number of laterals changed). This increased flow at the smaller scale cumulates at the larger scale to create larger flows, particularly with widespread storm events on highly drained watersheds.

4. Connectivity has increased greatly across the MRB as drainage was and continues to be installed. The graphic of the Le Sueur River Watershed below illustrates how connectivity has increased since European settlement (note that only public systems are illustrated and extensive private drainage networks are not shown). The vast network of manmade surface and subsurface pathways creates flow paths and connects formerly hydrologically-disconnected areas of the watershed. Connectivity has increased over decades and continues to impact the amount and types of erosion that occurs in the pre-settlement, “natural” streams.

The aerial photograph below illustrates increased connectivity at a smaller scale, in the Le Sueur Watershed. The county tile mains (dashed yellow and white lines) hydrologically connect this area to the Le Sueur River, a connection that would otherwise only exist through slow groundwater lateral flow or overland flow from extreme flooding conditions.
5. Increased streamflows are due to increased precipitation, not only in a given year but also in previous years. Previous year precipitation effects are imbedded in increased or decreased soil water storage (Johnson et al. 2009; Gupta et al. 2015, 2016 a,b,c,d,e; 2018)

We agree that precipitation has increased across the MRB. The DNR data (table below) indicates an 18% increase in precipitation in the basin over the last 20 years compared to the previous 40 years. This precipitation increase has undoubtedly increased stream flows as discussed in the TMDL and WRAPS reports.

<table>
<thead>
<tr>
<th>Precipitation</th>
<th>1999-2018 (20 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire basin</td>
<td>+ 4.7 inches</td>
</tr>
<tr>
<td>Pomme de Terre River watershed</td>
<td>+ 1.1 inches</td>
</tr>
<tr>
<td>Blue Earth River watershed</td>
<td>+ 5.6 inches</td>
</tr>
<tr>
<td>Lower Minnesota River watershed</td>
<td>+ 3.3 inches</td>
</tr>
</tbody>
</table>

Source: Minnesota Department of Natural Resources; long-term basin average annual precipitation: ~ 27 inches

However, Minnesota River flows have increased by as much as 75% during the same period of time (table below). Based on the information presented in question number 4, drainage at the field scale, system scale, and watershed scale (as well as other changes to hydrology including impervious surfaces and vegetation changes) has also increased flows in the Minnesota River and its major watersheds.

<table>
<thead>
<tr>
<th>Streamflow (average annual increases)</th>
<th>1999-2018 (20 years)</th>
<th>1979-2018 (40 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnesota River at Jordan</td>
<td>+ 68%</td>
<td>No trend</td>
</tr>
<tr>
<td>Minnesota River at Fort Snelling</td>
<td>+ 75%</td>
<td>No trend</td>
</tr>
</tbody>
</table>

Source: Metropolitan Council Environmental Services
We agree that antecedent soil moisture conditions impact flows. However, the lag time on this response is limited and likely negligible after a few years. A DNR discharge correlogram analysis for the Le Sueur River Watershed indicates a low correlation between previous years’ precipitation and subsequent flows (figure below). At and after year three, minimal correlation is observed.

In addition to assuming effects after a five-year lag period, the analysis you provided (copied below) lacks context within the hydrologic year. The impacts of rain events and resulting stream flows can vary greatly based on the seasonality and crop stage/condition. For instance, a two inch rain event in May (before crops have canopied) will increase stream flows much more than the same rain event with the same antecedent soil conditions in August (when crops are fully utilizing water). Drawing conclusions regarding crop changes impact on stream flow is difficult without the fuller context of the precipitation event timing and antecedent soil condition information.

Your analysis does not apply your principles to all years and instead relies on the substantially unlikely five-year lag response. Specifically, you argue that because flows in 1957 and 1991 are similar, this shows no flow impact due to tile or crop changes. We would like to point out that recent flows in years with similar precipitation are substantially higher: flows in 1989 and 1990 are more than double that of 1955 and 1956. Furthermore, the late 1980s were extremely dry, yet still show higher flows than the 1950s. These two observations seem to contradict your interpretation of the data.

<table>
<thead>
<tr>
<th>Year</th>
<th>Precipitation, mm</th>
<th>Streamflow, mm</th>
<th>Soybean Area, ha</th>
<th>Soybean area, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>767</td>
<td>78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1954</td>
<td>542</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1955</td>
<td>504</td>
<td>12</td>
<td>21,466</td>
<td>13.2</td>
</tr>
<tr>
<td>1956</td>
<td>629</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>864</td>
<td>140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>541</td>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>476</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>515</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>666</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>855</td>
<td>125</td>
<td>61,361</td>
<td>37.7</td>
</tr>
</tbody>
</table>
6. **The Minnesota River Basin being relatively flat, does not have much surficial storage (Fig. 15). Furthermore, the surface storage that is available is not uniformly distributed (Kessler et al., 2015).**

We agree that the potential for storage is not uniformly distributed across the MRB and that landscape surface storage has limitations. However, one primary reason that the MRB’s surficial water storage is now substantially limited is because the landscape is extensively drained. In addition to surface storage reductions, subsurface water storage has been substantially reduced. The MRB is largely composed of hydric soils, and until drained for crop production, roads, and urban development, these soils offered water storage. Reduced water storage is both the intent and undeniable consequence of drainage.

The WRAPS reports strategies rely heavily on working lands practices such as cover crops and reduced tillage to add soil organic matter and corresponding water storage to the landscape. The NRCS reports that soil organic matter holds 10 to 10,000 times more water and nutrients than the same amount of mineral soil (https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/health/mgnt/?cid=nrcs142p2_053859). Just a modest 1% to 2% increase in soil organic matter watershed-wide would make substantial improvements in watershed health. Surface water storage remains a viable option to improve water quality at the field, drainage management, and watershed scale, but we do not seek to eliminate artificial drainage or convert land back to its pre-settlement condition.

7. **There is some fluvial erosion along river banks but there is not much undercutting of river banks due to streamflow. Rivers in the Minnesota River Basin are mainly the carrier of sediments rather than the cause of sediment production (Figs. 7-10).**

Geomorphology field work and analyses completed by the DNR contradict your statement (see the DNR watershed geomorphology reports, in particular in the headwaters areas of the Greater Blue Earth River Watershed). Significant fluvial erosion is seen at all sites in the Greater Blue Earth River Watershed. Erosion rates above the nick zone far exceed the expected rate for the soils and channel conditions of the watershed. Numeric examples of the erosion rates in the Watonwan River Watershed were referenced in MPCA’s response to item 2.

The streams and rivers in the MRB have a high potential for erosion due to glacial features and their relatively young state, but the altered nature of the basin exacerbates natural erosion rates. Bank erosion is a normal process, but changes to hydrology have accelerated these erosional processes. Stream straightening, ditching, wetland draining, and other alterations have increased the hydrologic connectivity within the basin. Increased connectivity has resulted in higher flows, resulting in higher velocities, resulting in higher shear stress on streambeds and banks. These changes are easily observable in the entrenchment of streams and raw banks throughout the MRB.

8. **Most banks slough from the top of the bank due to seepage processes and not due to undercutting (Figure 8).**

As mentioned before, we are interpreting your comment on bank sloughing to refer to bluff sloughing. As you have documented, seepage can be a major driver in bluff erosion. That being said, the evidence you provide does not address the impact of fluvial processes on bank or bluff erosion. Undercutting is a major driver of bluff and bank erosion in fluvial settings (refer to DNR geomorphic study). Furthermore, bluffs are primarily located in the nick zone of the MRB, but stream banks are located throughout the
basin. Typically, seepage is rarely the primary driver of stream bank erosion. Instead, accelerated stream bank erosion driven by hydrologic alterations is common throughout the MRB.

9. **Evapotranspiration of corn and soybean is about same as that of prairie grasses that they replaced (Baeumler et al. 2018). This is consistent with other similar research in the Minnesota River Basin (Garcia y Garcia and Strock 2018).**

We agree that the total annual evapotranspiration (ET) of modern row crop agriculture is similar to that of native prairies. However, the timing of prairie and wetland ET is better synced to precipitation patterns than corn and soybean ET. Prairie grasses evapotranspirate more water earlier in the growing season, before corn and soybeans have matured (see WRAPS reports figure below).

![Estimated Monthly ET (cm)](image)

Baeumler et al. (2018) shows that wetlands, previously burned prairie, and recently burned prairie land evapotranspirate 134, 101, and 88 mm of water, respectively, in the month of May. While the study did not include May ET rates for soybeans, which are normally planted in early to mid-May, it would be expected they would evapotranspirate only a fraction of these rates, over the same period as they would not have any significant growth until June (see figure from Baeumler et al study below).

<table>
<thead>
<tr>
<th>Month</th>
<th>Prairie</th>
<th>Corn</th>
<th>Soybean</th>
<th>Wetlands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ETr</td>
<td>Previously Burned</td>
<td>Recently Burned</td>
<td>Irrigated</td>
</tr>
<tr>
<td>ET, mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>155</td>
<td>101</td>
<td>88</td>
<td>-</td>
</tr>
<tr>
<td>June</td>
<td>190</td>
<td>141</td>
<td>86</td>
<td>97</td>
</tr>
<tr>
<td>July</td>
<td>214</td>
<td>185</td>
<td>155</td>
<td>202</td>
</tr>
<tr>
<td>August</td>
<td>166</td>
<td>123</td>
<td>89</td>
<td>172</td>
</tr>
<tr>
<td>September</td>
<td>142</td>
<td>83</td>
<td>67</td>
<td>126</td>
</tr>
<tr>
<td>October</td>
<td>87</td>
<td>33</td>
<td>26</td>
<td>50</td>
</tr>
<tr>
<td>Sum</td>
<td>798</td>
<td>537</td>
<td>406</td>
<td>647</td>
</tr>
<tr>
<td>Seasonal Sum</td>
<td>954</td>
<td>666</td>
<td>511</td>
<td>-</td>
</tr>
</tbody>
</table>
Spring ET is critical to mitigating spring precipitation. Bauemler et al study stated ... *ETa values for the prairie units were generally higher in early spring whereas they were higher during mid-summer for corn and soybeans. This is expected considering native prairies in the area are mostly C3 type plants (efficient in photosynthesis in cool and wet season) with a greening up earlier in the spring compared to corn, which are C4 type plants with more photosynthesis and thus more ET in hot summer weather.* Also noted in the Bauemler et al study, two significant precipitation events occurred during the study in May 2015, and when combined with June totals resulted in 238 mm of precipitation. The ET for this two month period for wetlands, previously burned prairie and recently burned prairie was 306 mm, 242 mm, and 174 mm, respectively. This would indicate that a landscape of prairie and wetlands has the potential to evapotranspirate most, if not all of the precipitation of these two months. While not completely known, it could be expected that soybeans would have evapotranspired only about half of this rain amount.

