Pomme de Terre River

Turbidity Total Maximum Daily Load Implementation Plan

Submitted by

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On behalf of:

Pomme de Terre Stakeholders
Pomme de Terre River Assn. Joint Powers Board
Pomme de Terre River Assn. JPB Technical Advisory Committee

June 2011

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Acronyms

AU:	Animal Units
BMP:	Best Management Practice
BWSR:	Minnesota Board of Water and Soil Resources
CAFO:	Confined Animal Feeding Operation
CCRP:	Continuous Conservation Reserve Program
cf/L:	Cubic Feet per Liter
cfs:	Cubic Feet per Second
CREP:	Conservation Reserve Enhancement Program
CRP:	Conservation Reserve Program
CWA:	Clean Water Act
DNR:	Minnesota Department of Natural Resources
EQUIP:	Environmental Quality Incentive Program
FNMU:	Formazin Nephelometric Multibeam Units
HUC:	Hydrologic Unit Code
JPB:	Pomme de Terre River Association Joint Powers Board
LA:	Load Allocation
LWMP:	Local Water Management Plan
mg/L:	Milligram per Liter
mg/ton:	Milligram per Ton
MN:	Minnesota
MOS:	Margin of Safety
MPCA:	Minnesota Pollution Control Agency
MS4:	Municipal Separate Storm Sewer System
NPDES:	National Pollutant Discharge Elimination System
NRCS:	Natural Resources Conservation Services
NTRU:	Nephelometric Turbidity Ratio Units
NTU:	Nephelometric Turbidity Units
PdT:	Pomme de Terre River
RC:	Reserve Capacity
RIM:	Reinvest in MN conservation easement program
SWCD:	Soil and Water Conservation District
SWPPP:	Storm Water Pollution Prevention Plan
TAC:	Technical Advisory Committee
TDLC:	Total Daily Loading Capacity
TMDL:	Total Maximum Daily Load
TSS:	Total Suspended Solids
US EPA:	United States Environmental Protection Agency
USGS:	United States Geological Survey
WLA:	Waste Load Allocation
WRP:	Wetlands Reserve Program
WWTF:	Wastewater Treatment Facilities

1.0 Implementation Plan Executive Summary

In 2008, the Pomme de Terre River Association received funding to complete a Total Maximum Daily Load (TMDL) Assessment for a turbidity-impaired reach of the Pomme de Terre River. The United States Environmental Protection Agency (U.S. EPA) approved the TMDL assessment on September 21, 2011 Section 2 of this report summarizes the finding of the TMDL assessment; the full report can be found online at www.pca.state.mn.us.

This TMDL implementation plan is the result of input from local stakeholders, the Pomme de Terre River Association Joint Powers Board (JPB) made up of elected county commissioners and Soil and Water Conservation District Supervisors from Otter Tail, Douglas, Grant, Stevens, Swift, and Big Stone counties, and a Technical Advisory Committee (TAC) consisting of appointed staff from local Soil and Water Conservation Districts (SWCD), Local Water Plan Managers, Local Planning and Zoning Administrators, Department of Natural Resources, Minnesota Pollution Control Agency, Minnesota Board of Water and Soil Resources, USDA Natural Resource and Conservation Service (NRCS), and the Farm Service Agency (FSA).

The turbidity impaired reach of the Pomme de Terre River is the last reach of the river before it enters the Minnesota River at Marsh Lake. Since it is the mouth of the river, the entire watershed contributes to its impairment and therefore a watershed wide approach will be utilized in conjunction with a new major watershed project approved by the Joint Powers Board on April 15, 2011 to analyze and target areas. These plans should work in parallel to achieve the greatest results as well as increase the usefulness of both in seeking future funding opportunities.

A 24 member stakeholder committee was formed from stakeholder organizations and volunteers that were solicited at public meetings or recommended to the project by local natural resource professionals. The stakeholder committee met three times during the winter of 2010 to determine the best practices to correct the impairments of the Pomme de Terre River. Appendix A contains all the information regarding the stakeholder process. The first meeting was held on Jan. 12, 2010, the 2nd meeting was held on March 2, 2010, and the third meeting was held on April 8, 2010. The implementation plan process at this point was halted due to a petition for a contested case hearing against the TMDL Report. Several meetings were held between the MPCA and the petitioners to resolve the report issues, and a mutual agreement finally came in December of 2010. The final meeting with stakeholders took place on May 17, 2011.

Sections 4 and 5 of this plan discuss the potential implementation strategies that are available for reducing turbidity and section 6 is the direct result of the priority ranking and discussion of action items. Section 7 is the plan objectives and budget. Section 8 lays out a 10 year timeline for the project. Probability of successfully completing the action items in the plan will depend on funding. The success of this plan will also rely on the adaptability of this plan as outlined in section 9.

2.0 TMDL Report Summary

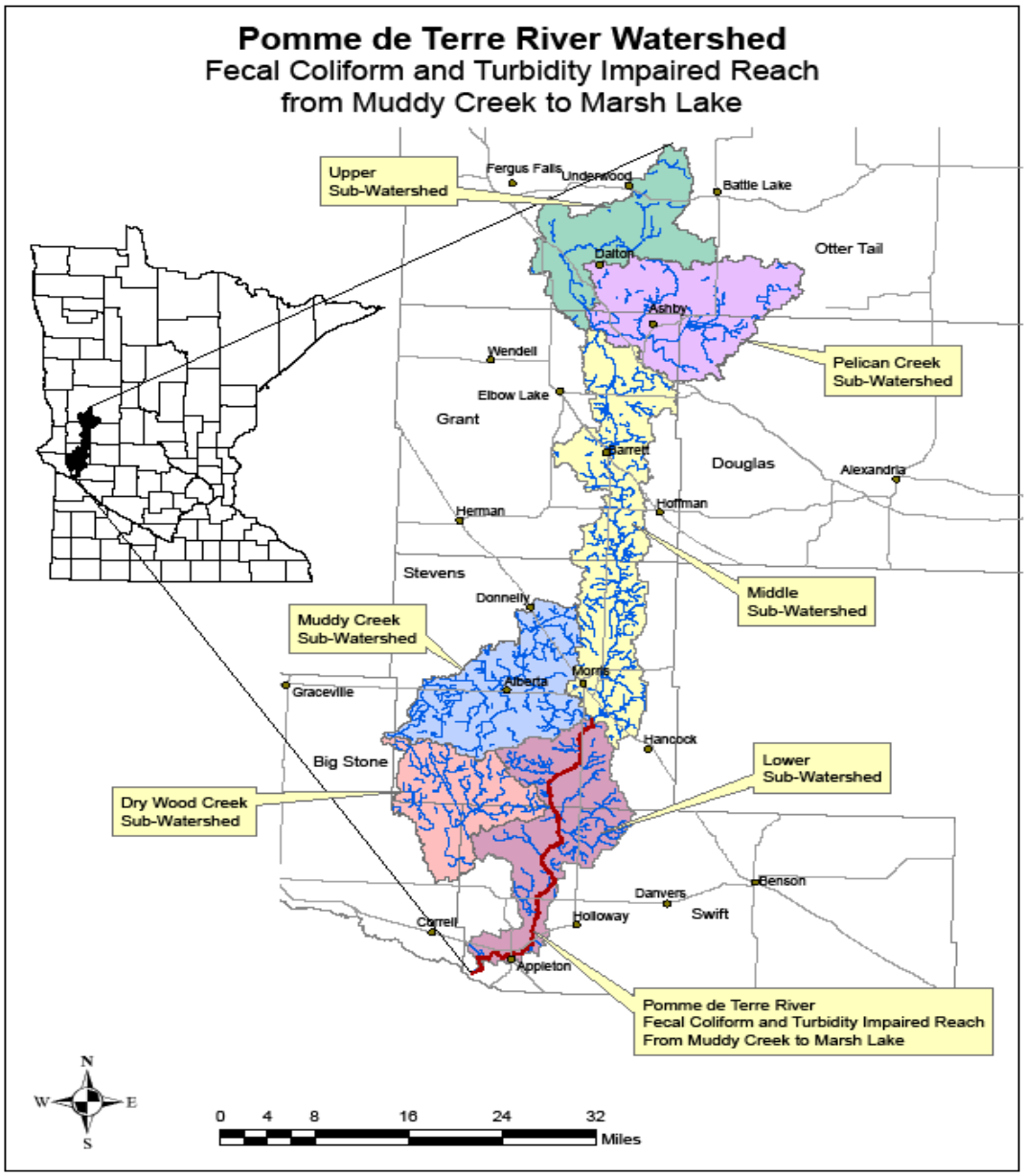
2.1 Project History

The Pomme de Terre River (PdT) Watershed has been studied since May, 1964 when it was included in the West Central Minnesota Resource Conservation and Development Area (WesMin RC&D) plan. In 1981 the Pomme de Terre River Association was organized and a Joint Powers Board (JPB) was created and signed by the six counties and soil and water conservation districts (SWCDs) in the watershed. The JPB was awarded a grant of $120,000 in 2008 by the MPCA to complete the turbidity TMDL and implementation plan. In addition, each of the six counties in the watershed contributed a total of $90,000 to the project. A Project Coordinator was hired in April of 2008 to complete the TMDL study and implementation plan. Throughout this process public participation grew. Programs including the MPCA based Citizen Lakes and Stream Monitoring Programs had numerous volunteers throughout the watershed collecting data. A stakeholder group was convened in early 2010 consisting of local producers, citizens, and lakeshore owners to discuss implementation strategies. The final meeting was held in May of 2011 after a lengthy contested case process and awaiting an extension to complete the final requirements of the plan. Prior to this time period a stakeholder group had convened in regards to a Fecal coliform TMDL implementation plan suggesting interest in the local watershed is fairly high amongst residents of all land uses. The turbidity TMDL Assessment was approved by the US EPA on September 21, 2011. The full report can be obtained on the MPCA website at: www.pca.state.mn.us upon approval.

2.2 Watershed Characteristics

The Pomme de Terre River Watershed is located in the upper Minnesota River Basin. It comprises nearly 560,000 acres or about 875 square miles. The majority of the watershed is in the Northern Glaciated Plains ecoregion with the northern tip in the North Central Hardwood Forest ecoregion. The counties and sub-watersheds are shown in Figure 1.

Figure 1: Pomme de Terre Counties and Sub-watersheds



The average elevation in the watershed is 1198 feet above sea level. Precipitation in the watershed averages between 25 to 29 inches annually, with June being the month with the greatest average precipitation.

The majority of the Pomme de Terre River Watershed is classified as rolling till prairie. This area is part of the prairie pothole region of the upper Midwest.

Drainage on the eastern side of the River is off the Big Stone Moraine, which is generally classified as having moderate water erosion potential. Waters falling on the western side of the basin drains the Fergus Falls Till Plain, which has a slight to high water erosion potential.

The total human population in the watershed is estimated to be about 18,400 (2002 census, and 2006 League of Minnesota Cities). Of the total, nearly 9,700 people live in urban areas while 8,700 people live in rural areas (53% and 47% respectively).

Of the six counties within the drainage basin of the Pomme de Terre River, only four actually have the river within their boundaries. The Pomme de Terre River flows from north to south, originating in Otter Tail County amid numerous lakes and wetlands. The river then flows through Grant, Stevens and Swift Counties where it reaches the Minnesota River at Appleton. Big Stone and Douglas Counties have land areas that drain into the Pomme de Terre River through a series of small streams and tributaries.

There are about 104 Department of Natural Resources (DNR) protected lakes located in the watershed, 87 of which are located in Otter Tail and Grant Counties. There are four major tributaries that join the Pomme de Terre River which are Artichoke Creek, Drywood Creek, Muddy Creek, and Pelican Creek. The 52 minor watersheds within the Pomme de Terre River Watershed can be combined by drainage areas into the following six sub-watersheds:

- Upper Pomme de Terre River
- Pelican Creek
- Middle Pomme de Terre River
- Muddy Creek
- Dry Wood Creek
- Lower Pomme de Terre River

A U.S. Geological Survey (USGS) flow gage, number 0529400, is located on the Pomme de Terre River in Appleton. It is in current operation as a real-time site. Information about this USGS flow gage and available data can be found on the internet at: http://waterdata.usgs.gov/mn/nwis/nwisman/?site_no=05294000&agency_cd=USGS.

The Pomme de Terre River Watershed is largely rural. Cultivated land and grassland make up about 76% of the watershed, and urban land makes up nearly 2%. Cultivated includes pasture lands. Approximately 50% of the cultivated land in the watershed is dedicated to growing corn and soybeans. The other 50% is made up mostly by smaller grains such as wheat, hay, and grasslands enrolled in the Conservation Reserve Program (Table 1).

The majority of the cultivated land is in the lower three sub-watersheds (Dry Wood Creek, Muddy Creek, and Lower Pomme de Terre). These sub-watersheds also have the least amount of grassland and water/wetlands throughout the drainage area. The Middle Pomme de Terre sub-watershed has a high percentage of cultivated land, but it also has one of the higher percentages of grassland. The majority of the water/wetlands are located in the two most northern sub-watersheds, Pelican Creek and Upper Pomme de Terre.

Table 1: Land Use in the Pomme de Terre River Watershed

Land Use	Number of Acres	% Of Watershed
Cultivated	386,362	68.9
Grassland	47,694	8.5
Forest	38,021	6.8
Water and Wetland	63,560	11.3
Urban/Residential	9,013	1.7
Other	15,314	2.8
Total	**559,964**	**100%**

1999 Land Use Inventory, Land Management Information Center

2.3 Description of Impairments

In 2002, the reach of the Pomme de Terre River, AUID 07020002-501, from Muddy Creek to Marsh Lake was listed for failure to meeting the aquatic life designated beneficial use due to excessive turbidity levels.

