Implementation Plan for the Lake St. Croix Nutrient Total Maximum Daily Load

Prepared for:

The Minnesota Pollution Control Agency
in cooperation with
The Wisconsin Department of Natural Resources
and
The St. Croix Basin Water Resources Planning Team

Original October 2012, Revised February 2013

Minnesota Pollution Control Agency

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October 2012

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1.0. INTRODUCTION

THE IMPACT OF TOO MUCH PHOSPHORUS IN LAKE ST. CROIX

The St. Croix River, its tributary streams and rivers, and Lake St. Croix are highly valued resources that provide exceptional recreational opportunities and support diverse wildlife in and out of the water. However, over the years eutrophication, or nutrient enrichment, has occurred in Lake St. Croix due to increasing amounts of phosphorus entering the lake from the watershed. The elevated level of phosphorus in Lake St. Croix results in algae blooms which diminish the enjoyment and use of the lake and impact the ecologic integrity. Elevated phosphorus levels not only impact Lake St. Croix, but also impact tributary streams, rivers, and lakes throughout the watershed. While progress has been made in recent years to understand and reduce the amount of phosphorus finding its way into streams and lakes, much work remains. To learn more about excess phosphorus in Lake St. Croix, and general information about the entire St. Croix River Basin, visit the following internet sites:

- St. Croix River Basin - Minnesota Pollution Control Agency
- St. Croix River Basin - Wisconsin Department of Natural Resources
- St. Croix Basin Water Resources Planning Team (hereafter referred to as the 'Basin Team')
- St. Croix River Association

THE PURPOSE OF THIS IMPLEMENTATION PLAN

This Implementation Plan represents an important step in the improvement of Lake St. Croix, and the entire St. Croix River Basin, by establishing a path forward for achieving the needed reduction in the loading of phosphorus from the watershed.

The Implementation Plan has been developed to meet the Lake St. Croix Nutrient Total Maximum Daily Load (TMDL). Section 303(d) of the federal Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop TMDLs for water bodies that are not meeting water quality standards. The TMDL process establishes the allowable loading of pollutants for a water body based on the relationship between pollution sources and conditions in the water body. By following the TMDL process, states can establish water quality-based controls to reduce pollution and restore and maintain the quality of their water resources.

Once a TMDL is established, an Implementation Plan must be developed. The Implementation Plan is designed to ensure that the required reductions in pollutant loadings identified by the TMDL will be achieved. The Implementation Plan provides information on management measures and regulatory controls; timelines for implementation of management measures and attainment of water quality standards; a monitoring plan designed to determine the effectiveness of implementation actions; and a description of adaptive management procedures.

In order to meet the goals for Lake St. Croix and improve water quality throughout the watershed, communities and landowners in the St. Croix Basin will need to reduce phosphorus in wastewater treatment facility discharges and storm water runoff from urban, residential, agricultural, and forestry land. Restoration of water quality depends upon local support as many phosphorus reduction activities will require voluntary efforts on privately owned land areas. Effective watershed management involves citizens, landowners, state and local government agencies, and non-profit agencies all working together to sustainably manage local water resources. This Implementation Plan presents the essential components of a watershed based plan to restore and protect Lake St. Croix and its tributary streams from the impacts of excessive phosphorus loadings. These plan components are presented in Figure 1.