Just as precipitation impacts on river flow are exponential, the effects of ET are also exponential. Relatively small changes in ET can have a non-linear impact on river flow. Therefore, modern row crop agriculture’s ET patterns have the effect of increasing spring river flows and decreasing later summer river flows.

As described in many of our documents, the majority of sediment loading occurs in the March through June timeframe due to snowmelt and spring rains on fields lacking sufficient canopy to protect bare soil. The bare landscape, reduced ET, and lack of rooted vegetation coupled with generally substantial precipitation events during these critical months, drive much of the increased flow and sediment load observed in the data over the same timeframe.

10. **In recent years, we have been getting much higher precipitation than what plants can transpire and that is why we are getting more water in rivers (Gupta et al. 2015; Gupta et al. 2016 a,b,c,d,e; 2018).**

We agree that more runoff can occur when precipitation exceeds evapotranspiration. Two key strategies in the WRAPS reports focus on increasing evapotranspiration and storage to reduce flow to rivers: 1) provide adequate storage to hold water that can then ET or infiltrate and 2) diversify the landscape with additional vegetation to provide more ET. Specific practices to add storage to the landscape have already been discussed above, but include increasing soil organic matter, which increases the soil water holding capacity. Practices that can diversify the landscape include adding cover crops during the spring or fall, integrating more small grains, and integrating perennial crops.

11. **Increased phosphorus (P) in Lake Pepin sediments is mainly due to bank sediments picking domestic and industrial P that was dumped in these rivers over time (Grundtner et al. 2014). We are still dumping phosphorus containing raw sewage in our rivers and that P is still being picked up and deposited downstream.**

12. **There is also plenty of legacy P in the river system that is being mobilized and transported downstream due to increased streamflow from increased precipitation.**

Both point 11 and point 12 are addressed here:

Decades have passed since the time of substantial unregulated point source phosphorus discharges. Since that time, most stream channels have gone through substantial erosion and channel changes, and the phosphorus that may have been sorbed by the bank sediment has long been eroded away. Legacy
phosphorus attached sediment has likely been removed from the watersheds after decades of storm, flow, and erosion events, contributing little to none of the current phosphorus load.

Point sources are required to measure the amount of phosphorus discharged. By comparing the point source phosphorus load to total watershed load, we know that point source derived phosphorus makes up a small fraction of the total watershed phosphorus load. These analyses are included in the Watonwan and Minnesota River-Mankato Watersheds WRAPS reports. While there are a few cases of raw sewage discharging into streams, the associated phosphorus contributions are relatively minimal as most events are related to large storm events and most of the by-passed effluent is stormwater.

The MPCA maintains the Watershed Pollutant Load Monitoring Network (WPLMN) with 199 locations monitoring many subwatersheds across Minnesota. Many of these are rural subwatersheds with low population density and no industrial activity. These watersheds have as high or higher phosphorus loading to their respective streams as streams associated with high population centers and significant industrial activities. These rural watersheds would have very low potential for “legacy” phosphorus but yet contribute as much or more phosphorus as high density areas based on the actual monitoring done by the WPLMN.

When comparing data from the WPLMN and DFM there is a strong correlation between the amount of phosphorus leaving agricultural fields and watershed yields measured by the WPLMN. For instance in 2016 Discovery Farms reported: Results from 2016 were similar to past years of DFM research, with total losses slightly above normal. Median TP loss from surface runoff in 2016 was 0.60 lb/ac with a range from 0.21 to 2.18 lb/ac. Fifty-seven percent of the surface runoff TP was in the dissolved form with 43% in the particulate form. See figure below.

![Annual Total Phosphorus Loss (lb/ac)](image)

During 2016, the WPLMN measured phosphorus watershed yields in the watersheds of the MRB with a low of 0.093 pounds per acre total phosphorus in the Pomme de Terre Watershed to a high of 1.810 pounds per acre in the Le Sueur Watershed.
While not all phosphorus lost at the “edge of field” ends up in surface water, the MPCA can use DFM information in watershed models to predict the transportation and fate of the phosphorus. When combined with known point source contributions of phosphorus, this closely matches the actual amounts seen through the WPLMN.

The MPCA will be finalizing the draft WRAPS reports and submitting the revised TMDLs to EPA for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
January 6, 2020

Karl Hakanson  
University of Minnesota Extension  
2001 Plymouth Ave N  
Minneapolis, MN 55411  
khakanso@umn.edu

RE: Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments

Dear Karl Hakanson:

Thank you for your comments regarding the draft Minnesota River Basin Total Maximum Daily Load (TMDL) and Watershed Restoration and Protection Strategy (WRAPS) reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft reports and submit comments. Your comments have been restated below in bold italics followed by the MPCA’s response.

**Minnesota River needs improved land, water management**  
... no kidding!

*Hi Scott,*

*This from the Agriculture Stewardship - Land, Water, Livestock*

_Minnesota Pollution Control Agency sent this bulletin at 07/23/2019 03:32 PM CDT_  
For years I worked in WI and MN on the farming-WQ interface. Voluntary BMPs galore. Cost sharing. I&E. Nutrient Management. Watershed projects. Farmer-led initiatives. TMDLs. You name it. Me and 10,000's of others across the nation. We don't have that much to show for it, I would say, in that WQ is getting worse.

My conclusion? Farmers don't have good ways to connect their business decision-making and farm management with the various water quality standards and parameters needed for "swimable, fishable" waters. They have no way of knowing the extent to which adopting recommended BMP x, y or z impacts WQ in terms of meeting WQ standards/watershed goals. IMHO, farmers need their own tools to be able to determine their per acre contributions of P and soil erosion delivery rates, and N loss expressed in terms of whether it is above, at or below needed rates for the watershed. Lacking this we are stuck with feel good voluntary adoption of BMPs.
Attached is a three minute one slide presentation for the recent water summit.

Thank you for your dedicated work to make farming more sustainable and improve water quality. The MPCA agrees the conservation adoption model used for the last several decades has not been universally successful at restoring impaired waters. The MPCA also agrees that farmers having better tools to assess their impact would be helpful. Generally, the “social” issues and hurdles associated with the current conservation model (and other related drivers and constraints like farm bill policy, mistrust, lack of support and networks, and a host of others) are the largest challenges to achieving clean water. The strategies tables presented in the Minnesota River - Mankato and Watonwan River WRAPS reports worked to reflect the host of “social” strategies that can help us achieve the physical strategies (BMPs and conservation practices). We have added your idea (“tools for farmers to estimate their fields’ impact/results of practice adoption”) to the social strategies for cultivated crops (to achieve the 10-year targets) in the Watonwan and Minnesota River - Mankato WRAPS reports.

The MPCA will be finalizing the WRAPS and submitting the revised TMDLs to the Environmental Protection Agency for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
January 6, 2020

Brent Hilbert
32796 742 Ave
South Haven, MN 55382
bhilbertfarms@gmail.com

Re: Response to Comments on the draft Minnesota River-Mankato Watershed Restoration and Protection Strategy and Minnesota River-Mankato Total Maximum Daily Load reports

Dear Brent Hilbert:

Thank you for your comments regarding the draft Minnesota River-Mankato Watershed Restoration and Protection Strategy (WRAPS) and Minnesota River-Mankato Total Maximum Daily Load (TMDL) reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft reports. Your comments have been restated below in bold italics followed by the MPCA’s response.

Being a farmer along the birch coulee creek and ditch 124, it is fascinating reading this report. It would be nice to see more data, including comparison to 10 and 25 yrs ago. Of course that is lacking, so we are left to make assumptions. I noted the stream bank stability comments, and have to agree. However, I did not see any information indicating a potential cause. From my observations over 40 years, it would appear that the ditch bottom is deeper, likely due to erosion. It means the bottom couple of feet of bank are virtually straight up and down, which naturally will lead to bank instability. Since most of these ditches appear to be soft bottom, how do you keep constant waterflow from eroding them?

The Minnesota Department of Natural Resources (DNR) performed stream survey (geomorphology) work in the Minnesota River-Mankato Watershed. Though Birch Coulee Creek was not surveyed as part of this effort, it is similar to other small streams in the watershed. Generally, a drainage ditch does not have the shear stress capable to down cut the channel bed. In fact, many ditches aggrade or collect sediment which explains the soft sediments you are describing. This aggraded sediment is typically removed during a ditch cleanout to increase the water transport capacity of the ditch. However, if you live where the channel is picking up slope, a straight channel with grade has the capability of cutting down through glacial till on the bottom of the channel. Once the channel down cuts, its banks get taller and more exposed and are prone to toe erosion and gravitational failures/slides.

Another situation you might be observing is side slope erosion from the channel as it begins a meander pattern. Often straightened reaches of streams and drainage ditches attempt to establish a meander pattern. Once meandering begins, it is common to see significant erosion on the outside turns of the channel. The more water that flows through the channel, the faster this process occurs resulting in more erosion than during low flow periods.