2.4 Description of Source Assessment

Turbidity levels are generally at their worst following significant storm events during the late spring and early summer months.

There is a strong correlation between turbidity and TSS levels and average monthly rainfall amounts. June is the month with the highest average rainfall and is the month with the highest average turbidity and TSS readings. This shows that high turbidity and TSS levels on the Pomme de Terre River are linked with rainfall events. This is most likely due to the erosive power of raindrops on the soil before agricultural crop cover is fully developed.

The percentage of TSS samples that violate the 52 mg/L TSS standard is greatest in the Mid-Range Flows (73% of samples exceed the standard) and in the Moist Conditions (62% of samples exceed the standard) flow regimes of the load duration curve.

Mid-Range flows usually represent the rise of a hydrograph as it progresses out of the dry condition range and enters into wetter conditions. The zone of land use that is most likely to contribute during this period would be the riparian corridor of the river. This is because limited upland soil saturation and quite possibly soil erosion has yet to take place during the early period of storm events or in smaller events that can only deliver localized eroded soils. Load duration curves can be found on page 27 of the Pomme de Terre River Turbidity TMDL report.

During the moist condition flow regime, material loading typically originates from both upland soils which under these wetter conditions are now saturated and begin contributing to the more effective transport of eroded materials and continuing to move riparian corridor eroded materials.

2.5 Measurable Water Quality Goals

The water quality standard for Class 2B streams for turbidity is 25 nephelometric turbidity units (NTU). Total suspended solids (TSS) and transparency (using a transparency tube) are two surrogates that can be used. To determine the TSS equivalent to the turbidity standard of 25 NTU in the impaired reach of the Pomme de Terre, paired turbidity and TSS samples collected from the Appleton monitoring site (STORET ID S000-195) were compiled. A TSS concentration of 52 mg/L was determined to be the surrogate value to the 25 NTU turbidity standard.

An estimate for an overall load reduction percentage can be made using the existing Total Suspended Solids data for the watershed. The standard for TSS in replacement of the turbidity standard for the watershed is 52mg/L. Currently the watershed-wide TSS value data has shown 110mg/L for 90% of samples taken (the 90^{th} percentile). To meet the 90^{th} percentile standard of 52mg/L we use the following equation to get a reduction percentage:

$$[(110-52)\ /110] \times 100=53\%$$

This approximate percentage illustrates the amount of sediment to be reduced from entering the watershed to reach the 52mg/L standard. It shows that 53% of sediment currently reaching the river must be prevented or widely reduced.

This reduction percentage is only intended as a rough approximation, as it does not account for flow, and is not a required element of a TMDL. It serves to provide a starting point based on available water quality data for assessing the magnitude of the effort needed in the watershed to achieve the standard. Using current data provided in the TMDL report, the highest TSS values are recorded in June with an average TSS load of 3000 tons. A 53% reduction from 3000 tons equates to 1590 tons of sediment reduced to reach the water quality standard.

2.6 Loading Capacity Allocation

Table 2: Daily Loading Capacities for the Pomme de Terre River, Muddy Creek to Marsh Lake (AUID: 07020002-501)

Pomme de Terre River: Muddy Creek to Marsh Lake AU ID: 07020003-501 Watershed area: 560,000 acres 855 sq. mi.	**Flow Zone**				
	High	**Moist**	**Mid-Range**	**Dry**	**Low**
	Values expressed as tons TSS/day				
Total Daily Loading Capacity	101	38.2	18.0	7.9	2.5
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	3.041	3.041	3.041	3.041	*
Communities Subject to MS4 NPDES Permit Requirements	1.01	0.382	0.18	0.079	*
Construction Stormwater (NPDES)	0.03	0.011	0.005	0.002	*
Industrial Stormwater (NPDES)	0.06	0.023	0.011	0.004	*
Wasteload Allocation Total	4.14	3.45	3.23	3.12	*
Load Allocation	86.76	30.93	12.97	3.99	*
MOS	10.1	3.82	1.8	.79	Implicit
	Value expressed as percentage of total daily loading capacity				
Total Daily Loading Capacity	100%	100%	100%	100%	100%
Wasteload Allocation					
Wastewater Treatment Facilities and Industrial Facilities with Numeric Discharge Limits for TSS (NPDES)	3.0%	7.9%	16.9%	38.5%	*
Communities Subject to MS4 NPDES Permit Requirements	1.0%	1.0%	1.0%	1.0%	*
Construction Stormwater (NPDES)	0.03%	0.028%	0.029%	0.025%	
Industrial Stormwater (NPDES)	0.06%	0.06%	0.06%	0.051%	*
Wasteload Allocation Total	4.09%	8.99%	17.99%	39.57%	*
Load Allocation	85.91%	81.01%	72.01%	50.43%	*
MOS	10%	10%	10%	10%	Implicit

* Allocation = (flow contribution from a given source) X (45 mg/L TSS) as indicated in section 5.8 of the TMDL report.

3.0 Priority Management Areas

The impaired reach of the Pomme de Terre River as outlined by the draft TMDL report includes the lower sub-watershed from Muddy Creek to where it enters the Minnesota River at Marsh Lake. The lower reach impairment is likely due to an accumulation of sediments throughout the watershed, therefore a watershed-wide approach will be utilized to mitigate the sediment load. Priority areas throughout the watershed will be identified based on a protection and a restoration strategy, and prioritization will be dependent on voluntary support for Best Management Practice installation. Employing this approach, grant funding and other aid can be

best utilized and show the greatest results in the shortest period of time.

4.0 Implementation Activities

Best Management Practices (BMPs) are designed to reduce pollutant levels while minimizing negative impacts to socioeconomic factors in watersheds. Many times voluntary BMP adoption results in positive impacts to those who work and plan around the practice as well as provide positive impacts to water quality of surrounding lakes and rivers. Implementation in this plan will be designed to accomplish two tasks with regards to decreasing turbidity: 1) to minimize overland flow categorized as runoff which can carry excessive pollutant and sediment to waterbodies and 2) to minimize streambank and lakeshore erosion which increases sediment and suspended solids in waterbodies.

4.1 Evaluation of Management Measures and Milestones

A summary of the implementation progress will be completed at the end of each year with assistance from each participating SWCD. This summary will list the percentage of each implementation practice implemented as well as an estimate of total resultant sediment load reduction.

The following management measures have been documented to reduce turbidity and sediment loading to waterbodies.

4.1.1 Pasture Management (Rotational grazing and cattle exclusion practices)

Livestock with access to streams and rivers pose a contamination risk. Unmanaged grazing can cause instability of stream banks, which leads to greater turbidity during higher flows. The negative impacts of grazing riparian areas can be prevented, minimized, or improved by controlling the timing, duration and intensity of grazing in the riparian area. A suite of practices have been identified which can help reduce turbidity, including providing an alternative livestock water supply, feedlot buffers, installation of stream crossings, limiting livestock access to streams in sensitive areas, and preventing over grazing.

4.1.2 Conservation Tillage

Excessive tillage has the potential to increase sediment delivery to streams. Tillage systems that maintain ground cover with less soil disturbance than traditional cultivation can reduce soil loss and energy use while maintaining crop yields and quality.

The negative impacts of excessive tillage can be prevented or minimized by avoiding tillage in areas prone to higher sediment delivery due to soil type, slope or proximity to water. In some cases, this can be accomplished by developing an appropriate system of tillage, buffer strips, filter strips, or grassed water ways.

Conservation on cropped areas can be accomplished by coordinating crop selection, management and growing conditions specific to each farm. Management considerations include proper nutrient, pest, and tillage management. Growing conditions include the soils, topography, and expected growing season and rainfall patterns.

4.1.3 Vegetative Practices

Vegetative practices include wetland restorations, lakeshore restorations, rain gardens, filter strips, riparian buffers and grassed waterways. These practices minimize sediment runoff from agricultural lands through increased infiltration and decreased pollutant transport. Costs of all practices are of 2011 estimates and are subject to frequent change based on land values, commodity prices, fuel and transport fees and several other stochastic variables.

Wetland Restorations

Wetlands are natural swamps, bogs, sloughs, potholes or marshes that have saturated soils and water loving plants. Wetlands are important as they provide wildlife habitat and serve as a natural filter for agricultural and urban runoff. They also remove nutrients, pesticides and bacteria from surface waters. Wetlands slow overland flow and store runoff water, which reduces both soil erosion and flooding downstream. Wetland restoration activities within the watershed average $5000/acre according to local NRCS experience. Soil loss is calculated via the Revised Universal Soil Loss Equation (RUSLE) and can vary greatly upon soil type, slope, and location. Advantages to this practice include existing programs such as WRP and CRP, and reasonably high cost share incentives. Disadvantages can include high expenses for larger wetlands, and long easements.

Lakeshore Restorations

Through the use of native species plantings, lakeshores can be stabilized by the root structures of living plants. These plantings include trees, shrubs, and grass, and help protect shorelines from erosion by holding sediment in the roots. They also serve as a buffer for overland runoff and restore natural habitat. Lakeshore restorations average $4000 including material and planting costs. Soil loss depends on soil type and lake geographic location. Loss can be calculated on a site specific basis using RUSLE. Advantages include biological benefits, as well as aesthetic value. Disadvantages can be cost of implementation and maintenance.

Rain Gardens

Rain gardens are small, depressional, natural plantings used in urban areas as well as lake properties and rural homes to help trap sediments from reaching waterbodies during rain events. This helps to decrease nutrient loads as well as decrease the pressure on storm sewer systems. Rain gardens cost an average of $1500, many times exceeding that cost dependent on size. Soil loss is calculated via RUSLE. Advantages include low cost and effort to implement. Disadvantages include maintenance or space.

Filter Strips
Filter strips are strips of grass and trees and/or shrubs that slow water and cause contaminants like sediment, chemicals, and nutrients to collect in the vegetation. The nutrients and chemicals are then used by the vegetated filter strips, rather than entering water supplies and water bodies. Filter strips are often constructed along ditches, thus moving row crop operations farther from the stream. Buffer strip cost is based on an implementation payment rate of $1200/acre/10 years. Soil loss reductions average 8 tons/acre/year in our watershed area based on local project estimates. Advantages include cost share and incentives as well as residual benefits (filtering bacteria or chemicals as well as soil). Disadvantages may be maintenance and easement length.

Riparian Buffers
Riparian buffers are also strips of grass, trees and/or shrubs that slow water flow and prevent contaminants like sediment, chemical and nutrients from reaching streams and lakes. Riparian buffers are created in and along the cultivated floodplain and along the main stem of streams. Buffer cost and soil loss is equivalent to filter strips.

Grassed Waterways
A grassed waterway is where a natural drainage way is graded and shaped to form a smooth, bowl shaped channel. This area is seeded to sod-forming grasses. Runoff water flows down the drainage way, across the grass rather than tearing away soil and forming a larger gully. An outlet is often installed to stabilize the waterway and prevent a new gully from forming. The grass cover protects the drainage way from gully erosion and can act as a filter to absorb some of the chemicals and nutrients in runoff water. Grassed waterway construction averages approximately $2000 per acre. Soil loss reduction based on local projects and expertise is estimated at 8 tons/acre/year. Advantages can include soil loss reduction and gully prevention at a fairly low cost. Disadvantages include intolerance to common herbicides.

4.1.4 Structural Practices
Terraces, water and sediment control basins, channel restoration, lakeshore stabilization, diversions, grade-control structures, and open tile inlet removals are all structural practices that help reduce runoff, reduce soil erosion, and reduce in channel erosion.

Terraces
Terraces break long slopes into shorter ones. As water makes its way down a hill, terraces serve as small dams to intercept water and guide it to an outlet. There are two types of terraces; storage terraces and gradient terraces. Storage terraces collect water and store it until it can infiltrate into the ground or be released through a stable outlet. Gradient terraces are designed as a channel to slow runoff water and carry it to a stable outlet like a grassed waterway. Terraces average approximately $2000/acre to establish. Soil loss reductions in our watershed area are estimated at 3 tons/acre/year based on local projects and expertise. This practice was selected for exclusion from the implementation plan BMP list due to a poor fit with local landscapes.

Water and Sediment Control Basins

A water and sediment control basin is an embankment that is built across a depressional area of concentrated water runoff to act similar to a terrace. These basins trap sediment and water running off farmland above the structure. These structures help reduce gully erosion by controlling water flow within a drainage area. Spacing for water and sediment control basins depends on the land slope, tillage, and management system. Basins in the Pomme de Terre watershed have average approximately $5000 per unit. Soil loss reductions per year are around 7 tons according to local project estimates. An advantage is soil loss reduction. Disadvantages are cost of installation, and maintenance.

Channel Restoration

Where appropriate, natural channel design practices could be used to restore the river to a more stable and natural dimension, pattern, and profile. For example, toe-wood brush mat techniques have been shown to greatly reduce bank erosion by providing roughness and a pool/riffle balance that helps decrease water velocity downstream. Riffles, rock veins, and weirs can be used for grade control, thalweg management, or erosion control and artificially cut off meanders could be reconnected. Channel restorations can be expensive. Project costs have averaged $10,000. Soil loss reductions can be difficult to estimate because degree of degradation and soil loss are largely unknown. Re-meandering of a channel, according to local staff can decrease soil erosion by nearly 90% for the site considering other local factors. Advantages include improved bank stability and soil loss. Disadvantages include cost to implement, and extended project engineering time.