How much does that contribute to sediment load, etc? I would wager the ditches are 3-4’ deeper than 40 years ago. How much dirt is that?
The table below shows a summary of erosion rate estimates based on data collected by the DNR from Minnesota River-Mankato Watershed tributaries over two years. Unfortunately, Birch Coulee Creek was not surveyed as a part of this work, but the table illustrates the range of estimated rates in the watershed. These estimates are based on erosion of the channel banks, and do not include incision rates.

<table>
<thead>
<tr>
<th>Site</th>
<th>Erosion Rate (Tons/Foot)</th>
<th>Length of Stream (Feet)</th>
<th>Total Erosion (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Spring Creek</td>
<td>0.042</td>
<td>530</td>
<td>22.26</td>
</tr>
<tr>
<td>Spring Creek Trout Easement</td>
<td>0.0332</td>
<td>16810</td>
<td>558.092</td>
</tr>
<tr>
<td>Fort Ridgely Golf Course</td>
<td>0.1339</td>
<td>2500</td>
<td>334.75</td>
</tr>
<tr>
<td>Little Cottonwood (HWY 71)</td>
<td>0.0691</td>
<td>730</td>
<td>50.443</td>
</tr>
<tr>
<td>Little Cottonwood (HWY 258)</td>
<td>0.025</td>
<td>518</td>
<td>12.95</td>
</tr>
<tr>
<td>Alternatt Creek</td>
<td>0.0143</td>
<td>507</td>
<td>7.2501</td>
</tr>
<tr>
<td>Little Cottonwood (HWY 68)</td>
<td>0.145</td>
<td>644</td>
<td>93.38</td>
</tr>
<tr>
<td>7 Mile (Reach 1)</td>
<td>0.138</td>
<td>600</td>
<td>82.8</td>
</tr>
<tr>
<td>7 Mile (Reach 2)</td>
<td>0.1014</td>
<td>600</td>
<td>60.84</td>
</tr>
<tr>
<td>7 Mile (Reach 3)</td>
<td>0.0808</td>
<td>600</td>
<td>48.48</td>
</tr>
<tr>
<td>7 Mile (Reach 4)</td>
<td>0.0433</td>
<td>600</td>
<td>25.98</td>
</tr>
</tbody>
</table>

When we talk about phosphorus and nitrogen in the watershed, how much is related directly to sediment already in the system?

As part of the WRAPS process, source assessments of pollutants including nitrogen and phosphorus were performed using the best available information and the professional judgment of Soil and Water Conservation District (SWCD) and County staff. Pollutant loading in streams in the Minnesota River-Mankato Watershed comes primarily from external sources and not from internal bed load. The green pie chart below shows the phosphorus sources for the Minnesota River-Mankato Watershed. The majority of phosphorus comes from cropland surface runoff followed by tile and open intakes, stream bank erosion, and urban development. The purple pie chart below show the nitrogen sources of pollutants for the watershed. The majority of the nitrogen in the watershed is coming from sources related to tile drainage and shallow groundwater. Less than 1% of the nitrogen comes from bank erosion/stream bottom which is included in the “Other” category.
Even if we implemented practices which eliminated all surface run off (including into drain tiles) can we actually expect the watershed to magically clean up in the horizon targeted?

The WRAPS presents both long-term and short-term goals and targets developed by the Minnesota River-Mankato Watershed working group composed of local SWCD and County staff. The long-term goals are based on achieving the water quality standards assigned to each body of water. The working group held much discussion regarding the years to reach overall reduction goals, ultimately choosing timelines that are well into the future but not so far out as to be meaningless. The 10-year targets, while still ambitious, are more modest, and represent the reductions local conservation staff feel are reasonable over the next 10 years. A 10-year timeline is consistent with most local water planning efforts, which allows for adapting approaches based on new information, technologies, and local priorities.

Lastly, I have implemented no-till and cover crops, and can testify to the erosion control benefits. I will also state that those approaches do far more than the forced buffer strip implementation along waterways. It doesn’t take a brain surgeon to realize that water doesn’t flow up hill, and buffer strips where there was negative grade does nothing other than remove acres from production without impacting water quality. It is imperative that future water quality efforts realize that taking land out of production, or reducing productivity are not acceptable tradeoffs, when the benefits aren’t truthfully feasible. Cover crops can help, but implementation should be incented, not forced.

Thank you for implementing no-till and cover crops on your land. The MPCA agrees working land practices and programs that benefit both the environment and crop production represent the most likely way forward to achieve water quality goals. The MPCA encourages you to spread the word to your fellow landowners about the benefits of the practices you are implementing. It will take efforts from everyone in the watershed to reach water quality goals including people in both urban and rural areas.

An another aside, I also read the 4 page summary on the Mankato watershed, and noted many questionable opinions expressed as though they were fact. One in particular talked about how drain tile has increased the total water flow and pace of water flow down the river. Making claims like this are misleading. References are absolutely necessary and should be noted everytime. Please remedy this.

While it is difficult if not impossible to identify the exact amount of influence drainage has at the outlet of a major watershed, there are examples of how drainage changes hydrology at different scales.

The University of Minnesota Extension agricultural drainage webpage (https://extension.umn.edu/agricultural-drainage/how-agricultural-drainage-works#frequently-asked-questions-1362415) describes hydrology changes at the field scale in this question and statement:

Does subsurface drainage cause more water to leave the field compared to undrained conditions?

While not true for all cases and locations, in general, subsurface drainage may cause 10 to 15 percent more water to leave the field than agricultural land with surface drainage only. This number is based on drainage simulation models, as variations this small are difficult to measure in the field due to high seasonal variability.
Discovery Farms (https://discoveryfarmsmn.org/) field scale information shows an increase in the total runoff from fields with subsurface drainage compared to fields with only surface runoff (see below). This Discovery Farms information shows that a greater percent of precipitation leaves through the tile line in a subsurface drained agricultural setting.

![Average Runoff](image)

Drainage improvement projects are done to increase the drainage coefficient (in/hr), effectively removing more water in less time. At the drainage system management scale, engineers’ reports for proposed drainage improvement projects show that the peak flow through drainage systems can increase by 3 to 10 times for the same storm event (depending on slope, tile size, and number of laterals changed). This increased flow at the smaller scale accumulates at the larger scale to create larger flows, particularly with widespread storm events on highly drained watersheds.

The DNR analyzed precipitation and flow data for the Minnesota River-Mankato Watershed in the Watershed Characterization Report (https://wrl.mnpals.net/islandora/object/WRLrepository%3A2387). An excerpt from their report says that alterations in flow regimes in southern Minnesota are well documented. The Little Cottonwood River, a tributary in the Minnesota River-Mankato Watershed, is a good example of this. Average precipitation in the Little Cottonwood River Watershed has varied since the 1950s with no significant increasing or decreasing trend. These data suggest that changes in runoff ratios documented in the period of record are not necessarily attributed to the amount of annual precipitation in the watershed. Discharge analyses showed an increasing trend in the amount of water flowing through the Little Cottonwood River from 1973 through 2010. Additionally, the Little Cottonwood River has had higher monthly flow averages for every month except November and December when comparing 1973 through 1982 and 1983 through 2010.
Thank you again for your review and thoughtful comments on the Minnesota River-Mankato TMDL and WRAPS reports. The MPCA will be finalizing the WRAPS report and submitting the revised TMDL to EPA for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
January 6, 2020

Linda Loomis
Administrator
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Re: Response to Comments on draft Minnesota River – Mankato Watershed Total Maximum Daily Load Study and the Minnesota River – Mankato Watershed Restoration and Protection Strategy

Dear Linda Loomis:

Thank you for your comments regarding the draft Minnesota River – Mankato Watershed Total Maximum Daily Load (TMDL) Study and the Minnesota River – Mankato Watershed Restoration and Protection Strategy (WRAPS). The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft reports and submit comments. Your comments have been restated below in bold italics followed by the MPCA’s response.

Total suspended solids (TSS), suspended sediment, and turbidity are equivalent but not equal, interchangeable measurements. The differences begin with how the samples are collected and are increased by different analytical methods. It is acceptable to combine the data, but the reader needs to be alerted to the differences. The methods, qualifiers, and coefficients used to enhance the equivalence of the measurements must be documented.

The following language has been added to the report to clarify the relationship between turbidity and TSS as well as the adoption of the TSS standard.

“The class 2B turbidity standard (Minn. R. ch. 7050.0222) that was in place at the time of the impairment assessment for many reaches in the project area was 25 NTUs. Impairment listings occurred when greater than 10% of data points collected within the previous 10-year period exceeded the 25 NTU standard (or equivalent values for TSS or the transparency tube). If sufficient turbidity data did not exist, transparency tube data were used to evaluate waters for turbidity impairments for the 2006 through 2014 303(d) lists of impaired waters. A transparency tube measurement less than 20 centimeters (cm) indicated a violation of the 25 NTU turbidity standard. A stream was considered impaired if more than 10% of the transparency tube measurements were less than 20 cm.

Due to weaknesses in the turbidity standards, the MPCA developed numeric TSS criteria to replace them. These TSS criteria are regional in scope and based on a combination of biotic sensitivity to the TSS concentrations and reference streams/least impacts streams as data allow. The results of the TSS criteria development were published by the MPCA in 2011. The new TSS standards were approved by EPA in January 2015. For the purpose of this TMDL report, the newly adopted 65 mg/L standard for class 2B waters is used to address the turbidity impairment listings in the Minnesota River – Mankato Watershed project area.”
The section titled Nitrate Source Summary on page 42 of the draft report proceeds to discuss total nitrogen (TN) without explaining that nitrate is one of the many forms of nitrogen found in the environment. There is a clearly defined drinking-water standard for nitrate but not for nitrogen. Combining the forms of nitrogen for discussion of environmental nitrogen makes discussion much easier, but the authors need to make the readers aware of the differences and any assumptions used when extrapolating TN occurrences to more specific forms such as nitrate.

The following text is found on Page 36 of the draft WRAPS report, which the MPCA believes sufficiently explains the different forms of nitrogen. This language will be added to the draft TMDL.

“Nitrogen can be present in water bodies in several forms including ammonia, nitrite, and nitrate. The process in which nitrogen changes from one form to another is called the nitrogen cycle (Britannica 2019). Most nitrogen in waters starts as ammonia; ammonia is converted to nitrite, and then nitrite is converted to nitrate.”

Similar caution is encouraged when discussing phosphorus in the environment. Because phosphorus has an affinity for sediment particles, total phosphorus (TP) usually is associated with suspended solids and/or contained in algal cells, whereas dissolved phosphorus generally is available for immediate uptake by aquatic organisms. This should be a consideration when assessing the mobility of phosphorus in the environment.

The following language was added to the draft WRAPS (Page 53) and the draft TMDL (Page 44).

“Because phosphorus has an affinity for sediment particles, TP is usually associated with suspended solids and/or contained in algal cells, whereas dissolved phosphorus generally is available for immediate uptake by aquatic organisms. This should be a consideration when assessing the mobility of phosphorus in the environment.”

The report mentions that the watershed consists of many of the small streams that drain directly into the Minnesota River that were not routinely gaged or sampled. The Minnesota River Basin Hydrological Simulation Program—FORTRAN (HSPF) model was employed to estimate loading from many of these small streams. Although there may have been no other data sources, the authors cautioned that model results could misrepresent the actual contributions from any of the unmeasured tributaries. The TMDL load-duration curves and tables often have the caveat that the HSPF-simulated flow of zero is likely an underestimate of the actual flow conditions. This was apparent when the tributary flows were shown as no flow when low-flow or base-flow should have been present. Local stakeholders could be offended when their ungaged, unsampled stream is identified by a computer model as being impaired.

The State of Minnesota does not use models to make water quality assessments. All water quality and biological assessments are based on actual chemical, physical, and biological samples. The HSPF model was used appropriately to characterize and estimate pollutant contributions from streams without direct flow and/or water quality monitoring.
An analysis comparing the flow-weighted mean concentration and yield for TSS, TN, and TP determined from the HSPF model results, Watershed Pollutant Load Monitoring Network (WPLMN) data, and professional judgment regarding watershed-wide estimates is presented on page 108. Although this is an enlightening exercise, an interpretation explaining the logic and results of this comparison is absent and would help readers understand the relevance of this exercise.

The information referenced is used to estimate the watershed-wide (surrogate) goals (numbers presented at bottom of the analysis). Refer to the narrative in the goals overview section for more information on the watershed-wide goal versus meeting the water quality standard (TMDL) goal. The following information was added to the appendix below the table.

“Watershed-wide goals are typically set and applied to a baseline data set that represents the watershed as a whole. In most watersheds, a WPLMN monitoring site near the outlet of the watershed is able to measure the water leaving the watershed. The Middle Minnesota River Watershed; however, is composed of multiple sub watersheds that directly outlet to the Minnesota River, and only two of these watersheds have WPLMN data coverage. By comparing the actual WPLMN data results and model results, one can observe how well the model is simulating the observed data. Furthermore, model data covers the entire watershed area, but does not represent the same baseline data years, and furthermore, model data may not have ideal calibration and validation information due to the lack of WPLMN sites. Therefore, from these lines of data, we can apply professional judgement to estimate low and high brackets and a medium estimate on what the actual pollutant concentrations were over the baseline years. The medium estimate was compared to the water quality standard and used to calculate the watershed-wide goal.”

It appears that the WRAPS report was based almost entirely on data from studies, including the watershed pollutant load monitoring network, and not so much on the work done for the companion TMDL report. There are many reasons why this might be convenient; however, the purpose of the TMDL is to provide a basis for the restoration and protection strategies provided in the WRAPS report.

The companion TMDL as well as other TMDLs previously or concurrently completed were used wherever possible to determine WRAPS water quality goals and pollutant reduction estimates. The restoration strategies that were developed for the WRAPS were informed by these water quality goals and reduction estimates. The following language is included on Page 28 of the draft WRAPS.

“Water quality goals for the Middle Minnesota River Watershed (Error! Reference source not found.) are intended to help both waterbodies within and downstream of the watershed meet water quality standards and other goals (e.g. Gulf Hypoxia and Lake Pepin goals). These goals were set after analyzing TMDL studies, state-wide reduction goals, WPLMN data, and HSPF model output. The TMDL studies include: the Middle Minnesota River Watershed TMDL produced as part of the Watershed Approach (produced concurrently with this WRAPS report; see the MPCA Middle Minnesota River Watershed webpage [MPCA 2019b]), Crystal Lake TMDL Study Excess Nutrients (MPCA 2008) and Minnesota River and Greater Blue Earth River Basin Total Suspended Solids Total Maximum Daily Load Study (published concurrently with this WRAPS report; see Minnesota River and Greater Blue Earth River Basin TMDL for TSS website [MPCA 2018e]).”
One of the more interesting and relevant findings of the WRAPS report is the observation that the single largest fecal bacteria source in the MMRW was estimated as crop surface runoff where manure had not been incorporated. Surface runoff from crops with surface-applied manure account for an estimated 56 percent of the bacteria, whereas environmental propagation and surface runoff from crops with subsurface-applied manure were estimated at 13 and 11 percent, respectively.

The MPCA agrees runoff of non-incorporated manure represents a significant source of bacteria to surface waters. Best management practices to mediate the impacts of surface applied manure runoff represent a key strategy to reduce bacteria concentrations in surface waters of the Minnesota River – Mankato Watershed.

The edits identified in this letter have been made to the WRAPS and TMDL. The MPCA will be finalizing the Minnesota River – Mankato WRAPS and submitting the TMDL to EPA for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
January 6, 2020

Gretchen Sabel
Communications Director
League of Women Voters Upper Mississippi River Region
www.lwvumrr.org
gpsabel@yahoo.com

RE: Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments

Dear Gretchen Sabel:

Thank you for your comments regarding the draft Minnesota River and Greater Blue Earth River Basin Total Suspended Solids Total Maximum Daily Load Study (TMDL), Lower Minnesota River Watershed TMDL, Minnesota River-Mankato Watershed TMDL and Watonwan River Watershed TMDL reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft TMDL reports and submit comments. Responses to your comments are included below.

Our main concern with the TMDLs out on public notice now is that they do not fully address the big picture problem of sedimentation on the Minnesota River. The solution of restoring wetland and other types of natural infrastructure in the basin is left out. The MPCA recommendations act more as small Band-Aids, with little chance of actually restoring water quality in the Minnesota River.

For example, the recommendations on page three of the Summary in the Greater Blue Earth River draft TMDL and many of the recommendations in the other three draft TMDLs deal almost entirely with symptoms, such as a recommendation for sediment basins, and ignores the cause of most of the problems with excess sediment and nutrients in the Minnesota River Basin: the loss of greater than 90% of the wetlands in the Minnesota River Basin. Those lost wetlands both served to store most of the rain that fell, greatly widening and lowering the hydrograph, and also removed most of the nutrients and sediment before feeder streams reached the Minnesota River.

Increased rainfall exacerbates the sedimentation problem, as was shown in southeastern Minnesota where recent record rains have washed out flood protection measures in Zumbro Falls, as one example. This is not a time for a Band-Aid approach – rather we need a comprehensive and aggressive plan that engages public and private sectors, including agriculture, in implementing solutions.

More must be done to restore the natural infrastructure of wetlands that protected the Minnesota River from sedimentation. Because a TMDL is meant to be an integrative document, guiding the work of many actors, it would be appropriate to have a much greater emphasis on wetland restoration and other types of natural infrastructure in these TMDLs. There are partners who would assist in this work – one example is Natural Infrastructure for Business which makes the business case for expanding the use of restored hydrology rather than sedimentation basins.
https://www.naturalinfrastructureforbusiness.org/resources/

The MPCA agrees that wetlands have multiple benefits on the landscape, not the least of which is water retention. Wetland restoration is a strategy identified in the Watershed Restoration and Protection
Strategy (WRAPS) reports and we emphasize the multiple benefits of wetland restoration for water quality and habitat throughout the Minnesota River Basin.

As you indicated, the prairie/wetland complex that once dominated the landscape of the Minnesota River Basin has been significantly altered. Most wetlands have been effectively drained and work continues to improve the drainage network in response to cropping changes and increased precipitation. Wetland restoration is just one part of the strategy to manage drainage and increase water storage. Solutions will need to be economically feasible and provide landowner benefits to be adopted at the scale needed for watershed restoration.

The MPCA and other State agencies have worked with County and Soil and Water Conservation District staff through the WRAPS process to better understand what types of practices landowners are willing to try and what funding should be dedicated. Working with individual landowners to look at water and sediment issues on their properties allows local staff to get the concept of water storage out to the public and provide assistance on how to make that happen at the individual field scale. More work needs to be done to promote activities that work on the drainage system scale to delay the timing and reduce the volume of water leaving these systems.

While the TMDL reports give a general implementation strategy, the WRAPS reports go into more detail at the watershed scale as to the kinds of activities that are needed to reach water quality goals. I recommend reviewing the WRAPS reports for each of the watersheds in the Minnesota River Basin. The WRAPS reports can be found on our website at https://www.pca.state.mn.us/water/watersheds.

You might also be interested in some of the civic engagement and education work from the Watonwan River Watershed that aimed to increase the understanding of community concerns and water quality issues: https://watonwanriver.org/.

If changing or adding policies is needed then it is important to have the help of citizens like yourself to consider and discuss the changes needed. To do that we need to work together to find solutions that not only improve water quality but are acceptable and economically feasible to landowners. These are not easy conversations and will need to be brought to the agencies and the legislature to approve the funding that is needed.

We would welcome the opportunity to sit down with you to discuss your ideas on education and advocacy in order to find ways to benefit water quality while working within the agricultural community.

The MPCA will be submitting the revised TMDLs to the Environmental Protection Agency for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division
RE: Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments

Dear Brian Thalmann:

Thank you for your comments regarding the draft Minnesota River Basin Total Maximum Daily Load (TMDL) and Watershed Restoration and Protection Strategy (WRAPS) reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft reports and submit constructive comments. Your comments are restated below followed by responses from the MPCA.