Lakeshore Stabilization

The majority of lakes in the Pomme de Terre watershed lie within the Northern glaciated plains ecoregion and North Central hardwoods ecoregion and are characterized by shallow lakes. These are lakes that are typically less than 15 feet in depth and can be heavily wind stratified. Area lakes are prone to post-developmental runoff and erosion from ground disturbances and would benefit from stabilization methods including cedar revetments, rock wave breaks, and natural root and fiber log erosion control structures. These practices hold sediment to the banks and allow natural plants to grow further increasing the erosion prevention potential. Reduced erosion increases water clarity which increases sunlight penetration allowing aquatic plants to grow further preventing soil loss. Stabilization projects have averaged $40,000 for projects conducted within the local area. Soil loss would vary greatly depending on height and depth of shore. Tons of soil lost would be calculated from total area lost in cubic yards and converted to tons. A major disadvantage to this practice is landowner costs as these are typically large projects.

Diversions

A diversion is much like a terrace, but its purpose is to direct or divert runoff from an area. A diversion is often built at the base of a slope to divert runoff away from bottom lands. A

diversion may also be used to divert runoff flows away from a feedlot, or to collect and direct water to a pond. Diversions help reduce soil erosion on lowlands by catching runoff water and preventing it from reaching farmland below. Diversion practices for the watershed have averaged $3000 per project implemented. According to local NRCS project estimates diversions can reduce soil loss by 3-6 tons/year.

Grade Control Structures

A grade control structure is a dam, embankment or other structure built across a gassed waterway or existing gully control. The structure drops water from one stabilized grade to another and prevents overfall gullies from advancing up a steep slope. Grassed, non-eroding waterways made possible with grade control structures give better water quality; can be crossed with equipment, and look better than non-stabilized gullies. Grade control structures can also be used to store water, which provides a water source and habitat for wildlife. Grade control structures, according to NRCS staff would be highly variable depending on application, but would average $.60/sq ft. Soil loss would vary greatly depending on project soil types and size and could be determined using RUSLE. Disadvantages to this could be cost of implementation, and loss of larger pieces of cropland. One large advantage over a grassed waterway is grade control structures can be driven over and sprayed with herbicide with no effect.

Open Tile Inlet Removal

Traditional open surface tile intakes can be a significant contributor of sediment to ditches, streams and rivers. Replacing open tile intakes with alternative designs has the potential to reduce sediment while still providing adequate drainage. According to local tile manufacturers, alternative inlets cost around $450 on average to install. Soil loss reductions could be calculated with RUSLE but in our area average around 7 tons/acre of drainage/year. Disadvantage would be maintenance. Advantages are greatly reduced soil loss, and fairly inexpensive to install.

5.0 Point Source Management Measures Alternatives and Analysis

5.1 Evaluation of Management Measures Alternatives

5.1.1 Municipal Stormwater Management

The city of Morris will be required to apply for an MS4 permit which includes BMP implementation and education. Active enforcement of MS4 permit requirements and application of the required Storm Water Pollution Prevention Plans (SWPPP) will be required. Other communities in the watershed not required to obtain MS4 permits will be encouraged to implement BMPs. Educational efforts will also be conducted to inform residents about stormwater pollution. Urban stormwater BMPs are as follows: street sweeping, rain gardens, and stormwater conscious development will be promoted.

Street Sweeping
Street sweeping can be used remove sediment and road sand from the road surface which prevents these materials from entering storm sewer systems during significant rainfall events. Cities pay costs attributed to street sweeping. Soil loss reductions would vary due to several local factors.

Rain Gardens
Rain gardens are also considered a vegetative practice under the non-point source category but not only help trap fertilizers and sediments around lakeshores but also help abate runoff in urban areas near parking lots, in yards, parks and anywhere that may have a high percentage of impervious surface draining into storm sewer systems. See vegetative section for cost and soil loss reductions.

Stormwater Conscious Development
There are certain development practices, such as green roof technologies, that can help reduce runoff and pollution through stormwater drainage. Some LEED certified practices such as location, not developing previously undeveloped land, pervious pavements, and low impact development can greatly reduce nutrient introduction to storm sewer systems. Cost and soil loss would vary greatly depending on site preparation, specific practice implemented, and many other local factors. A major advantage is having low impact which reduces soil loss. A disadvantage could be the cost of certification for some practices.

5.1.2 National Pollutant Discharge Elimination System
The National Pollutant Discharge Elimination System, NPDES, permit program authorized by section 402 of the Clean Water Act, cover discharges from industrial facilities, municipal stormwater conveyances, concentrated animal feeding operations, construction sites, Waste Water Treatment Facilities, combined sewer overflows and sanitary sewer overflows. The discharges for sectors of this group are controlled by numeric permit limits which are typically set below the TSS standard for streams and rivers, so while they may discharge TSS, they are not contributing to exceedances of water quality standards. Stormwater discharges are generally subject to certain performance or practice standards, rather than precise TSS limits.

6.0 Identification of Priority BMPs

6.1 Selection of management measures by stakeholder input
These measures have been chosen through a public stakeholder group process. Something to consider when applying for funding for these implementation activities is public support.

Without a willingness to participate in a practice, whether it is inapplicable, infeasible by land type or failure to meet an equitable cost-benefit ratio, practices cannot be seen as beneficial. The following non-point source practices were ranked starting highest to lowest by the stakeholder group and will be funded as such depending on type of funding and availability. Some fund sources do not allow certain practices, so the top ranked practices may not always be funded.

Table 3 illustrates the final stakeholder ranking chart. Stakeholders were asked to rank practices in accordance to willingness to participate if applicable, or belief in practice benefits. The ranks were from 1: being the highest, to 5: being the least desirable. The terrace practice was the only practice elected to be omitted from the Implementation Plan by the stakeholder group based on limited local applicability.

Table 3: Ranked BMPs with averages based on 1-5 scale.

Rank	BMP	Average Score
1	Open Tile Inlet Removal	1.13
2	Channel Restoration	1.50
3	Rotational Grazing Plans	1.80
4	Filter Strips	2.06
5	Street Sweeping	2.25
6	Grassed Waterways	2.40
7	Lakeshore Stabilizations	2.73
8	Conservation Tillage	2.88
9	Water and Sediment Control Basins	2.93
10	Riparian Buffers	3.06
11	Grade Control Structures	3.13
12	Lakeshore Restorations	3.20
13	Wetland Restorations	3.25
14	Rain Gardens	3.38
15	Diversions	3.47
16	Feedlot Buffers	3.50
17	Exclusion Fencing	3.73
18	LEED Certifications	4.13
19	Green Roof Technologies	4.31
20	Pervious Pavements	4.50

7.0 Plan Objectives and Budget

7.1 Objectives

Objective 1: Implementation Measures

The Pomme de Terre River, through a TMDL study and report conducted by the MPCA, has identified an impairment for excess turbidity. BMP strategies outlined in this plan are the target

for future funding opportunities and are designed to reduce the further introduction of sediments into the Pomme de Terre River. These implementation strategies are only the first line of what this plan is designed to carry out. They were selected and ranked by a group of stakeholders and are ordered below in the budget table according to stakeholder rank and not numerically by task.

The tasks for this objective are outlined in the Objective 1 budget table, including the number of each targeted BMP to complete, cost per practice, and total funding required. Tasks are as follows:

- **Task 1** – Pasture Management
- **Task 2** – Conservation tillage
- **Task 3** – Vegetative Practices
- **Task 4** – Structural Practices
- **Task 5** – Stormwater conscious development.

Objective 2: Civic Engagement

The term civic engagement encompasses many aspects of public involvement. Included in this strategy is the need for public participation in different events and to get people engaged or involved in improving water quality. Participation of the JPB and the Watershed Project Coordinator in events, and a connection between people of all backgrounds that live throughout the watershed and have an impact of the water quality therein. Meetings will be held by the JPB and Technical Advisory Committee to discuss project underway in the watershed.

The strategy to be used within the 10 year time frame includes widening the volunteer base by utilizing opportunities that already exist through the MPCA's Citizen Lake, and Citizen Stream Monitoring Programs. Other activities include website updates, social media outreach, advertising, and promotional items.

Furthermore, the approval of a major watershed work plan by the JPB in April of 2011 stresses the use of civic engagement and allows for the convening of stakeholder groups, sportsman's clubs, lake associations, and other concerned citizens. Tasks for Objective 2 and associated costs are further outlined in the Objective 2 budget table and are as follows:

- **Task 1** – Board and stakeholder meetings
  - The Pomme de Terre River Association Joint Powers Board (JPB) meets bi-monthly or when needed to discuss current projects and events happening in the watershed
  - The Technical Advisory Committee appointed by the JPB meets monthly as more funds are received and project plans need approval or the committees input.
  - Annual stakeholder meetings will be held once a year to give an update on projects that have been completed and what progress is being made in the watershed.
- **Task 2** – Public events and outreach

- Public events are considered those that include community education or outreach but are not classified as meetings. These could include but are not limited to county fairs, event booths, local business promotion events, or speaking requests.
- Outreach will include classroom or outdoor educational activities, social media profiles and website updates.

- **Task 3** – Promotion
  - Promotion could include many of the above civic engagement tasks with the addition of promotional items to hand out, or targeted marketing by SWCDs using promotional items at local events.

Objective 3: Monitoring

There will be 2 monitoring strategies used through this plan. Post implementation monitoring will occur periodically throughout the 10 year plan time period. Citizen based monitoring will occur continuously throughout the 10 year plan time period. Monitoring costs are outlined in the Objective 3 budget table, tasks are outlined below.

- **Task 1: Effectiveness Monitoring**
  - Monitoring will occur throughout 2011 and 2012 on lakes in the Pomme de Terre Watershed as a result of a 2011 Surface Water Assessment grant received in January 2011. Parameters include Total phosphorus, Chlorophyll-a, pH, and clarity.
  - Monitoring will occur during 2011 and 2012 at 2 gauging sites equipped with stage monitoring equipment.
  - Monitoring will occur throughout 2011 and 2012 at roughly 10 sites for various water quality parameters as a result of the board approval of a major watershed work plan by the JPB.
  - Effectiveness monitoring as part of the turbidity implementation activities are scheduled on a bi-yearly basis through 2021 starting in 2013, and will include TSS, TP, pH, and dissolved oxygen. Other parameters may be included if necessary.
- **Task 2: Citizen Based Monitoring**
  - Monitoring will be conducted on lakes throughout the watershed through the CLMP program hosted by the MPCA. Secchi disk readings are taken typically twice a month on each lake with a listed volunteer. Further volunteers will be sought to get more data on watershed lakes.
  - Monitoring will be conducted throughout the Pomme de Terre River through the CSMP (Stream monitoring) program hosted by the MPCA. Further volunteer monitors will be sought to collect more data on new stretches of the Pomme de Terre River.

- It has been requested by the stakeholder group convened for the turbidity TMDL that further monitoring be conducted on stretches of Drywood creek to pinpoint excess nutrient and sediment inputs. The lack of mid-stream monitoring sites was suggested to be unsatisfactory in pinpointing where public funding could be best spent. Interest was noted in citizen sponsorship of monitoring activities and a pilot project will be sought to begin conducting site specific monitoring in the Pomme de Terre watershed. Parameters will be determined upon monitoring agreement.

Objective 4: Administration

- **Task 1: Project Coordination**
  - The Pomme de Terre River Association currently employs a Watershed Project Coordinator housed in the Stevens SWCD office. The Watershed Project Coordinator is responsible for communicating events and projects, community outreach and civic engagement, and securing further funding for implementation activities. The Stevens SWCD office manager provides financial recording and budget updates as well as pays invoices for Watershed projects. These positions will require funding through further grant opportunities as projects and project funding expires. Associated costs with project coordination are in the Objective 4 budget table.

- **Task 2: Personnel**
  - As implementation practices and opportunities grow, so does the need for additional help to complete the tasks required under this plan. Multiple funding sources and needs require hiring additional support to carry out the duties described. Another watershed employee will be sought to distribute the duties of an ever-growing workload. The location and specifics of this position are yet to be determined and are subject to the requirements of funding opportunities. Estimated personnel costs are outlined in the Objective 4 budget table.

- **Task 3: Overhead**
  - The Watershed Project Coordinator has been housed in the Stevens SWCD office in Morris, MN. Overhead to house watershed employees includes a computer, desk space and all necessary office components. Transportation is currently provided via Stevens SWCD through use of county cars or District vehicles. A Watershed Project vehicle will be sought through available funding sources to alleviate incapacities during planting seasons and allow the Watershed Project staff greater flexibility in the watershed area.

7.2 Budgetary Outline

Objective 1: Implementation Budget Table *Estimate funding source descriptions can be found on the definitions page.