Water Quality Research and Implementation Efforts Funded by Minnesota Corn Farmers

The MCR&PC in conjunction with the MCGA has invested nearly $6 million in third-party research focused on understanding nitrogen fertilizer management toward increased Nitrogen Use Efficiency (NUE), which reduces loss potential while maintaining crop performance. Much of this work contributed to the base of information upon which the Best Management Practices (BMPs) referenced in these reports are founded and available on our website.

The MCR&PC has also made a significant commitment to soil health through third-party research, on-farm research and education. MCR&PC has invested more than $1.1 million in third-party research evaluating cover crop establishment methods, seed mixes, water quality benefits and impacts on corn productivity. On-farm research on soil health is occurring through the Soil Health Partnership (SHP). The SHP is a farmer-led initiative fostering transformation in agriculture through improved soil health, benefiting both farmer profitability and the environment. Established in 2014 by the National Corn Growers Association, SHP has built a network of working farms to test, measure and share results of advanced farm management practices that will enhance sustainability and farm economics for generations to come. SHP collects long-term data on working farms in real growing conditions and mentors farmers. The MCR&PC has financially committed to the development and 5-year maintenance of four SHP sites in Minnesota. Finally, MCR&PC has invested in education efforts like the Conservation Tillage Conference hosted by the University of Minnesota since 2015.

MCGA has not only invested in BMP research, but has also focused on BMP implementation through education and training. In partnership with the University of Minnesota, the Nitrogen Smart program has educated 756 participants from 2016 to 2018, influencing BMP nitrogen applications on 423,695 reported acres. With not all farmers who participate in the program reporting, the University of Minnesota has estimated that statistically it has influenced nitrogen application on up to 632,380 acres. 2019 numbers have not reported, as training is ongoing through the year.
The Nitrogen Smart program was conceived by leadership at the MCGA and the Minnesota Agricultural Water Resource Center and developed into a program by University of Minnesota Extension. The program consists of a three-hour training on how nitrogen behaves in the environment and how these affect nitrogen fertilizer management, as well as environmental concerns. Through post meeting evaluations, three out of four meeting attendees report changing at least one practice to improve nitrogen use efficiency. Using survey data, we estimate that the annual reduction in applied nitrogen by attendees is 2.2 million pounds.

Artificial drainage is an essential tool for improving agricultural production by ensuring timely planting and field operations. MCR&PC has also made significant investments in research and education related to drainage. The drainage research has focused on both nutrient management practices and hydrologic impacts. MRC&PC has also supported a University of Minnesota Extension Specialist focusing on water quality, nutrient management and agricultural drainage education.

The MCGA Innovation Grant Program is now in its fifth year. The program was started with the premise that some of the greatest challenges facing corn farmers may have solutions that growers have already thought of or have had the insight to try. Innovations like these can be furthered through small grants to farmers to test the idea on a limited scale for workability and potential to help other farmers address identical challenges in their operations. Since 2016, the MCGA Innovation Grant Program has made an investment of $583,149 toward farmer-led innovations to reduce N (and P in 2019) loss to ground and surface water via improved agronomic practices.

Farmers have used the program to make drainage systems more environmentally responsible, fine-tune nitrogen fertilizer rates and host field days where area farmers get together and discuss potential new conservation practices. Examples projects funded in the first four years of the program include: state-of-the-art drip irrigation, allowing spoon-feeding of both water and nitrogen; new approaches to planting cover crops using air seeding; ideal timing of cover crop planting; evaluating variable-rate nitrogen programs; and measuring impacts of reduced verses traditional tillage. Priorities for the program in 2020 include: improved nutrient use efficiency; comparative tillage innovations (practices to reduce erosion, improve soil health and quality); and production practices that enhance water quality.

With corn prices below the cost of production and many farmers struggling to turn a profit, farmers can be hesitant to look outside the box and try something new. The MCGA Innovation Grant Program can help test novel approaches during challenging economic times and provides an example of what can be accomplished to improve water quality by deploying financial resources to on-the-ground projects and maximizing funds toward that purpose.

The MPCA applauds the efforts you have described. Maintaining agricultural production while finding innovative approaches to reduce the delivery of pollutants to the state’s waters is consistent with MPCA’s vision of a healthy Minnesota River Basin. The MPCA appreciates your efforts and the credibility your organization has with corn producers in Minnesota. The MPCA would welcome the opportunity to partner with your organization on research, outreach, and planning to further our common goals.
One of the principles of the MPCA reports is that much of the phosphorus leaving agricultural fields is applied from fertilizer and manure. Farmers have made significant investments in research to optimize nutrient management efficiency and are implementing those practices through investments in precision management equipment. The movement of phosphorus through a watershed involves a series of complex interactions of source and transport pathways that function over multiple time scales. These interactions need to be considered when trying to mitigate phosphorus losses from a watershed. For instance, legacy phosphorus attributed to internal loading with the system is important consideration for establishing attainable reduction goals.

The MPCA agrees movement of phosphorus through a watershed is complex, from particulate phosphorus attached to soil to legacy internal phosphorus in lakes to dissolved phosphorus mobilized in running water. Strategies identified in the WRAPS reports attempt to account for the different sources and pathways for phosphorus in the watersheds. Local planning efforts will focus on the strategies and locations for implementation based on specific watershed priorities.

Total suspended solids, like phosphorus, movement through a watershed is a result of complex interactions among precipitation, land use, topography, geology, and soil type. It’s a particularly complex issue in the Minnesota River Basin, which is geologically predisposed to move sediments through the watershed. Throughout the reports there is a premise that the higher stream flows are more attributed to drainage that the other factors including, most notably, precipitation. The well-established potential for subsurface drainage top reduce peak flows at the field scale does not support the argument that subsurface drainage worsens the flows and resulting sediment delivery more than precipitation at basin-scales. Strategies to reduce sediment delivery in the basin need to consider this rather than focusing on a single driver.

Poorly drained soils increase risks to agricultural production from excess water and elevated water tables. Artificial drainage mitigates these stresses to crops resulting in improved yields and less year-to-year yield variability. Many corn farmers would not have been able to plant a crop this spring in the absence of subsurface drainage. However in addition to improving crop productivity, artificial drainage provides an opportunity to employ many of the conservation practices referenced in the MPCA reports, including cover crops and minimum tillage. MCGA supports the concept of multipurpose drainage management as promoted by the Board of Water and Soil Resources (BWSR) and encourages MPCA to work with BWSR to expand the use of this program.

The MPCA agrees that sediment delivery to surface waters as well as increased flows that accelerate erosive activity in rivers is complex. The factors you have listed are all important to how water and sediment are delivered to surface waters. The MPCA agrees that precipitation through surface and subsurface pathways is the ultimate source of water to a watershed. Furthermore, the MPCA acknowledges precipitation has and continues to increase in the Minnesota River Basin. However, the delivery of that precipitation to surface waters has been accelerated through land use conversion (both rural and urban) and artificial drainage (both rural and urban). Discovery Farms data (see below) shows at a field scale that on average, annual total water runoff from a tiled field, exceeds runoff from a non-tiled field. The MPCA recognizes the importance of subsurface drainage to crop production, especially in a wetter climate. We hope that we can find ways to mitigate the effects of increased precipitation and increased drainage through working land practices, such as some of the options you listed and other water storage practices. It will be key for local resource professionals to work individually with producers to find the options that best fit their operations. MPCA believes finding areas of agreement and building partnerships with organizations such as MCGA will be critical to achieving the ultimate goal of restored water.
Most of the assessment and underlying analysis work conducted for the TMDL and WRAPs reports are based on monitoring that was completed in 2015. Since that time new policies, programs and research investments have been put into place that will help to meet restoration and protection strategies outlined in the reports. As these efforts ramp up implementation, we anticipate there will be measured progress towards water quality improvements in the basin. We urge MPCA to give these efforts time to work before imposing new restrictions on farmers, but instead target funding towards cost-share and increased practice adoption through incentives. As a part of our comments, MCGA would like to highlight a few efforts that will assist with implementation efforts in the MRB.

The MPCA agrees many new policies and programs are in place since the watersheds in question have been monitored. Some, but not all, of the programs and policies you have highlighted are identified in the reasonable assurance sections of the TMDL documents. The reasonable assurance sections of the TMDLs will be updated to include pertinent information you have provided (groundwater protection rule, AGREETT, Drainage System Repair Cost Apportionment Option). The MPCA recognizes improvements will not happen overnight and the programs and policies should be given time to be fully implemented. Different temporal and spatial scales of monitoring are still in place that will allow us to detect trends over time to see the impact of conservation efforts on the landscape. This is key to an adaptive management approach that will allow resource professionals to modify strategies as new information becomes available.

In order to further bolster our efforts and the implementation of other organizations or partners in the MRB, MCGA strongly encourages the MPCA to develop and implement a more intentional strategy of directing Clean Water Funds towards practice and project implementation. To date a significant portion of the constitutionally dedicated funds have been used to measure, monitor and assess water quality in Minnesota. A strategic shift is needed from monitoring, modeling, tool development and research to a majority of funded projects to practice and project implementation in key areas such as agriculture, storm water management and wastewater treatment. More dollars need to be directed to local partners, including municipalities and farmers. All have a role to play in addressing water quality issues across the MRB. Especially at a time of difficult financial stress for many farmers across our state, cost-share dollars for practice implementation can help progress continue and not depend on individual farmers to shoulder the costs.
As expressed, significant time, effort, and money has been spent studying the watersheds of Minnesota. WRAPS and TMDLs are intended to qualify and quantify pollution sources in our rivers and lakes, which is essential so practices can be prioritized and targeted to maximize efficiencies in improving and protecting Minnesota’s waters. Since the inception of the Clean Water Fund in July of 2009, 81% of the funds have been spent on implementation practices across the state. In the figure below from the 2018 Clean Water Fund Performance Report you can see the amounts spent on different activities.