Task	BMPS	Units proposed	Cost Estimate	Priority	Estimate Source	Grant Total	Match/Other Cost Share	Total Costs
4	Open tile inlet removal	1200 inlets	$450/inlet	High	CWF	$405,000	(25%) $135,000	$540,000
4	Channel restoration	10 projects	Up to $10,000avg	High	Combination of sources	$75,000	(25%) $25,000	$100,000
1	Rotational graze plans	6000 acres	$23/ac	High	EQIP	$138,000	($37/ac) $222,000	$360,000
3	Filter Strips	18,000 acres	$1000/ac	High	FSA soil rent	$18,000,000	($120/ac) $21,600,000	$39,600,000
2	Conservation tillage	255,360 acres	$23/ac	High	EQIP	$0	$5,873,280	$5,873,280
3	Grass waterways	20	Up to $2000avg	High	EQIP	$20,000	(50%) $20,000	$40,000
3	Wetland restorations	12,000 acres	$1000/ac	High	WRP/RIM	$12,000,000	$12,000,000	$24,000,000
4	Water and sediment control basins	600 basins	Up to $5000avg	High	EQIP	$1,500,000	(50%) $1,500,000	$3,000,000
3	Riparian buffers	300 acres	$1000/ac	High	CRP/RIM	$300,000	$300,000	$600,000
4	Grade control structures	30 structures	$10,000avg	Med	EQIP	$150,000	(50%) $150,000	$300,000
3	Lakeshore restorations	60	Up to $4000avg	Med	NFWF/CWF	$180,000	(25%) $60,000	$240,000
3	Lakeshore stabilization	10	Up to $40,000avg	Med	NFWF	$300,000	(25%) $100,000	$400,000
3	Rain gardens	300	Up to $1500avg	Med	CWF	$337,500	(25%) $112,500	$450,000
4	Diversions	5	$3000avg	Med	EQIP	$7,500	(50%) $7,500	$15,000

1	Feedlot buffers	20 acres	$1000/ac	Low	PdT 319	$20,000	($1000/ac) $20,000	$40,000
1	Exclusion fencing	6000 ft	$.16	Low	EQIP	$960	$960	$1,920
5	Stormwater conscious development	Educational	$7,500	Low	Variable	$5,000	$2,500	$7,500
TOTALS						$33,438,960	$42,126,740	$75,565,700

Note: Tasks for this table are aligned by priority, not numerical order.

Total grant requirement for objective 1: **$33,438,960**
Other cost share to support programs**: $42,126,740**
Total funds required for objective 1: $75,565,700

Objective 2: Civic Engagement Budget Table

Task	Tasks	Units proposed	Cost Per	Priority	Grant Total	In-Kind (Mile + Rate)	In-Kind Overhead	Total Costs
1	Joint Powers Board Meetings	6/yr X 10	$10	High	$600	$62,520	-	$63,120
1	Technical Committee Meetings	12/yr X 10	$10	High	$1,200	$379,200	-	$380,400
1	Annual Stakeholder Meetings	1/yr X 10	$300	Med	$3,000	$10,560	-	$13,560
2	Public events	Variable	Var	Med	$5,000	-	-	$5,000
3	Advertisements	18/yr	$80	Low	$14,400	-	-	$14,400
3	Social Media	Updates	-	-	-	-	$1,500	$1,500
3	Promotional items	2/yr X 10	$500	Low	$10,000	-	-	$10,000
3	SWCD targeted marketing	6/yr X 10	$2000	Low	$120,000	-	-	$120,000
3	Website updates	10 years	$280	Med	$2800	-	$1,500	$4,300
TOTALS					$157,000	$452,280	$3,000	$612,280

Total grant requirement for objective 2: **$157,000**
In-kind requirement: **$455,280**
Total Funds required for Objective 2: $612,280

Objective 3: Monitoring Budget Table

Task	Monitoring Category	Units	Cost Per	Grant Total	In-Kind	Total Costs
1	Effectiveness Monitoring	210	$15	$3,150	-	$3,150
1	Mileage	28,000mi	$.55 avg	$15,400	-	$15,400
2	Citizen Monitoring	500	$20	-	$10,000	$10,000
TOTALS				$18,550	$10,000	$28,550

Total grant requirement for Objective 3: **$18,550**
In-kind requirement: **$10,000**
Total funds required for Objective 3: **$28,550**

Objective 4: Administration Budget Table

Task	Staff Admin Category	Units	Cost Per	Priority	Grant Total	In-Kind	Total Costs
1	Coordinator (Salary + benefits averaged over 10 years)	10 Years	$55,500	High	$555,000	-	$555,000
1	Office Manager	10 Years	$9722	High	$97,220	-	$97,220
2	Project Assistance	10 Years	$23,026	Med	$230,260	-	$230,260
3	Overhead	10 Years	$800	High	$8,000	$8,000	$16,000
3	Vehicle	1	$20,000	High	$20,000	-	$20,000
TOTALS					$910,480	$8,000	$918,480

Total grant requirement for Objective 4: **$910,480**
Total in-kind requirement for Objective 4: **$8,000**
Total funds required for Objective 4: **$918,480**

Total grant funds required..... $34,524,990
Total cost share leverage funds required.....$42,126,740
Total in-kind support required.....$473,280
Total Cost.....$77,125,010

"Total Cost" reflects what the total cost estimate would be if all budgeted components of the project were funded over the 10 year plan period. This is also dependent on funding availability, as projects can only be accomplished if funding sources remain accessible.

8.0 Roles and Responsibilities of Project Partners

Soil and Water Conservation Districts
The SWCDs in Big Stone, Swift, Stevens, Grant, Douglas, and West Otter Tail counties will provide staff and equipment to make contacts for BMP implementation, design and layout of BMPs, and assist with the information and education program. Each SWCD will have an appointed individual on the Technical Advisory Committee as well as an SWCD board supervisor and county commissioner appointed to the JPB.

Counties
County environmental services, feedlot inspectors, and applicable planning and zoning personnel will assist with programs at a county level. Included may be shoreland ordinance, feedlot requirements, ditches or other projects. The counties within the watershed will include an appointed employee from one of the above departments to the TAC, and a County Commissioner appointed to the JPB.

NRCS and FSA
The NRCS districts in conjunction with Soil and Water districts will help administer related practices such as EQIP, CStP, WRP, and other federal incentive programs. NRCS will provide an employee to be appointed to the TAC from a local or area office to provide technical assistance to the group. They will also help create conservation plans for federally administered projects. As well as NRCS, the Farm Service Agency (FSA) will also be included to assist with CRP and CCRP requirements as well as current soil rental rates.

Minnesota Pollution Control Agency (MPCA)
The MPCA will provide project support through the assigned watershed project manager. The MPCA will provide technical assistance where applicable with project reports and compliance as well as assistance in monitoring. The MPCA is the lead agency in the TMDL planning process. The project manager may be asked to attend Technical Advisory and Joint Powers Board meetings.

Minnesota Department of Natural Resources (DNR)
The DNR will assist in technical aspects of project implementation including assistance, permit issuance where applicable, and assistance with Clean Water Fund applications. Individuals from this organization may be asked to attend TAC meetings.

Board of Water and Soil Resources (BWSR)
An individual representing BWSR will provide technical assistance as well as assistance in applying for Clean Water Fund grants. They may also be asked to provide training in the use of data entry systems such as E-Link, and asked to attend TAC meetings.

Joint Powers Board (JPB)
The JPB, consisting of a county commissioner and SWCD board of supervisors member from each of the six counties within the Pomme de Terre River Watershed has the decision making power and approves all projects and plans.

Technical Advisory Committee (TAC)
The TAC consists of local Soil and Water Conservation Districts (SWCD), Local NRCS District Conservationists, Local water managers, Department of Natural Resources, Minnesota Pollution Control Agency, Board of Water and Soil Resources, and the US Fish and Wildlife Service. The TAC will be responsible to provide recommendations as requested to the JPB.

Stevens SWCD
The Stevens SWCD board maintains fiscal responsibility for the JPB. It is anticipated this arrangement will continue as long as grant funding is available.

9.0 Timeline

Objectives	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Objective 1: Implementation											
Task 1: Pasture management	X	X	X	X	X	X	X	X	X	X	X
Task 2: Conservation tillage	X	X	X	X	X	X	X	X	X	X	X
Task 3: Vegetative practices	X	X	X	X	X	X	X	X	X	X	X
Task 4: Structural practices	X	X	X	X	X	X	X	X	X	X	X
Task 5: Point source measures	X	X	X	X	X	X	X	X	X	X	X
Objective 2: Civic Engagement											
Task 1: Board and stakeholder meetings	X	X	X	X	X	X	X	X	X	X	X
Task 2: Public events and outreach	X	X	X	X	X	X	X	X	X	X	X
Task 3: Promotion	X	X	X	X	X	X	X	X	X	X	X
Objective 3: Monitoring											
Task 1: Effectiveness monitoring			X		X		X		X		X
Task 2: Citizen based monitoring	X	X	X	X	X	X	X	X	X	X	X
Objective 4: Staff and Administration											
Task 1: Project coordination	X	X	X	X	X	X	X	X	X	X	X
Task 2: Personnel	X	X	X	X	X	X	X	X	X	X	X
Task 3: Project overhead	X	X	X	X	X	X	X	X	X	X	X

10.0 Adaptive Management

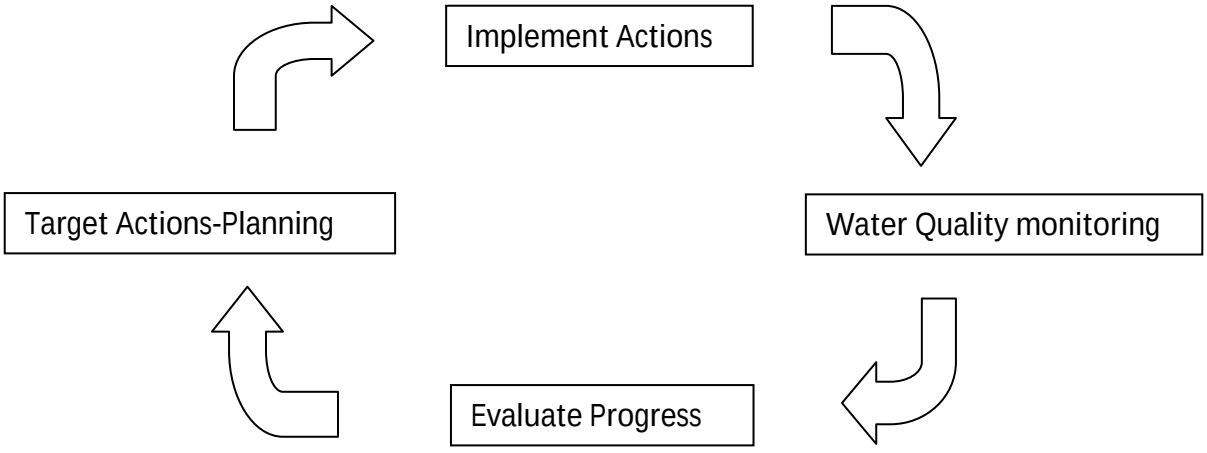
The implementation actions outlined in this management plan will decrease the turbidity loading in the Pomme de Terre River. However, at this stage it is not known exactly how many practices will be installed, and what those practices will consist of. Since the cumulative effect on water quality therefore is unknown, a continual process must happen that evaluates instream water quality and then tailors the implementation actions to the findings. Also note that this plan must change in accordance to funding availability and statutory changes regarding the regulation of some practices.

As practices are being implemented in the watershed, instream water quality will be monitored to evaluate the impact that the implementation actions have on turbidity levels in the Pomme de Terre River. If water quality is improving, this suggests that the current approach is working and the same course will be followed. If water quality is not improving, this suggests that the approach being taken is not sufficient, or is targeted at the wrong sources. In this case, the approach will be evaluated and adjusted so tangible instream water quality improvements can be realized.
If plan amendments are necessary, a 3 step process may be used to amend the implementation plan.

Step 1: The JPB reserves the right at any time to open the plan for discussion. If the TAC wishes to visit the plan approval must be requested from the JPB.

Step 2: Upon approval of plan discussion, the TAC would meet as necessary to formulate language to alter, include, or exclude information and submit recommendations to the JPB.

Step 3: Any changes would be submitted to the JPB for approval.



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12.0 Appendix A

Pomme de Terre River
Watershed Project
www.pdtriver.org

Shaun McNally, Coordinator
12 Hwy 28 E Ste 2
Morris MN 56267
(320) 589-4886 ext. 109
shaun.mcnally@stevensswcd.org

To: Turbidity TMDL stakeholder group
From: Shaun McNally, PdT Watershed Project Coordinator
Subject: Implementation plan meeting
Date: December 10, 2009

It's time to get to work on the turbidity implementation plan! This plan has to be written by local entities and approved by the MPCA before we can apply for implementation funds. With ***your*** help, the Pomme de Terre Watershed Project will draft the plan.

I have scheduled our first stakeholder meeting for **Tuesday, January 12th 2010. 7:00 pm at the Morris ARS "soils" lab.** (See attached map). This will be the first in a series of meetings where you help develop the turbidity TMDL implementation plan for the PdT River Watershed.

Agenda for the meeting is as follows:
1. We will discuss the meeting structure and overview of the implementation plan process and your role in all of this.
2. I will go over the TMDL report and the data, and what it tells us.
3. Katherine Pekarek-Scott of the MPCA will go over the TMDL process and why we are doing what we are doing.
4. Question and answer time, go over next meeting details, and get a homework assignment.

Enclosed is a packet of reading materials on various Best Management Practices (BMPs) that were mentioned in the turbidity TMDL as possible ways to reduce sedimentation to the river. As a group, we will be deciding on what practices we want to focus on in the watershed to reduce the turbidity levels. Please read through the information in the next few weeks to better familiarize yourself with the practices we will be discussing.

If you cannot attend this meeting please let me know by phone or email. If you have any questions feel free to contact me.

I look forward to beginning this process and working with you to write the implementation plan.

Pomme de Terre Watershed TMDL Implementation Plan Development
Stakeholder Meeting 1
Tuesday January 12, 2009 7 pm
Morris USDA ARS lab, Morris, MN

Present

Shaun McNally, Katherine Pekarek-Scott, Joe Montonye, Deb Koehntop, Sean Scott, Don Scherfenberg, Tom Gardner, Don Dally, Larry Mahoney, Brady Janzen, Doug Wulf, J.L. Meagher, Dennis Wulf, Kurt Staples, Mike Wulf, Jim Krosch.