The MPCA understands the needs to fund implementation practices and has been making efforts to reduce cost for WRAPS and TMDL development and shift more funding to implementation. For instance, the MPCA has reduced the money spent on WRAPS and TMDL development from a high of $21.9 million (of the $34.86 million in the graph above) in FY 12-13 to $19.047 million in FY 18-19. Funding for WRAPS and TMDL development has decreased even further in FY 20-21. While there will always be a need for monitoring, assessment, research, and WRAPS/TMDL development to ensure we are making progress toward our water quality goals, the trend is that more of the Clean Water Fund will be spent on implementation.

The Clean Water Fund is only one part of the funding for implementation. Since 2004 over $3.3 billion dollars have been spent for water quality implementation in Minnesota. Non-point implementation accounts for 92% of the spending. Below is a breakdown of the spending. For additional information on how this is broken down across all the watersheds in Minnesota, please see the MPCA’s Healthier Watersheds webpage (https://www.pca.state.mn.us/water/healthier-watersheds).
Further, MPCA and other partners should examine economic modeling to predict increased farmland or farm operation values under practices that promote soil health, conservation tillage and cover cropping systems. Having this economic data can also demonstrate to farmers the direct benefit to their operation from practice implementation and could help to accelerate adoption in the MRB.

The MPCA agrees this type of analysis would be valuable. As with many tools that are available, credibility of the messenger in the eye of crop producers would be very important for its acceptance. This speaks to the need for strong partnerships between the State and organizations such as MCGA to ensure the information would be fairly considered by its intended audience.

The MPCA will be finalizing the WRAPS reports and submitting the revised TMDLs to Environmental Protection Agency for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division
January 6, 2020

Amanda Strommer
Minnesota Department of Health
1400 E Lyon St
Marshall, MN 56258-1268
amanda.strommer@state.mn.us

Re: Response to Comments on the Draft Minnesota River-Mankato Watershed and Watonwan River Watershed Restoration and Protection Strategies Reports

Dear Amanda Strommer:

Thank you for your review of the draft Minnesota River-Mankato Watershed and Watonwan River Watershed Restoration and Protection Strategies (WRAPS) reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft WRAPS reports.

We look forward to working with you on future WRAPS reports and the Department of Health’s Groundwater Restoration and Protection Strategies (GRAPS) work. Please feel free to contact us with any questions or comments.

The MPCA will be updating the WRAPS documents based on comments received and will submit the reports for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
January 6, 2020

Greg Mikkelson
21575 515th Ave
Lake Crystal, MN 56055
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RE: Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments

Dear Greg Mikkelson:

Thank you for your comments regarding the draft Minnesota River and Greater Blue Earth River Basin Total Suspended Solids Total Maximum Daily Load Study (TMDL), Lower Minnesota River Watershed TMDL and Watershed Restoration and Protection Strategies (WRAPS), Minnesota River-Mankato Watershed TMDL and WRAPS and Watonwan River Watershed TMDL and WRAPS reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft TMDL and WRAPS reports and submit comments.

TMDLs are a federally required component of the Clean Water Act administered by the Environmental Protection Agency (EPA). TMDL reports define the maximum amount of pollution that can enter a water body on a daily basis without violating State water quality standards. These TMDLs use observed water chemistry, observed flow, modeled flow (when observed flow data sets are inadequate), and widely accepted tools (BATHTUB model for lakes; duration curves for streams) to estimate pollutant load capacities. TMDLs also provide a summary of general watershed information and potential implementation activities to address reasonable assurance requirements (activities will lead to achieving water quality standards). Information or research related to water quality standards can be submitted through the Triennial Standards Review process (https://www.pca.state.mn.us/water/2017-triennial-standards-review).

WRAPS reports use TMDL information, biological data, stressor identification findings, model output, Discovery Farms (https://discoveryfarmsmn.org/) data, and other relevant watershed information to summarize impairments, pollutant sources, water quality goals, and restoration and protection strategies. The MPCA and other State agencies work closely with local conservation professionals to identify strategies to improve water quality based on studied best management practices (BMPs) efficiencies, model scenarios, and by considering the host of social constraints. In general, WRAPS reports pull together as many lines of scientific evidence as possible to ensure reasonable strategies. Each iteration of a WRAPS report provides an opportunity to update information and adapt strategies.

Response to your comments (in bold italics) are as follows:

All these TMDL’s and WRAPS need to be redone using peer reviewed research by Dr. Satish Gupta and Drew Kessler, to name a few. Presently MPCA is using flawed science and non-peer reviewed research, which then produces wrong conclusions.
The scientific process necessitates multiple perspectives and analyses. Scientific findings are often the result of conflicting theories that are tested time and time again, sometimes with varying results. In this way, the critical eye of the scientific community and the robust body of work created around a topic help the scientific understanding of the topic evolve. This being said, we appreciate the critical and often contradictory analyses Dr. Gupta offers. While we do not necessarily agree with some of his findings and interpretations, we appreciate that the challenges he puts forth ultimately help the collective scientific understanding on these topics and further checks assumptions.

Dr. Gupta also submitted comments on the draft TMDL and WRAPS reports. The MPCA’s responses to those comments will be posted on our webpage at Minnesota River Basin | Minnesota Pollution Control Agency. The MPCA recommends you review the responses to Dr. Gupta’s comments for additional information.

Riverbanks are a major source of sediment in the Minnesota River and have remained stable since European settlement

The MPCA agrees near channel sources such as stream banks, bluffs, and ravines represent a significant source of sediment in the Minnesota River Basin. For example, The Le Sueur River Watershed Sediment Budget (Gran) estimated that 40% of the sediment came from bluff collapse; 28% of the sediment came from upland field erosion; 22% came from channel widening (bed and bank), and 10% came from ravine incision.

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However, geomorphology work completed by the Minnesota Department of Natural Resources (DNR) along with a body of work on erosion processes in the Minnesota River Basin clearly shows that bank erosion and sediment supply have greatly increased since European settlement. The DNR’s geomorphic, cross-section analysis shows that few areas in the Minnesota River Basin are considered stable (stable being defined as “a river’s ability, in the present climate, to transport the flows and sediment of its watershed, over time, in such a manner that the channel maintains its dimension, pattern, and profile without either aggrading or degrading” (Rosgen 1996, 2001a, 2006)). An accelerated rate of streambank erosion has been found in nearly all studied streams in the basin.
For example, recent DNR geomorphic work shows substantial erosion rates in the Watonwan River Watershed (https://www.pca.state.mn.us/sites/default/files/wq-ws3-07020010d.pdf). Predicted erosion rates take into account bank height, surface protection (cover present and root density), degree of incision (bankfull height vs. bank height), bank angle, bank materials, and near-bank stress (e.g. how tight is the bend, is the thalweg/deepest part of the channel against the eroding bank). A bank survey of Judicial Ditch 1 (JD1) predicted 0.42 feet of erosion per year, but the actual measured bank erosion from 2012-2013 was 1.526 feet per year, a substantial annual change for the six foot high bank. A study bank within the North Fork Watonwan River predicted an erosion rate of 0.25 feet per year, but the actual measured bank erosion from 2012-2013 was 0.67 feet per year (see cross section information below).
While streambank erosion is a natural process, acceleration of this natural process due to changes in climate, land use, and hydrology lead to a disproportionate sediment supply, stream channel instability, and a loss of land, aquatic habitat and other adverse effects (Rosgen 2006).

**MPCA is ignoring new research and not recognizing increased rainfall as part of the problem.**

The MPCA agrees precipitation across the Minnesota River Basin has increased. While this certainly impacts erosion rates, it is not the only factor. Land use and land use change play a major role in how precipitation is routed and affects erosion from upland, streambanks, bluffs and ravines. The rate, timing and delivery of precipitation also contribute to the potential for fluvial erosion processes to occur. The rate and sources of erosion will continue to change as we develop and alter land use practices through city infrastructure projects, agricultural practices, and drainage system maintenance and improvement.

_The current strategy and MPCA’s suggested management practices could make water quality worse as research from universities show, especially on buffers. The buffers issue needs to be looked at regarding water quality impact and measured for their effects especially on dissolved phosphorus._

The Natural Resources Conservation Service (NRCS) guidance states “Conservation buffers slow water runoff, trap sediment, and enhance infiltration within the buffer. Buffers also trap fertilizer, pesticides, pathogens and heavy metals... If properly installed and maintained, they have the capacity to: remove up to 50% or more of the nutrients and pesticides; remove up to 60% or more of certain pathogens; remove up to 75% or more of sediment.” The MPCA recognizes that for buffers to be effective they must be properly installed and more importantly maintained or there is potential, under certain circumstances, to contribute dissolved phosphorus. Even with this concern, the MPCA believes buffers are good conservation practices as they provide for multiple benefits as described by NRCS. However, the MPCA recognizes that buffers are not a cure-all and additional conservation practices might be needed to address all pollutants associated with surface runoff.

_Natural background loads need to be addressed in all these reports. Meaning what would sediment levels be without people and farmers. In other words, what levels are naturally occurring and not preventable and recognizing that number or less can’t be the goal._

Both Minn. R. 7050 and the Clean Water Legacy Act have very specific definitions for natural background. In a general sense, natural background sources are inputs that would be expected under natural, undisturbed conditions. Natural background sources can include inputs from natural geologic processes such as soil loss from stream development and upland erosion of areas not disturbed by human activity; atmospheric deposition; wildlife; and loading from grassland, forests, and other natural land covers.