Minutes

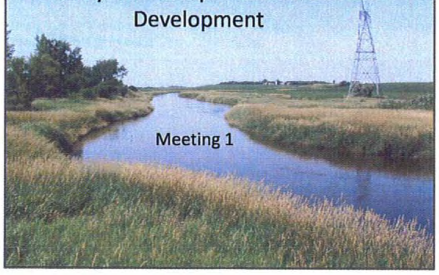
- Shaun McNally opened the meeting and welcomed everyone, and had everyone introduce themselves. He went over the agenda for the meeting, and a brief overview of the implementation plan process.
- Katherine Pekarek-Scott gave a presentation on TMDLs, discussing what is a TMDL, the TMDL process, the TMDL equation, how a waterbody is assessed and listed, and some FAQ's about TMDLs.
- Shaun McNally started off his presentation discussing the implementation plan process, what is an implementation plan? Why a plan is done? What is in a plan? How implementation plans are required for most water quality grants in the State, and the stakeholders role in implementation plan development.
- Shaun then presented a summary of the turbidity TMDL for the group to have a background on what is in the TMDL report. The presentation included discussions on the listing of the reach of the river, what data was used to list it. He provided a summary of turbidity and TSS data from the last 10 years at the Appleton monitoring site. He discussed the load duration curve method and presented and explained the load duration curve, and how ldc's are useful in guiding implementation efforts. Shaun discussed how most of our exceedences occur in the mid-range and moist condition flow regime and the implications of what that means based on the load duration curve.
- Group was asked to read the handouts mailed to them for the next meeting. Meeting time was set for **Monday Feb. 8th. 7 pm.**

Discussion

- Question: If the impairment is in the southern part of the watershed, why is Grant County involved in this? A: This is a watershed wide effort, sediment flows downstream
- Discussion was held about the data collection at the Appleton monitoring site
- Discussion was held about the stream classification systems, Muddy Creek is a class 7 limited resource water. It was brought up that Muddy has lots of problems and drains right into the PdT
- Question: What does the data show from way back in the 70's for TSS readings? A: TSS readings on average have been steadily increasing. Point was brought up about more corn/soybeans planted now and less wheat planted than back then.
- Discussion was held on the turbidity transect graph showing steadily increasing turbidity readings, and a marked increase in Swift County. Discussion on the differing soils and geology down in that region of the watershed.
- Discussion was held on the old Drywood Creek dam, and that something should be done with it.
- Question: Who sets the limits for turbidity, and what is the rationale behind it? A: EPA sets the water quality standards based on stream classifications. It was unknown as to why the limits were set as they are. Katherine stated that the standards undergo periodic review for possible revisions, and the turbidity standard is currently being looked at for possible changing to a TSS standard.

3/4/2010

Pomme de Terre River Turbidity TMDL Implementation Plan Development



Meeting 1

Tonight's Agenda

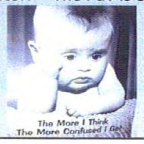
- Welcome and introductions
- Overview of the process and why are we here?
- TMDL FAQs: Katherine Pekarek-Scott, MPCA
- TMDL Report: What does it tell us?
- Get homework assignment, set next meeting date.

What is a TMDL?

- "Total Maximum Daily Load" is a calculation of the maximum amount of a pollutant that a Waterbody can receive and still meet water quality standards. (US EPA)
- Or.... "how much crap can we put into a river and it still not be considered polluted" (Me)

TMDL???

- An Acronym: "Total Maximum Daily Load"
- A Noun: "The TMDL is done"
- A Report: "We sent the TMDL to the EPA"
- A Process: "We're doing a TMDL study"
- A Descriptor: "The PdT is on the TMDL list"



The TMDL Process

- Monitor water quality, if impaired place on the TMDL list (done)
- Do a TMDL study (done)
- Create an implementation plan (you are here)
- Implement these Best Management Practices (over a 10 year period)
- Monitor water quality to see if there is an improvement
- Hopefully remove water body from list

The Implementation Plan

- MN State Statute 114D.15 Subd. 11.
  - "TMDL Implementation Plan" means a document detailing restoration activities needed to meet the approved TMDL's pollutant load allocations for point and non-point sources.
- Implementation plans spells out activities that can be done to correct impairments in the PdT River

Why Do an Implementation Plan?

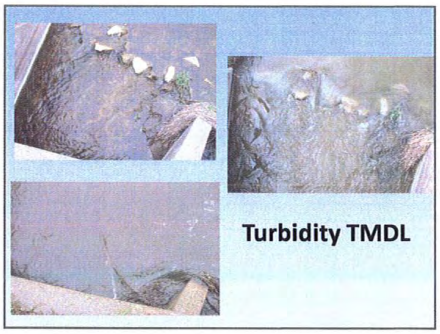
- It's required by the state for any TMDL.
- An approved implementation plan provides exclusive access to certain restoration funding opportunities.
- Many grants for water quality improvement require an approved TMDL implementation plan. Any money from the State, the MPCA, or BWSR.
- It opens up more pots of money for us.

What's in an Implementation Plan?

- A summary of the TMDL
- An identification of target pollutant reductions, priority areas, and management measures needed to obtain the TMDL
- Reasoning and analysis of all management measures that were considered
- An identification of project objectives
- A timeline
- An evaluation plan
- A budget estimate for completing the project activities

What is Your Role in the Implementation Plan Process?

- You are stakeholders....You or your organization has a stake in the future land use concerns in the watershed
- Our goal is to educate you on the TMDL report, concerns, current monitoring, and funding sources
- As a committee we will be voting on implementation strategies...Where you think we should be focusing our efforts.



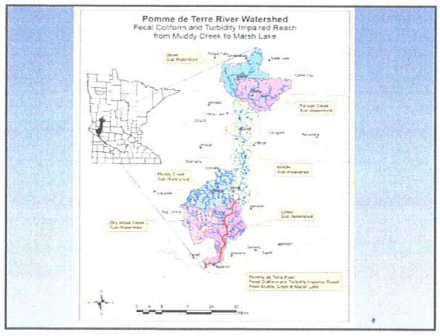
Turbidity TMDL

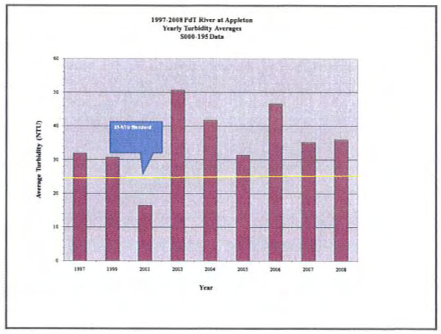
Turbidity in the Pomme de Terre

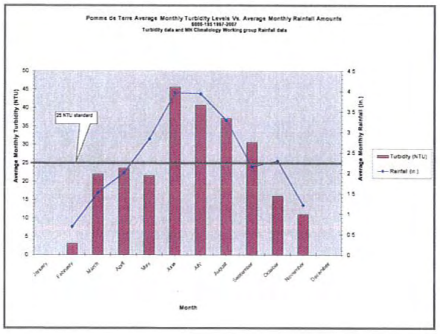
- The Pomme de Terre is classified as a class 2B stream
  - It's beneficial use is cool and warm water fisheries and all recreation
  - The EPA sets numeric criteria for each class of stream
  - **The turbidity limit for a class 2B stream is 25 NTU**

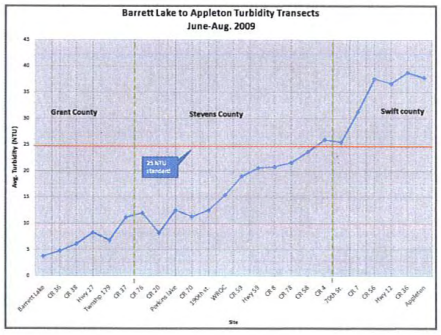
Turbidity in the PdT

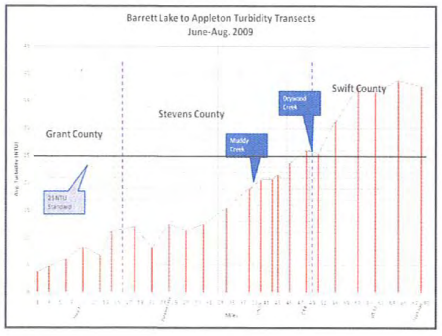
- The reach from Muddy Creek to Marsh Lake was listed on the TMDL list in 2002 for violating the turbidity standard.
- The standard states that over a 10 year period there needs to be at least 20 samples, and if 10% of the samples exceed the standard, the reach is considered impaired
- In the 10 year period before 2002, 45% of samples exceeded the turbidity standard. ***This is what put the River on the impaired waters list.***
- In the 10 year period from 1998-2008, 57% of the samples have exceeded the turbidity standard









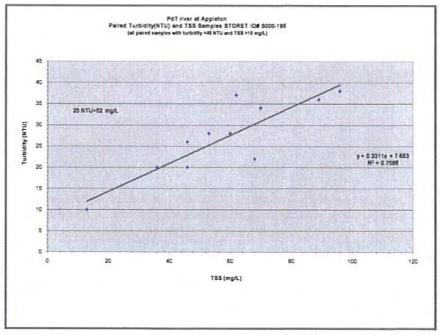


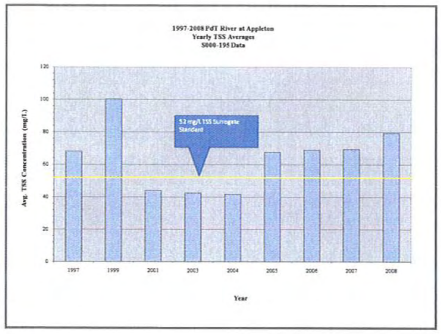
So How Much Stuff is in the River?

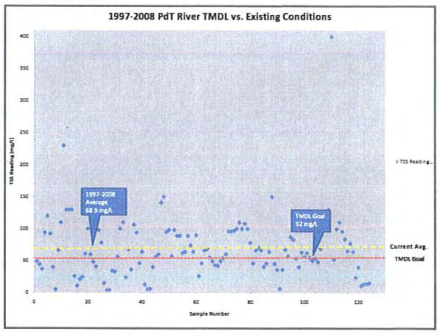
- Turbidity is a dimensionless unit
- Loading allocations, capacities and reductions are commonly based on a surrogate parameter, **total suspended solids (TSS)**
- TSS is the measurement of sediment and organic matter in a sample of water and is reported in mg/L
- Each stream has a different turbidity/TSS ratio

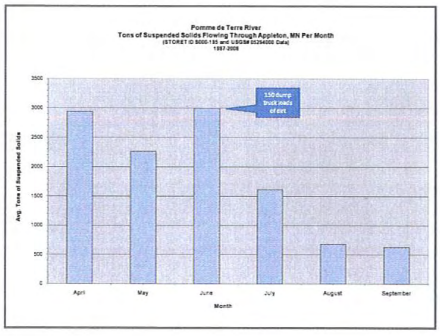
y=mx+b..Remember High School Math?

- To determine the TSS equivalent to 25 NTU you need paired turbidity and TSS measurements
- Plot the paired measurements on a graph and then do a regression analysis.
- **52 mg/L TSS is the equivalent to 25 NTU in the PdT River**









Duration Curve Approach

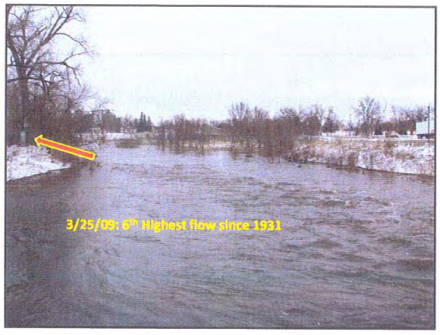
- Allows for characterizing water quality data at different flow regimes.
- Provides a visual display of the relationship between stream flow and loading capacity.
- Accounts for how stream flow patterns affect changes in water quality over the course of a year.
  - Seasonal variation is a TMDL requirement

Duration Curve Approach

- Compile flow data for the river
- Produce a flow duration curve
- Calculate the TSS surrogate for the PdT (52 mg/L)
- Produce a load duration curve
- Integrate all the TSS measurements
- Determine loading capacity and allocation

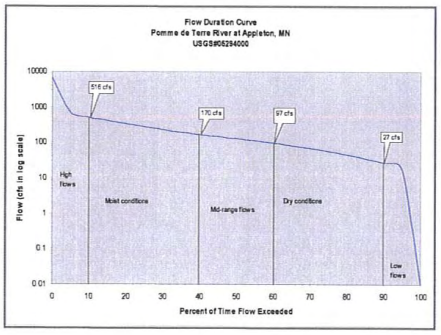
Compile Flow Data and Develop the Flow Duration Curve

- USGS gauging site in Appleton has daily flow data from 1931.
- Last 30 years were used to better reflect current watershed conditions
- 7,012 daily flow values were compiled and then sorted by flow volume from highest to lowest and placed on a curve.



Flow Duration Curve

- Identifies intervals, which can be used as a general indicator of hydrologic condition (wet vs. dry and to what degree)
- Divide the curve into 5 flow regimes to provide additional insight about conditions and patterns associated with the impairment
- High flows, moist conditions, mid-range flows, dry conditions, low flows

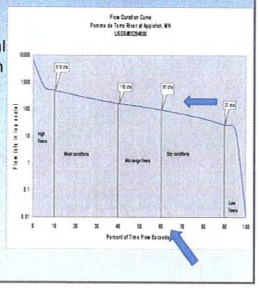


Flow Duration Intervals

- Low flows are exceeded a majority of the time
- Floods are exceeded infrequently
- Flow duration intervals are expressed as a percentage
  - 0% corresponds to the highest stream discharge on record (flood conditions, 8,890 cfs, 4/7/97)
  - 100% corresponds to the lowest stream discharge on record (drought, 0.01 cfs, 1988)

Flow Duration Intervals

- A flow duration interval of 60 is associated with a discharge of 97 cfs
- Implies that 60% of all observed stream discharge values equal or exceed 97 cfs.