The evaluation of natural background occurs during several steps of the TMDL process. First, the TSS standard inherently addresses natural background conditions. Minnesota’s regional TSS standards are based on reference or least-impacted streams and take into account differing levels of sediment present in streams and rivers in the many ecoregions across the state, depending on factors such as topography, soils, and climate. This process recognizes differences in streams across Minnesota and allows for different TSS standards for streams in different parts of the state, such as 65 mg/L for the Minnesota River or 10 mg/L for the St. Croix River. This process was rigorously reviewed and ultimately approved by the EPA.
During source assessment for the TMDLs, multiple lines of evidence were used to evaluate natural background. One such study for sediment is the Engstrom et al (2009) study on Lake Pepin sediment. Engstrom found that sediment loads have increased about one order of magnitude beyond natural background levels since pre-settlement times. The MPCA uses the year 1830 as a reference point for measuring the beginning of human effects on sediment loads. While the MPCA did not develop an explicit natural background level for each impaired stream reach, based on the MPCA’s water body assessment process and the TMDL source assessment exercises, there is no evidence at this time to suggest that natural background sources are a major driver of the water body impairments and/or affect their ability to meet state water quality standards.

**MPCA should also learn from their mistakes and not repeat them, such as their plan for a 40 percent reduction in non-point source pollution 20 years ago. Much of this same information was used then and now and should prove that this information was wrong since the goals weren’t achieved.**

Not achieving a reduction goal primarily through voluntary adoption of conservation practices, does not prove the underlying science is wrong. It does suggest a different approach is needed for implementing BMPs. The practices that were implemented during the past 20 years have had positive results in many areas even when coupled with a changing landscape and increased precipitation. With the increased knowledge gained through the WRAPS process, local conservation partners are better able to prioritize and target their efforts to address water quality issues.

Overall, the reductions needed 20 years ago are similar to the reductions still needed today. However, the state of Minnesota is approaching implementation in a different manner. The state now uses a Watershed Approach and addresses issues in a holistic manner, engages local citizens to better understand the barriers to voluntary implementation of conservation practices, and more importantly, with the passing of the Clean Water Legacy Amendment, provides significantly more funding to address the issues.

The MPCA will be finalizing the WRAPS reports and submitting revised TMDLs to EPA for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
Nicklas,

Please see my replies to your questions below. If you have any other questions or comments on the WRAPS and/or TMDLs feel free to submit them by September 20. Thanks.

Hi Scott
I had left a message earlier today regarding the MN River draft TMDLs. I think I have answered my own questions, but I'll go over what I think I know.

There are four Public Notices questing comments on draft WRAPS and TMDLs for the MN River Basin by Sept 20, 2019.

PNs
-Mn River Mankato
-Mn River, and Blue Earth, LeSueur, and Watonwan rivers
-Watonwan River, and
-Lower Mn River

The corresponding draft TMDLs
-Draft Mn River Mankato Watershed TMDL study. Includes various streams, applies to TSS, E. coli, Phosphorus and Nitrate. The study does not identify MnDOT as an MS4 discharging to these streams, and therefore no WLA. Correct. Page 29 of the TMDL says, "The Phase II General NPDES/State Disposal System (SDS) Municipal Stormwater Permit for MS4 communities has been issued to several cities, townships, and counties in the watershed. Whereas the MnDOT Outstate District is a permitted MS4, there are no roads or rights-of-way regulated through their permit in the TMDL watersheds."

-Draft Mn River and Greater Blue Earth Basin TSS TMDL study. TSS only and IDs MnDOT as an MS4. No reductions are required by MS4s, as TSS language in the MS4 permit is protective. Correct. MS4s were assigned a load based on the same export coefficient as was used in the South Metro Miss TSS TMDL. TSS loading does not need to be reduced, but it is not permitted to increase. Requirements of the MS4 permit should be followed.

-Watonwan River Watershed TMDL study. Covers E. Coli and Phosphorus. MnDOT is not identified as an MS4, therefore no WLA. Correct. No MS4 areas are located in the Watonwan impaired watersheds.

- Lower Mn River TMDLs. Divided into 3 Parts. Covers numerous streams and lakes for various parameters. Does not apply within the Mankato Urbanized Area, so would not apply to MnDOT Outstate MS4, therefore no MnDOT MS4 Outstate WLA. Correct. There are no MnDOT Outstate MS4 areas in the impaired watersheds for these TMDLs. Parts appear to apply to MnDOT Metro MS4 and draft WLAs are listed. Correct.
January 6, 2020

Brad Hovel
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jsmentek@mnsoybean.com

RE: Response to Minnesota River Basin Total Maximum Daily Load and Watershed Restoration and Protection Strategy Reports Comments

Dear Brad Hovel:

Thank you for your comments regarding the draft Minnesota River and Greater Blue Earth River Basin Total Suspended Solids Total Maximum Daily Load Study (TMDL), Lower Minnesota River Watershed TMDL and Watershed Restoration and Protection Strategies (WRAPS), Minnesota River-Mankato Watershed TMDL and WRAPS and Watonwan River Watershed TMDL and WRAPS reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft TMDL and WRAPS reports and submit comments. Your comments have been restated below in bold italics followed by MPCA’s responses.

The Minnesota Soybean Growers Association (MSGA) appreciates the opportunity to provide comments on the recently released reports dealing with water quality in the Minnesota River and tributaries. The Minnesota River Basin (MRB) is a critical link in the inland waterways for the delivery of commodities to the Mississippi and eventually, the Gulf of Mexico.

MSGA believes the key point for MPCA to remember in all of the reports is that no farmer in the state wants to lose sediment or nutrients to the waters of Minnesota. These are extremely valuable resources to Minnesota’s farmers. MSGA believes the reports do not consider all of the available science on the ecosystem and climate dynamics involved in the Minnesota River and its tributaries. This is highlighted by the comments of Dr. Satish Gupta. Dr. Gupta has spent years examining the movement of nutrients and sediment in the Minnesota River Valley. Dr. Gupta’s comments highlight the research and science that was ignored in the creation of these reports. We request the reports be rewritten to reflect all of the relevant scientific research, and not simply cherry-picked science.

MSGA strongly disagrees with any characterization in any of the four reports that farmers are not concerned with nutrient and manure management. The reports severely underestimate the extent to which Minnesota soybean farmers are engaged in extremely extensive and precise nutrient and manure management. Minnesota’s farmers have used federal and state programs, along with their own dollars, to invest in conservation practices, equipment and technology that limit the amount of nutrients and manure they use on their farms. All of these also limit the amount of both soil and nutrient loss to the state’s waters, while allowing Minnesota’s farmers to produce more and more on every acre. In turn, this creates robust export numbers, ultimately helping Minnesota’s economy and slowing the devastation of rainforest and other habitat that exacerbates climate change.
Today’s Minnesota soybean farmers face the effects of unprecedented amounts of moisture coming in larger singular rain events. These events, along with the changing climate, alter how traditional conservation practices work on farms and influence what new practices may be needed. The MRB reports ignore established research as to how tile drainage improves soil health and leads to greater water holding soil capacity. MSGA urges the MPCA to look with unbiased consideration at Dr. Gupta’s work and the research outlined in his comments on the MRB, in order to create plans that accurately represent real climate and ecosystem dynamics. This inclusion will lead to better results for Minnesota’s residents and waters.

Please review “Comments on the MPCA Total Maximum Daily Loads and Sediment Reduction Strategy Reports for the Minnesota River, the Greater Blue Earth River and other Tributaries” submitted by Satish Gupta and incorporate his work into your plans for the Minnesota River.

The MPCA agrees with your key point that no farmer wants to intentionally lose soil and nutrients. Losses of either soil or nutrients affect a farmer’s short and long-term productivity and economic viability while also potentially negatively impacting the water resources of the State of Minnesota.

Many of your comments reference the work of Dr. Satish Gupta. Dr. Gupta also provided comments on the public noticed reports. Please see the MPCA’s response to Dr. Gupta’s comments at Minnesota River Basin | Minnesota Pollution Control Agency for more information. Dr. Gupta provides a valuable perspective on the causes of impairments in the Minnesota River Basin. However, there is a broad base of scientific study and field observations that contradict many of his conclusions. The scientific process necessitates multiple perspectives and analyses and while we do not necessarily agree with many of Dr. Gupta’s interpretations, we do utilize his findings to check assumptions and dig deeper to understand more about pollution sources in the Minnesota River Basin. It is also worth noting that Dr. Gupta did not question any of the actual allocations calculated to achieve the water quality standards for any of the TMDLs in question.

It is not the MPCA’s intent to imply farmers are not concerned with nutrient and manure management. Please let me know if you have specific examples in the text of the reports that indicate otherwise. The reports do emphasize the importance of keeping manure and nutrients in the field where they can be utilized by the crop being produced. The MPCA applauds the efforts of farmers that you have described. Maintaining agricultural production while finding innovative approaches to reduce the delivery of pollutants to the state’s waters is consistent with MPCA’s vision of a healthy Minnesota River Basin. The MPCA appreciates your efforts and the credibility your organization has with soybean producers in Minnesota. The MPCA would welcome the opportunity to partner with your organization on research, outreach and planning to further our common goals.

Significant time and effort has been spent studying the watersheds in the Minnesota River Basin. WRAPS and TMDLs are intended to qualify and quantify pollution source in our rivers and lakes. They are also intended to assist local resource professionals in their prioritizing and targeting of implementation activities by informing the One Watershed, One Plan (1W1P) process. We would welcome your input and participation in working with County and Soil and Water Conservation District (SWCD) staff to develop relationships with landowners in order to provide more opportunities for communication on conservation efforts.
The MPCA acknowledges precipitation has and continues to increase in the Minnesota River Basin. However, the delivery of that precipitation to surface waters has been accelerated through land use conversion (both rural and urban) and artificial drainage (both rural and urban). Discovery Farms data (see below) shows at a field scale that on average, annual total water runoff from a tiled field, exceeds runoff from a non-tiled field.

Drained soils can be healthy or unhealthy depending on factors such as cover and living roots (cover crops), disturbance (tillage and chemicals), and diversity (crop rotation). Drainage removes water to make space for air, which is good for crops, but it is not a critical component of soil health nor does it inherently support soil health.