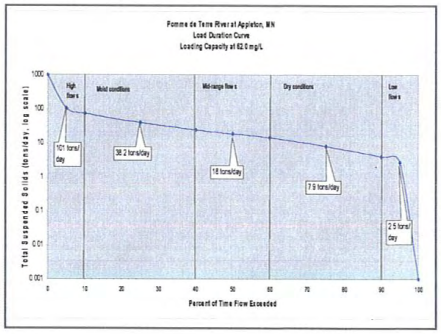


Determine the TMDL (Maximum Amount of Pollutant)… More Math!

- Do this for each of the 5 flow regimes
- Each flow regime has a different TMDL (the more water flowing, the more pollution the River can take)
- Use the mid-range flow value for each flow regime
- Convert the flow and TSS concentration into a load of tons per day
- TMDL = $\frac{\text{median flow (cfs) x 52mg/L x 28.31(L/cf) x 86,400(s/day)}}{907,184,740(\text{mg/ton})}$

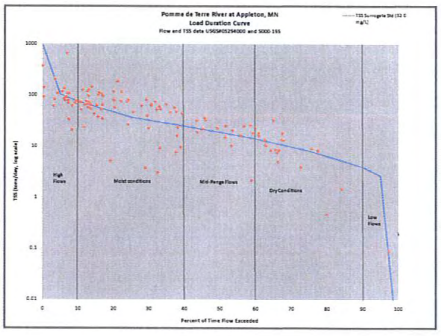
An Example: Moist Condition Flow Regime

- Flow range 170-516 cfs
- Median flow 273 cfs
- 273(cfs) x 28.31(cf/L) x 86,400(s/day) = 667,753,632(L/day)
- 52(mg/L) x 667,753,63(L/day) = 3.47×10^{10} (mg/day)
- 3.47×10^{10}(mg/day) / 907,184,740(mg/ton)= **38.2 tons/day**
- **Use the TMDL values at each regime to create a load duration curve.**



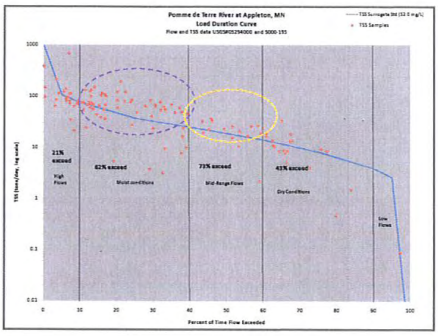
TSS Loading

- Convert the TSS readings into a daily load using flow data from the USGS station and the water quality data from the Appleton monitoring station.
- mg/L ⟹ tons/day
- Plot these readings on the load duration curve
- Values that lie above the load duration curve represent samples that exceed the 52mg/L TSS surrogate standard.



What Does the Duration Curve Tell Us?

- Useful to characterize water quality concerns and to describe patterns associated with the impairment
- By looking at the hydrologic conditions that have the most exceedences one can determine where the potential contributing areas are.



What Does This Pattern Mean?

- The problems start to develop above a flow duration interval of 60%: The Mid-Range Flows and Moist Conditions
- According to Bruce Cleland of the EPA; in an agricultural area, this type of pattern indicates the increased sediment load is the result of pollutant delivery associated with rainfall and runoff from riparian areas

Duration Curves as a Diagnostic Tool

- Duration curves and water quality data can help guide local implementation efforts to achieve meaningful results
- Can be used as a diagnostic tool which supports a "bottom up" approach towards TMDL development and water quality restoration by identifying target programs and BMPs

In Agricultural Areas

- Mid-Range Flows
  - Targeted programs should focus on riparian protection
  - Targeted activities
    - Riparian buffers: CRP or CREP
- Moist Conditions
  - Target programs should also focus on saturated upland soils
  - Targeted activities:
    - Conservation tillage
    - Contour strips
    - Grassed waterways

What's Next?

- Meeting 3 will have experts present on different Best Management Practices, conservation programs, and funding sources and opportunities for the watershed.
- How about Wednesday Feb. 10th? Same time and place.
- Please read through the packet of information on sediment reduction practices for next meeting.

HOW DID WE GET HERE?
A TMDL REVIEW

Pomme de Terre River Turbidity TMDL
Implementation Plan Stakeholder Meeting
January 12, 2010

NAME THAT ACRONYM!

BMP (1pt) Best Management Practices

CRP (1pt) Conservation Reserve Program

MPCA (1pt) Minnesota Pollution Control Agency

NRCS (1pt) Natural Resources Conservation Service

CAFO (1pt) Confined Animal Feeding Operation

SWAG (2pt) Surface Water Assessment Grant

TMDL Total Maximum Daily Load

2

A TMDL IS DEFINED AS:

A Mathematical Equation

&

A Process

3

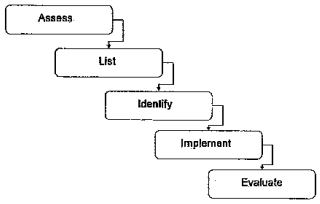
THE MATHEMATICAL EQUATION

LA + WLA + MOS + RC = TMDL

- LA = Load Allocation
- WLA = Waste Load Allocation
- MOS = Margin of Safety
- RC = Reserve Capacity
- TMDL= The amount of a specific pollutant that can enter the water and still meet the water quality standard.

4

THE PROCESS



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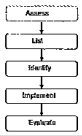
THE PROCESS - ASSESS STARTING LINE

- In Section 303 of Federal Clean Water Act
- Collect Water Quality Data
- Determine if the waterbody meets standards

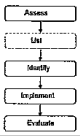


THE PROCESS - LIST

If waters do not meet standards, they are listed

Different Names - One List

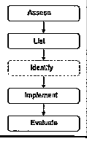
- Impaired Waters List
- TMDL List
- 303(d) List



THE PROCESS - IDENTIFY
ARE WE THERE YET?

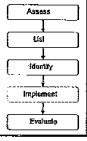
Completing the TMDL Report

- An **assessment** of what's causing impairment (may include biological, chemical, habitat, flow, etc.) - The sources
- An **allocation** of acceptable pollutant loads from point and nonpoint sources - The mathematical formula



THE PROCESS - IMPLEMENT
WE'RE HERE!

- Develop an Implementation Plan
- Collaborative efforts of public, private and non-profit organizations
- Long-term perspective
- Get Implementing!



THE PROCESS - EVALUATE

- Monitor to determine effectiveness of BMPs
- Make changes to implementation strategies based on monitoring and reevaluate

FREQUENTLY ASKED QUESTIONS (FAQ)

(and Answers)

Q: CAN PREVIOUS STUDIES (CWPS) FULFILL REQUIREMENTS OF A TMDL?

A: No.

- TMDLs require completion of a load allocation formula which previous studies would not have done
- However, some or all data from previous projects may be useful in completing a TMDL

Q: WHO HAS LEGAL RESPONSIBILITY FOR CONTENT OF A TMDL STUDY?

A: The MPCA and US EPA

- MPCA reviews all TMDLs for quality and completeness
- MPCA and EPA responsible for legally defending the technical accuracy of the document

Q: WHO WILL PAY FOR TMDL IMPLEMENTATION ACTIVITIES?

A: There are several possible sources of funds:

- State and Federal Funds
- Local Government Funds
- Private Funds
- Others?

Q: DO TMDLS MEAN MORE REGULATION?

A: MPCA's regulatory authorities do not change as a result of a TMDL.

- It is illegal to pollute waters of the state regardless of whether or not a TMDL has been completed.

Q: DO TMDLS MEAN MORE REGULATION?

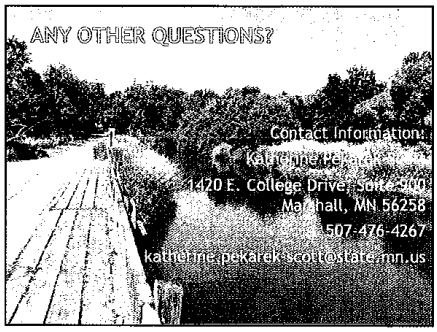
- As a result of TMDL study, some National Pollutant Discharge Elimination System (NPDES) Permits may be modified
- We will continue to rely on existing authorities and financial incentives and education to address certain nonpoint sources
- Local units of government have authority to develop new regulatory tools to control nonpoint sources

Q: WILL TMDLS LIMIT EXPANSION OF EXISTING FACILITIES?

A: TMDLs have mechanism in place to address this issue

- Specifically, the load allocation includes reserve capacity for future growth and development

ANY OTHER QUESTIONS?



Contact Information:
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Shaun McNally

From: Shaun McNally [shaun.mcnally@stevensswcd.org]
Sent: Wednesday, January 13, 2010 2:10 PM
To: 'Brady Janzen-Riverview Farms'; 'Brian Wojtalewicz'; 'Deb Koehntop-Stevens County Farm Bureau'; 'Don Dally'; 'Don Scherfenberg'; 'James Moore'; 'Jane Butzer-DOT hydraulic engineer'; 'Jim Krosch'; 'Jim Wulf'; 'John Meagher'; 'John Stephens-Perkins Lake'; 'Kurt Staples'; 'Larry Mahoney-MN Soybean Growers'; 'Mark Erdahl'; 'Patrick Moore-CURE'; 'Sean Scott'; 'Steven Commerford-MN Soybean Growers'; 'Tom Gardner-Barrett Lake'; 'Tracey Anderson-UMM'; 'Troy Goodnough'; 'Warren Formo-MN Ag Waters Resource Coalition'
Subject: Meeting 1
Attachments: Copy of PdT Turbidity TMDL Report preliminary draft3.pdf; Copy of stakeholder meeting 1.pdf

Stakeholders,
To those of you who were able to attend last night's meeting, thank you. I have included in this email a copy of the draft turbidity TMDL and a copy of my presentation if anyone is interested, and for those who weren't able to make it. Our next meeting has been scheduled.

Monday Feb. 8th
7 pm
Morris USDA ARS soils lab

On the agenda for this meeting is presentations on various practices to reduce sedimentation and funding programs to help pay for these practices. Presenters include:

Joe Montonye (Grant SWCD): Vegetated buffer strips...what they do, how they work, and available programs
Jeff Hellerman (Stevens NRCS): NRCS programs for sediment reduction
Dr. Joe Magner (MPCA/U of M): Streambank restoration practices...case studies, types of practices, cost, reductions
Matt Drewitz (BWSR): Funding opportunities available through the Clean Water Legacy Act and other programs

If you couldn't make the first meeting....We still need you, so please join us on the 8th if you can make it. This will be the 2nd in a series of meetings to help draft the turbidity TMDL implementation plan for the Pomme de Terre Watershed.

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Shaun McNally

From: Shaun McNally [shaun.mcnally@stevensswcd.org]
Sent: Friday, February 12, 2010 1:52 PM
To: 'Brady Janzen-Riverview Farms'; 'Brian Wojtalewicz'; 'Deb Koehntop-Stevens County Farm Bureau'; 'Don Dally'; 'Don Scherfenberg'; 'James Moore'; 'Jane Butzer-DOT hydraulic engineer'; 'Jim Krosch'; 'Jim Wulf'; 'John Meagher'; 'John Stephens-Perkins Lake'; 'Kurt Staples'; 'Larry Mahoney-MN Soybean Growers'; 'Mark Erdahl'; 'Mike Bruer'; 'Patrick Moore-CURE'; 'Sean Scott'; 'Steven Commerford-MN Soybean Growers'; 'Tom Gardner-Barrett Lake'; 'Tracey Anderson-UMM'; 'Troy Goodnough'; 'Warren Formo-MN Ag Waters Resource Coalition'
Subject: Stakeholder meeting 2 re-schedule

Stakeholder group,

I have re-scheduled the canceled stakeholder meeting for
Tuesday March 2
7:00 pm
Morris ARS lab

Hope most of you can make it, I think you'll find the speakers we have on tap very informative.
Thanks,

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Watershed Project Coordinator
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Pomme de Terre TMDL Implementation Plan Development
Stakeholder Meeting 2
March 2, 2010
Morris ARS lab, Morris, MN

Agenda

The purpose of tonight's meeting is for the participants in the stakeholder group to learn about various practices and programs that are available that can help reduce sediment delivery to the waterways of the PdT watershed, and programs that are available to help pay for these practices.

Speakers:
Jeff Hellerman: Stevens County NRCS District Conservationist
Joe Montonye: Grant SWCD Manager
Dr. Joe Magner: Minnesota Pollution Control Agency/U of M Dept. of Forest Resources
Matt Drewitz: MN Board of Water and Soil Resources (BWSR)

Homework assignment and next meeting details

Pomme de Terre Watershed TMDL Implementation Plan Development
Stakeholder Meeting 2
Tuesday March 2, 2010 7 pm
Morris USDA ARS lab, Morris, MN

Present

Shaun McNally, Katherine Pekarek-Scott, Joe Montonye, Deb Koehntop, Tom Gardner, Don Dally, Larry Mahoney, Doug Wulf, J.L. Meagher, Dennis Wulf, Troy Goodnough, Glen Beyer, Matt Solemsaas, Jeff Hellerman, Matt Drewitz, Joe Magner

Minutes

- Shaun McNally opened the meeting by welcoming everyone and explaining the format of the night's meeting. This is to be an informational meeting on various methods and programs available for sediment reduction in waterways. The next meeting the group will be voting on what practices they think should take priority in the watershed.

Jeff Hellerman Presentation:

Jeff's presentation was about the USDA's Natural Resource Conservation Services EQIP program and the type of practices they help producers with. This program will help pay for producers to implement practices such as cattle exclusion, rotational grazing, feedlot upgrades, sediment basins, terrace systems, nutrient management, and low pressure irrigation conversion. On average the EQIP program will reimburse 75% of the cost of installing a practice.
Jeff also discussed the Wetland Reserve Program that is now combined with the MN RIM program.

Joe Montonye Presentation:

Joe's presentation was on conservation buffers. Joe discussed various types of buffers such as filter strips, wetlands, riparian buffers, lakescaping, French drain tile inlets, and raingardens. Joe talked about buffers need to be strategically placed and are one line of defense to filter ground and surface water. And work best when combined with other conservation practices like conservation tillage and/or water and sediment control basins. Buffers can remove up to 80% of the sediment entering surface waters, can remove nitrates, and help stabilize stream banks. Other benefits to buffers can be wind erosion reduction; flood reduction, visual aesthetics, and can provide income to farmers on land that is wet or marginal. Joe discussed the various programs available like CCRP, CREP RIM, WRP, and the various buffer practices available under the CRP program.
Discussion was held on the Grant county buffers and how lake clarity has improved on many county lakes since the buffers were pushed in that county. Question was raised on the Continuous CRP program. This is not a permanent buffer; continuous only means it can be signed up at any time unlike general CRP where they have set sign up periods.

Dr. Joe Magner Presentation:

Dr. Magner's presentation was on stream hydrology, turbidity and channel restoration practices. He began by discussing how systemic changes in watershed hydrology through our land use

practices have changed how much water normally flows in a stream or river. An example was in some watersheds in the past, only 30% of the land area actually contributed water to the main river. Now with ditching and tiling, 100% of the land area is contributing water to the main river. This increase flow is causing our stream channels to try to adjust to this by widening and down cutting. As the drainage area of a stream increases, the stream channel area also increases. If we have an area of stream bank erosion we have to try to determine if it is a local issue, or a systemic issue in the watershed.
Dr. Magner then discussed some channel restoration projects he has worked on. Rock or log vanes can be used to redirect the flow away from an eroding stream bank. Using local materials can greatly reduce the cost of these types of projects. Some problems like an eroding bluff require quite a bit more thought and practices like using vanes to protect the toe of the stream, but also some practices on the top of the bluff may be needed to prevent water from seeping into the bluff and eroding it from the top.

Matt Drewitz Presentation:
Matt was on hand to discuss funding opportunities available to the watershed through the new amendment funding that was passed in 2008. Of the 4 different programs in this amendment: arts and culture, parks and rec., outdoor heritage (Lessard), and clean water, our project will be getting money out of the clean water fund. Matt discussed how the clean water money was broken down, and who gets what. Our project will get implementation funds from BWSR. In 2010, they had $13 million available in grants from the clean water fund. Matt discussed how potential projects are ranked and scored when applying for grant funding and how we need to tie our grant application to our TMDL implementation plans, which is why we need to have a plan in order to apply for funding.

Other Discussion:
After the presentations, Katherine from the MPCA mentioned that the TMDL will now be on public notice for the next 30 days. This is the public's chance to read and formally comment on the report. The Lake Shakotan TMDL was mentioned as one that was revised based on the comments received during the comment period.
Joe Montonye posed the question for the producers in the group: "what makes you sign up or not sign up for these programs, is it money or something else?" Discussion ranged from these programs are too complicated and drawn out, to too many strings attached by the government, and they are not flexible enough. Money was important though as these practices affect the producer's bottom line.
The next meeting date will be set after Shaun contacts the group. Shaun asked all present to look at the "homework" sheet and fill it out to help guide our discussion and voting at the next meeting.

Homework Assignment: Turbidity BMPs

Turbidity
Causes can include soil erosion from fields, stream bank erosion, urban runoff from precipitation, excessive algal growth. 57% of the PdT's water samples (1997-2008) exceeded the turbidity standard of 25 NTU.

Facts:

- Turbidity levels are generally highest following rain events in late spring and early summer.
- Watershed wide, 69% of the land is in agricultural production (row crops, cattle production)
- South of Morris, 84% of the land is in agricultural production
- Only 1.7% of the watershed is urban area (.8% of that is Morris)
- There is 751 miles of streams, creeks, ditches and other waterways in the watershed.
- In Stevens County only 35% of county ditch miles have adequate buffers. In Grant County only 31% of county ditch miles have adequate buffers.(BWSR Public Drainage Ditch Buffer Strip Study)

Possible solutions and programs:

- High residue crop farming: no-till, strip till, minimum till
- Grass buffers along streams and waterways
- Conservation practice structures: sediment basins, grassed waterways, terraces.
- Stream bank stabilization and diversion structures
- Rain gardens and storm water retention ponds to absorb stormwater, extra street sweeping in towns
- Pasture management: cattle exclusion fencing, stream crossings, rotational grazing

Please choose *one* of the following general implementation strategies that you believe would have the biggest improvement on the turbidity impairment on the Pomme de Terre River (TMDL pages 36-38)

1. Pasture Management
Examples: exclusion fencing, rotational grazing

2. Conservation Tillage
Examples: No-till, Strip-till, Ridge-till

3. Vegetative Practices

Examples: Filter strips, Riparian buffers, Grassed waterways, Wetland restorations

4. Structural Practices

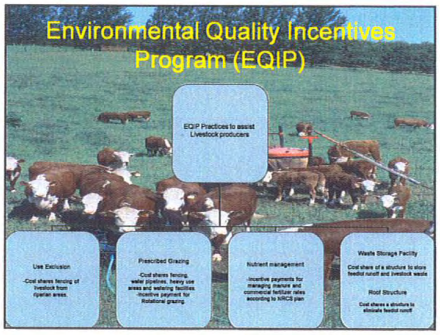
Examples: Water and sediment basins, Open tile inlet removal, Bank armoring: rock rip-rap or bioengineering, Stream barbs

5. Other (Please list)

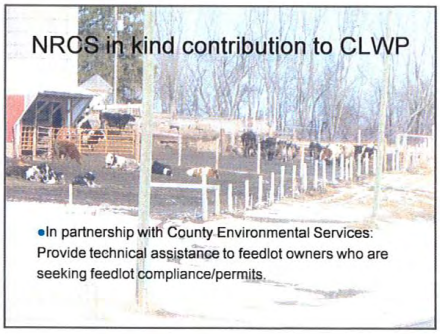
Of the general implementation strategy you chose above; please list direct actions, ideas, thoughts, and solutions that would address turbidity. Example: If you chose #3, a direct action would be to ensure a 30 foot wide buffer of vegetation on the banks of all watercourses.

3/3/2010


USDA Natural Resources
Conservation Service
Jeff Hellermann
District Conservationist


Environmental Quality Incentives
Program (EQIP)
EQIP Practices to assist
Livestock producers
Prescribed Grazing
Nutrient management
Waste Storage Facility
Roof Structure


Environmental Quality Incentives
Program (EQIP)
EQIP practices to assist
crop producers
Nutrient Management
Sprinkler Irrigation System


NRCS in kind contribution to CLWP
•In partnership with County Environmental Services:
Provide technical assistance to feedlot owners who are
seeking feedlot compliance/permits.


Wetlands Reserve Program (WRP) and
ReInvest in Minnesota (RIM) Combination
– 30 year WRP easement and a
Permanent RIM easement.
75% WRP and 25% RIM easement and
restoration cost sharing

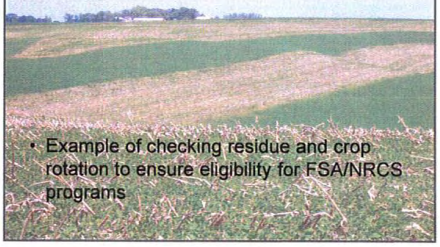

CRP Filter strip
30 – 120 ft

1

Conservation Stewardship Program (CSP)

- Brand new program
- First signup began in August 2009.
- Received 6 applications. 5 were approved
- 5 year contracts
- Intended to reward good stewards of the land and to encourage conservation activities
- Average 2010 annual payment approx $25/acre

Highly Erodible Land Compliance



- Example of checking residue and crop rotation to ensure eligibility for FSA/NRCS programs

3/3/2010

CONSERVATION BUFFERS

WHAT IS A CONSERVATION BUFFER?

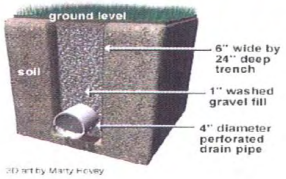
- In short, buffers are a common-sense way to protect the environment and demonstrate a commitment to conservation. They're best described as a small area or strip of land in permanent vegetation that's designed to slow water runoff, improve water quality, provide shelter and stabilize riparian areas.
- Strategically placed in the landscape, buffers can effectively mitigate the movement of sediment, nutrients, and pesticides.

FILTER STRIP

LAKESHORE RESTORATION

WETLANDS

BLIND INLETS (FRENCH DRAIN)



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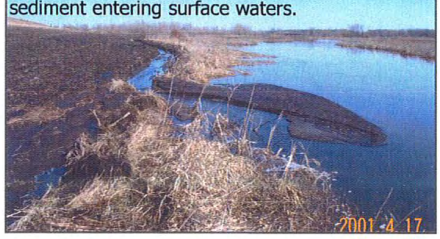
RAIN GARDENS

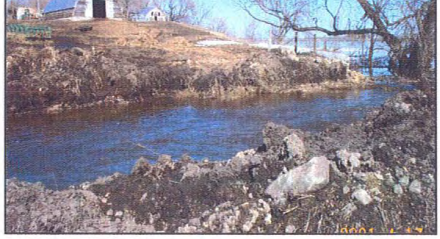
BENEFITS OF BUFFERS

- Located in environmentally sensitive areas, buffers provide **another line of defense** to filter both surface and shallow ground water before it enters streams and lakes.

- Buffers reduce 40% (on average) of phosphorous entering surface waters
- Buffers can reduce up to 80% of sediment entering surface waters.



Buffers can remove up to 60% of pathogens in runoff water.



Buffers remove a significant amount of nitrate and stores it in the plant material

Buffers help to stabilize Stream banks

Buffers provide a source of food, nesting cover and shelter for wildlife.

Sometimes a Buffer keeps us out of areas, where we ought not be.....

Blind inlets can reduce sediment losses from fields by as much as two thirds compared to what would be expected if traditional tile inlets are used.

Other Benefits

- Reduces wind erosion.
- Slows water runoff.
- Reduces downstream flooding.
- Adds visual aesthetics to the landscape.

Greater Profits

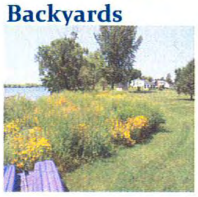
- Often provides income from local, state and federal programs.
- Reduces crop losses from flooding.
- Protects soil in vulnerable areas.

Where should buffers be established?

- Lakes and Wetlands
- Streams and Ditches

Where should buffers be established?

Backyards



Commercial Areas

Programs available to establish Buffers on Ag Land

- (CCRP) Continuous Conservation Reserve Program
- (CREP) Conservation Reserve Enhancement Program
- (RIM) Re-Invest in Minnesota Reserve
- (WRP) Wetland Reserve program
- (EQIP) Environmental Quality Incentives program
- State Cost-Share Native Buffer program

CCRP Buffer Practices

- **CP21 Filter Strips**
- **CP27 Farmable Wetlands Program**
- **CP28 Farmable Wetlands Buffer**
- **CP22 Riparian Buffer**
- **CP29 Marginal Pastureland Wildlife Habitat Buffer**
- **CP30 Marginal Pastureland Wetland Buffer**
- **CP23A Wetland Restoration, Non-Floodplain**

Programs to Establish Buffers on Non-Ag land

- **Shoreland Habitat Restoration Grant Program**

- **STATE COST-SHARE PROGRAM**
  - **Critical Area planting**
  - **Native Buffer program**

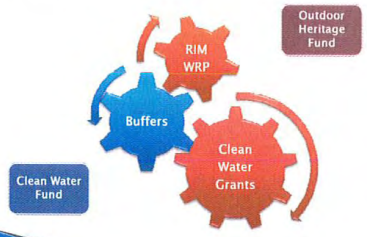
3/3/2010

Implementation Opportunities for the Pomme de Terre Watershed

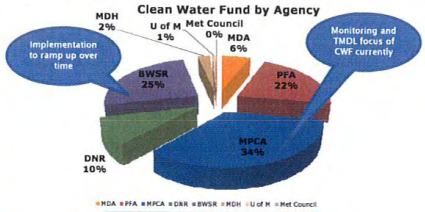
BWSR Clean Water Competitive Grants

Matt Drewitz, BWSR
Clean Water Specialist
March 2, 2010

BWSR Amendment Funds



FY10-11 Multi-Agency Breakdown of Funds ($151Million)