Soil health as defined by the NRCS is “the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans.” The MPCA relies heavily on other entities such as NRCS and the Minnesota Soil Health Coalition to provide information on soil health. Neither entity describes the need for tile drainage to improve soil health. NRCS describes four key principals: keep soil covered as much as possible; disturb the soil as little as possible; keep plants growing throughout the year; and diversify as much as possible. The Minnesota Soil Health Coalition details ways to improve infiltration “The quickest way to improve soil infiltration is to try and mimic the historical landscape conditions; soil covered the entire growing season with green diverse cover, large and small ruminant mammals roaming the landscape, and little to no soil disturbance. Sounds impossible in production agriculture to mimic mother nature, but it can easily be achieved by applying reduced tillage practices like no-till/strip-till, diverse cover crop rotation, designated field roads to controlling traffic on crop fields and use multi species cover crops, just to name a few.”
In regards to water storage, The University of Minnesota publication Fields to Streams describes the effect of tile drainage best—“The actual impact of adding to an existing subsurface drainage system is complex and varies widely”. Under a limited number of conditions tile drainage can aid in creating the “sponge effect” of soil. However, even in these limited cases the effect is short lived and overall, based on the studies cited in the reports and data from Discovery Farms, indicate that drain tile leads to more precipitation ending up as runoff in the stream and not stored on the landscape.

The MPCA recognizes the importance of subsurface drainage to crop production, especially in a wetter climate. We hope that we can find ways to mitigate the effects of increased precipitation and increased drainage through working land practices, such as soil health, reduced tillage, and other water storage practices. It will be key for local resource professionals to work individually with producers to find the options that best fit their operations. The MPCA believes finding areas of agreement and building partnerships with organizations such as the Minnesota Soybean Growers Association will be critical to achieving the ultimate goal of restored water.

We would appreciate the opportunity to meet with you to discuss our process and the information collected and utilized in the creation of TMDL and WRAPS reports. While most of our emphasis has been working with Counties and SWCDs, your input and contacts with your producers could help MPCA better understand how to improve programs and services that would help producers try conservation practices on their lands.

The MPCA will be finalizing the WRAPS reports and submitting revised TMDLs to Environmental Protection Agency (EPA) for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
Dear Richard Runck:

Thank you for your comments regarding the draft Lower Minnesota River Watershed Restoration and Protection Strategies (WRAPS) and the Minnesota River-Mankato Watershed TMDL reports. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft TMDL and WRAPS reports and submit comments. Your comments are restated below followed by responses from the MPCA.

For Minnesota’s River Restoration Inquiry Studied

Reference is to Ball an Heydan’s Survey, establishing Brown an Nicollet Section Lines of Minnesota during the Fall of 1854.
Nicollet County where Little Rock River enters the Valley of the Minnesota River, shown on their 1854 Survey Map is a “pencil pointed dam” crossing a supposed Little Rock River Stream Bed. This description of a “pencil pointed dam” provided by the 1854 Survey could also be due to a dry climate period and/or being an intermittent stream bed.
This type of dam was of interest to me since it provided evidence of how small terraces in the ravines leading to the Minnesota River, as possibly how they were created by the damming of water to allow water born suspended sediment to fall out creating these ravine terraces from sediment fall out. Due to recent years of increased water drainage flows down these ravines their prehistory established sediment terraces are being now water-carted into the Minnesota River.
During early 1900’s, Low Head Dams were constructed in different water stream bed areas associated with the Minnesota River Valley.
Was told, by “Old Timers” some seventy or more years ago one of the reasons for their construction was to entrap water born sediment. These “Old Timers” were pendent on the Minnesota River using their knowledge of fishing, turtle traps, spearing, netting, clam shell collecting, dark houses, wild vine grape collecting an were not intimidated in expressing their observation about Minnesota’s River water clarity as deteriorating. At times, these rugged individuals, were teemed “unscientific River Rat’s”.
Perhaps, review of low head dams construction should be considered again. How many million yards of water born sediments are held behind the constructed Rapid Dam.
Placing sluice water ways along ravine terraces might stabilize these prehistory created sediment terraces with accumulated data.
Your study of historical documents and observations of the river environment is similar to the work done within the watersheds to understand how sediment is delivered and transported in the Minnesota River Basin. The MPCA agrees with the observations you referenced that the Minnesota River’s water clarity has deteriorated over time. The MPCA has also documented increases in nutrients and a decreased diversity of the fish and overall aquatic community. Trend analysis indicates sediment concentration in the Minnesota River has been decreasing, so conservation efforts are making a difference. However, the the overall sediment quantity in the river has been increasing due to higher flow volumes.

Streams and rivers carry sediment and create the terraces you discuss as part of a natural erosion process. However, many streams and rivers in the Minnesota River Basin are experiencing greatly increased flows and sediment loads as compared to the early 1900s. Increased precipitation is a significant factor in this, but so is land use change and increased artificial drainage. While low head dams were used in the past to create impoundment areas for municipal and industrial uses, the current flow and sediment loads would fill in quickly and require a great deal of maintenance to remove sediment to function as a sediment trap. Like the Rapidan Dam, the trap only works if you continue to remove sediment. Low head dams also affect fish movement for spawning and habitat, which we have seen as an issue in several of the watersheds. This leads to more tolerant fish like carp and bullheads taking over as dominant species that can survive in the degraded conditions.

The MPCA agrees it is important to store water and sediment so it can be metered out more slowly to surface waters. Many of the strategies identified in the WRAPS document focus on conservation practices that retain water and sediment at their sources to reduce the amount that makes it to the stream. In the field that includes water and sediment control basins and in town it includes storm water retention ponds. There are many other implementation actions that can be done across the Minnesota River Basin to help reduce the amount of water and soil delivered to the rivers.

Once again, thank you for your comments and observations. Your local knowledge and observations are important for resource professionals to gain a better understanding of the issues facing our rivers and have conversations about how to make improvements. Please feel free to contact me if you have more questions or would like to discuss our work.

The MPCA will be finalizing the WRAPS report and submitting the revised TMDL to EPA for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

This document has been electronically signed.

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

SM:jdf
January 6, 2020

Steven Sodeman
42050 737th Ave
St. James, MN 56081
ssodeman@mvtwireless.com

RE: Response to Comments on the Total Maximum Daily Loads and Watershed Restoration and Protection Strategy Reports

Dear Steven Sodeman:

Thank you for your comments regarding the draft Minnesota River and Greater Blue Earth River Basin Total Suspended Solids Total Maximum Daily Load (TMDL) study, the Watonwan River Watershed Restoration and Protection Strategy (WRAPS) and TMDL, the Minnesota River – Mankato WRAPS and TMDL, and the Lower Minnesota River WRAPS and TMDL. The Minnesota Pollution Control Agency (MPCA) appreciates that you took the time to review the draft TMDL report and submit comments. Your comments have been restated below in bold italics followed by the MPCA’s response.

Scott, you know this is far too broad and general to be specific. How can anyone object to your data? You have spent billions collecting it. But many can object to your agenda. Your agenda seems to be to shut down all of agriculture, which gives MCPA no credibility.

While it is difficult to estimate the amount of money spent on data collection in the Minnesota River Basin, about $116 million has been spent on monitoring statewide out of a total of $958 million Clean Water Fund dollars spent (12%) between fiscal years 2010 through 2019. The data collected during monitoring is critical to develop prioritized and targeted actions so that future funds are spent wisely correcting the water quality issues in Minnesota. The TMDLs and WRAPS reports make no reference to new regulation of agriculture. The TMDLs quantify pollution reductions that are needed to bring surface waters into compliance with state water quality standards. While this can have financial and/or regulatory implications for point sources, the strategies for reducing non-point sources of pollution, as identified in the WRAPS documents, rely largely on the voluntary adoption of conservation practices.

As I have told you and others on your team, "Stop the Monitoring" and "Start Implementing". MCPA has bled us dry with data and sucked up the implementation funds, speaking as a Watonwan SWCD Supervisor. All that precious money in the Clean Water Legacy Amendment has not found its way into Watonwan County in 10 years. Please retire so those of at the local level can finally get money to do something! You are no longer needed. These comments are intended for the entire river system.

As expressed, significant time, effort, and money has been spent studying the watersheds of Minnesota. The WRAPS and TMDLs are intended to qualify and quantify pollution sources in our rivers and lakes, which is essential so practices can be prioritized and targeted to maximize efficiencies in improving and protecting Minnesota’s waters. Since the inception of the Clean Water Fund in July of 2009, 81% of the funds have been spent on implementation practices across the state. In the figure below from the 2018 Clean Water Fund Performance Report, you can see the amounts spent on different activities.
The MPCA understands the need to fund implementation practices and has been making efforts to reduce cost for WRAPS and TMDL development and shift more funding to implementation. For instance, the MPCA has reduced the money spent on WRAPS and TMDL development from a high of $21.9 million (of the $34.86 million in the graph above) in FY 12-13 to $19.047 million in FY 18-19. Funding for WRAPS and TMDL development has decreased even further in FY 20-21. While there will always be a need for monitoring, assessment, research, and WRAPS/TMDL development to ensure we are making progress toward our water quality goals, more of the Clean Water Fund will be spent on implementation.

More specifically, the graphics on the next page illustrate the dollars spent toward reducing surface water pollution in the Watonwan River Watershed since 2004. These dollars include federal, state, local and private monies spent in the watershed. This does not account for money that landowners have spent on their own (without program assistance). Upon completion of the Watonwan River Watershed One Watershed, One Plan, which relies on information provided by the Watonwan TMDL and WRAPS, the Watonwan River Watershed will be eligible for hundreds of thousands of additional dollars to apply toward conservation and water quality. For additional information on the Watonwan River Watershed and other watersheds in Minnesota, please see the MPCA’s Healthier Watersheds webpage (https://www.pca.state.mn.us/water/healthier-watersheds).
The MPCA will be finalizing the WRAPS reports and submitting the TMDLs to the Environmental Protection Agency for final approval. If you have any further questions, please contact me at 507-344-5250.

Sincerely,

Scott MacLean
Supervisor
Southwest Watershed Unit
Watershed Division

This document has been electronically signed.

SM:jdf