Expect a similar break down for the next few State budget cycles

FY2010 Clean Water Funding

Agency Fund	FY 2010 Amount	LGUs Eligible
BWSR Runoff Reduction Grant	$2,460,000	WDs, WMOs
BWSR Clean Water Assistance Grant	$2,650,000	SWCDs, WDs, WMOs, Counties
BWSR Feedlot Grant	$2,500,000	SWCDs, WDs, WMOs, Counties, and JPBs
BWSR Shoreland Grant	$1,400,000	SWCDs, WDs, WMOs, Counties, and JPBs
BWSR Conservation Drainage Grant	$200,000	SWCDs, WDs, WMOs, Counties, and JPBs
MPCA SSTS Inventory Grant	$350,000	Counties
BWSR SSTS Imminent Health Threat Grant	$800,000	Counties
BWSR SSTS Program Enhancement Grant	$870,000	Counties
MDA Ag BMP Loans	$1,800,000	Eligible Ag BMP Loan Authorities
Totals Funds	$13,280,000	

Additional BWSR General Fund Grant Funds in Competitive Pool

Native Buffer Cost Share: $1,000,000

Cooperative Weed Management: $100,000

Ranking Criteria for 2010 Clean Water Fund Projects

Ranking Criteria	Maximum Points Possible
Narrative	10
Outcomes	25
Prioritization	30
Readiness to Proceed	10
Augmented Funding	10
Long-term public benefit	10
Consistency with Groundwater Plans	5
Total Points Available	100

Results of 2010 Grant Process

- 210 Applications for $44M in Requests
- $13M in grants available
- Grant process highly competitive
- FY2011 process may start earlier this year
- Anticipated similar funding levels available in 2011 as 2010

7

Outcomes and Measures

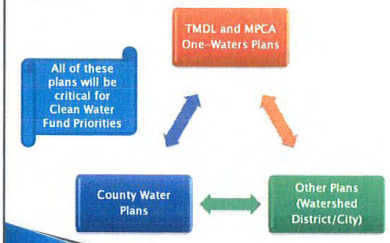
- Amendment funding has raised the bar of expectations on OUTCOMES
- Clean Water Fund dollars required by legislature to describe MEASURES and OUTCOMES up-front

8

Defining Measures and Outcomes

9

Connecting TMDLs to Local Water Plans



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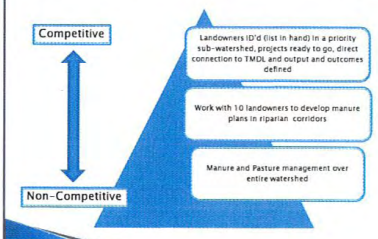
Developing an Application for Implementation Funds

11

Specificity need to be competitive



12

Focusing Conservation Efforts

- BMPs
- Technical Assistance
- Landowner Involvement
- Economics
- Program Availability

Riparian Buffers

Conservation Tillage

Riparian Pasture Management

Examples BMPs from PDT TMDL

13

Summary: How to be competitive for Clean Water Grants

- Defining measurable outputs and outcomes
- Connecting your project back to a water quality plan
- Targeted projects that directly address the water resource of concern

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For More Information

- Matt Drewitz, BWSR Clean Water Specialist
  - 507-359-6076
- Jeff Hrubes, BWSR Clean Water Specialist
  - 218-833-8608
- Pete Waller, BWSR Board Conservationist
  - 218-736-5445, ext. 104
- David Sill, BWSR Board Conservationist
  - 507-537-6374

2010 Clean Water Fund Annual Report:
http://www.bwsr.state.mn.us/cleanwaterfund/Annual_Report-FY2010.pdf

15

Shaun McNally

From:	Shaun McNally [shaun.mcnally@stevensswcd.org]
Sent:	Wednesday, March 03, 2010 2:20 PM
To:	'Arne Kildegaard'; 'Brady Janzen-Riverview Farms'; 'Brian Wojtalewicz'; 'Deb Koehntop-Stevens County Farm Bureau'; 'Don Dally'; 'Don Scherfenberg'; 'James Moore'; 'Jane Butzer-DOT hydraulic engineer'; 'Jim Krosch'; 'Jim Wulf'; 'John Meagher'; 'John Stephens-Perkins Lake'; 'Kurt Staples'; 'Larry Mahoney-MN Soybean Growers'; 'Mark Erdahl'; 'Mike Bruer'; 'Patrick Moore-CURE'; 'Sean Scott'; 'Steven Commerford-MN Soybean Growers'; 'Tom Gardner-Barrett Lake'; 'Tracey Anderson-UMM'; 'Troy Goodnough'; 'Warren Formo-MN Ag Waters Resource Coalition'
Cc:	'Pekarek-Scott, Katherine (MPCA)'; 'Shaun McNally'
Subject:	Stakeholder meeting 2
Attachments:	Jeff Hellerman.pdf; Joe Magner.pdf; Joe Montonye.pdf; Matt Drewitz.pdf; meeting 2 minutes.pdf; Homework Assignment 2.pdf

Stakeholders,

Thanks again for those who attended last night. We had 4 informative presentations. I've included them in this email for those who weren't able to make it. Minutes from last night's meeting are attached. Also included is a "homework assignment". Please look this over, as it will help us guide our discussion and voting at the next meeting.

Speaking of the next meeting. This is the meeting where you as a group will decide on what practices you think should be a priority for our implementation plan. I'd like to schedule the meeting for the week of March 22nd or March 29th. Tuesdays and Thursdays seem to work the best. So the dates I am thinking of are **March 23rd or March 25th, or March 30th or April 1st.**

Please let me know if any of those dates WON'T work for you. I'll try to schedule the date that will work best for most of us.

Thanks for your commitment to the Pomme de Terre.

Shaun McNally
Pomme de Terre River
Watershed Project Coordinator
12 Hwy 28 E. Ste. 2
Morris, MN 56267
(320) 589-4886 ext. 109
(320) 287-2615 cell
shaun.mcnally@stevensswcd.org

Tuesday 05/17/2011

6pm-9pm

Pomme de Terre River Association Watershed Project

POMME DE TERRE RIVER ASSOCIATION TMDL STAKEHOLDER MEETING

Meeting <u>Tonight</u> in the <u>basement</u> of the Old No. 1

Tonight will be the last of the stakeholder group meetings as we work to finalize the TMDL process for Turbidity in the Pomme de Terre River Watershed.

BMP Ranking Sheet

Please note all BMP's discussed will be included in the implementation plan unless a majority votes to remove it from the list or we discuss removing it. This ranking sheet will help us prioritize BMP's that have support and will result in the reduction of sediment entering local rivers, streams, and lakes.

Structural Practices – Please rank these practices on a scale of 1-5 in accordance with what you feel their effectiveness is and your willingness to adopt the practice on your own property if it were applicable to you. Circle the "0" if you would like to see this practice removed from the implementation plan.

	Most Importance → Less					Remove
1. Channel Restoration_____	1	2	3	4	5	0
2. Lakeshore Stabilization Practices_____	1	2	3	4	5	0
3. Grade Control Structures_____	1	2	3	4	5	0
4. Alternative Tile Intakes_____	1	2	3	4	5	0
5. Terraces_____	1	2	3	4	5	0
6. Diversions_____	1	2	3	4	5	0
7. Water and Sediment Control Basins_____	1	2	3	4	5	0

Vegetative Practices

1. Wetland Restorations_____	1	2	3	4	5	0
2. Lakeshore Restorations_____	1	2	3	4	5	0
3. Rain Gardens_____	1	2	3	4	5	0
4. Riparian Buffers_____	1	2	3	4	5	0

	Most Importance → Less					Remove
5. Filter Strips_____	1	2	3	4	5	0
6. Grassed Waterways_____	1	2	3	4	5	0

Pasture and Feedlot Management and Conservation Tillage

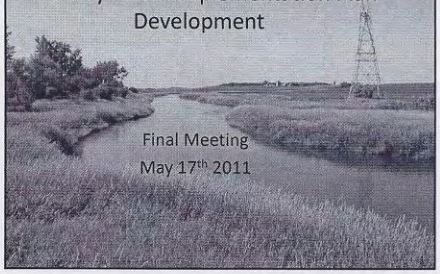
1. Exclusion Fencing_____	1	2	3	4	5	0
2. Rotational Grazing Plans_____	1	2	3	4	5	0
3. Feedlot Buffers_____	1	2	3	4	5	0
4. Conservation Tillage_____	1	2	3	4	5	0

Point Source BMPs

1. Street Sweeping_____	1	2	3	4	5	0
2. LEED Certifications_____	1	2	3	4	5	0
3. Pervious Pavements_____	1	2	3	4	5	0
4. Green Roof Technologies_____	1	2	3	4	5	0

Write In – Please take a few moments to write in your ideas of some BMPs that we may have missed when creating this list for possible inclusion into the implementation plan.

Pomme de Terre River Turbidity TMDL Implementation Plan Development



Final Meeting

May 17th 2011

Tonight's Agenda

- Welcome and introductions
- The Turbidity TMDL, changes and questions – Katherine Pekarek-Scott and Joe Hauger, MPCA
- Implementation Plan background, timeline, and an overview of BMPs – Brett Arne, PdT River Association
- Selection of practices to be included or excluded in the plan – Stakeholders
- Recap and further questions - Everybody

The Implementation Plan

- MN State Statute 114D.15 Subd. 11.
  - "TMDL Implementation Plan" means a document detailing restoration activities needed to meet the approved TMDL's pollutant load allocations for point and non-point sources.
- Implementation plans spell out activities that can be done to correct impairments in the PdT River.

Why Do an Implementation Plan?

- It's required by the state for any TMDL.
- An approved implementation plan provides exclusive access to certain restoration funding opportunities.
- Many grants for water quality improvement require an approved TMDL implementation plan.
- It opens up more pots of money for us.

What's in an Implementation Plan?

- A summary of the TMDL.
- An identification of target pollutant reductions, priority areas, and management measures needed to obtain the TMDL.
- Reasoning and analysis of all management measures that were considered.
- An identification of project objectives.
- A timeline.
- An evaluation plan.
- A budget estimate for completing the project activities.

What is Your Role in the Implementation Plan Process?

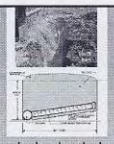
- You are stakeholders….You or your organization has a stake in the future land use concerns in the watershed.
- Our goal is to educate you on the TMDL report, concerns, current monitoring, and funding sources.
- As a committee we will be voting on implementation strategies…Where you think we should be focusing our efforts.

Best Management Practices

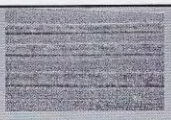
- The heart of the implementation plan
- "BMPs" are the practices we can seek funding for, and need your help deciding what is include, or what to exclude(if anything) from the plan.

Best Management Practices Review

- **Structural**
  - Channel Restoration – Designed to restore the natural riffle, pool relationship of channels to decrease water velocity thus decreasing sediment load.
  - Lakeshore stabilization – The use of live cedar revetments, rock wave breaks and natural fiber root wads control sediment from entering the lake basin. Shallow lakes are heavily wind stratified and excess suspended sediment can degrade water clarity and fish and plant life.



- **Structural**
  - Grade control structures - can include check dams, but other more recommended practices include grassed waterways with grade control riffles using rock fill and channel control.
  - Alternative tile intakes – The use of blind inlets or other alternative tile intakes can reduce the amount sediment entering tile systems.



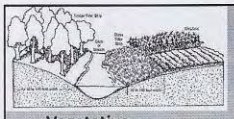
- **Structural**
  - Terraces – These structures help slow water movement down long slopes by breaking it into shorter slopes. Water's momentum is interrupted by reaching vegetated strips before it continues downhill reducing rill and gully formation.
  - Diversions – Used to divert water flow away from a problem area and into a collection area or drainage basin.

Best Management Practices Review

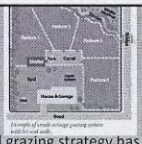
- **Structural**
  - Water and Sediment Control Basins – Similar to terraces and diversions but act as the depression to collect sediment as water flows across land above the structure.

- **Vegetative**
  - Wetland restorations – wetlands act as the natural filter for sediment and other chemicals during high water periods, they slow overland flow and store runoff.
  - Lakeshore restorations – Through native plantings, lakeshores can be stabilized by root structures of natural plants which further help to break waves and limit erosion. They also serve as a barrier for chemicals and stormwater runoff similar to filter strips.

- **Vegetative**
  - Rain gardens – These are typically small, depressional natural plantings designed to collect stormwater and runoff easing the load on storm sewers or other drainages.
  - Riparian buffers – Strips of grass, trees, and shrubs that slow overland water flow and hold nutrients and chemicals from entering streams and lakes.



- **Vegetative**
  - Filter strips are similar to riparian buffers but may be constructed along smaller streams and wetlands to prevent sediment and nutrients from entering the stream.
  - Grassed waterways – Constructed in areas prone to gully erosion, planted to sod-forming grasses to prevent further erosion and deep gully formation.



- **Pasture Management**
  - The use of a rotational grazing strategy has shown to increase the forage potential of the pastured areas as well as prevent extended contact with streambanks, improve plant recovery and ground cover which helps slow overland water flow. The use of exclusion fencing can help limit livestock from direct water contact preventing animal waste from "direct deposit".

Best Management Practices Review

- **Conservation tillage**
  - Practices that keep 30% cover on the soil after seeding to prevent sediment loss by water or wind.

- **Point Source Contaminant Management**
  - **Municipal stormwater management**
    - Morris is currently the only city in the watershed with a Storm Water Pollution Prevention Plan (SWPPP)
    - Cities that are required to obtain one and do not will be required to meet standards.
    - Urban Stormwater plans can include the following BMPs:
      - Street Sweeping
      - Rain gardens
      - LEED certified development initiatives
      - Pervious pavements
      - Green roof technologies

Best Management Practices Review

- **Point Source Contaminant Management**
  - **National Pollutant Discharge Elimination System**
    - Municipalities and Industrial NPDES permit holders are given discharge limits and no further activities are required outside of their permit requirements.

Questions

Other practices to discuss?