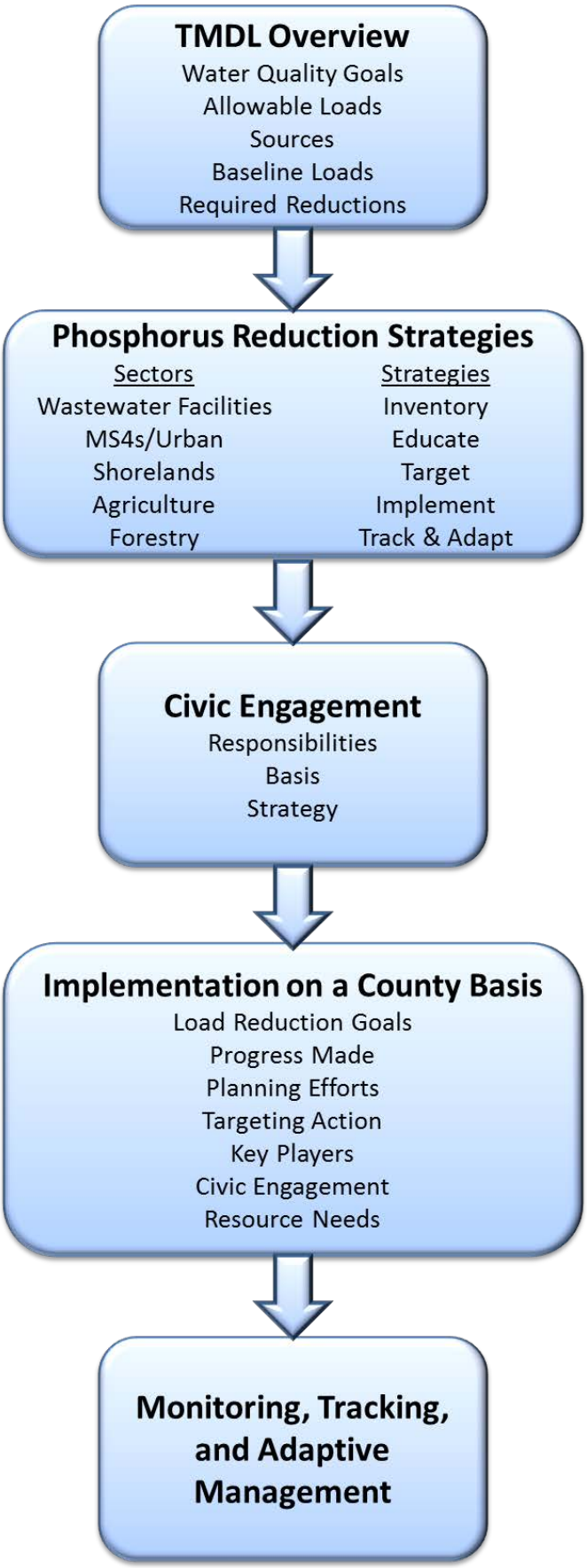

Figure 1. Lake St. Croix Implementation Plan Components

2.0. TMDL OVERVIEW

This section provides a brief summary of the key components of the Lake St. Croix Nutrient TMDL. The TMDL and supporting material can be found on the internet at:

- MPCA Lake St. Croix TMDL Website

Lake St. Croix consists of four pools downstream of Stillwater, Minnesota: Bayport, Troy Beach, Black Bass, and Kinnickinnic Pools (Figure 2). The St. Croix River Basin (Figure 3), which drains to Lake St. Croix, represents a large area, approximately 7,760 square miles, with approximately 44 percent of the basin land area located within Minnesota and 56 percent within Wisconsin. The St. Croix River originates near Solon Springs, Wisconsin, and flows west and south more than 160 miles until it joins the Mississippi River at Prescott, Wisconsin. Lake St. Croix is a naturally impounded riverine lake in the lower 25 miles of the St. Croix River.

WATER QUALITY GOALS FOR LAKE ST. CROIX

Lake St. Croix was first listed on both the Minnesota and the Wisconsin 2008 303(d) Impaired Waters List due to eutrophication (excess phosphorus). A TMDL for phosphorus in Lake St. Croix was developed through a collaborative effort among the Minnesota Pollution Control Agency (MPCA), Wisconsin Department of Natural Resources (WDNR) and the Basin Team. The Lake St. Croix Nutrient TMDL has undergone public notice, review and comment and agency approval (approved by EPA in August, 2012). The primary components of the TMDL were largely based on the results of past lake and nutrient loading studies. The TMDL included establishing the water quality targets for Lake St. Croix (Table 1).

Table 1. Lake St. Croix Water Quality Standard

Water Quality Parameter	Standard
Total phosphorus, µg/L	40
Chlorophyll-a, µg/L	14
Secchi disc transparency, m	1.4

ALLOWABLE PHOSPHORUS LOADS TO LAKE ST. CROIX

The TMDL determined that, in order to meet these goals, the phosphorus loading to Lake St. Croix could not exceed 360 metric tons of phosphorus per year. This loading target is more than twice the estimated natural background phosphorus load of 166 metric tons per year.

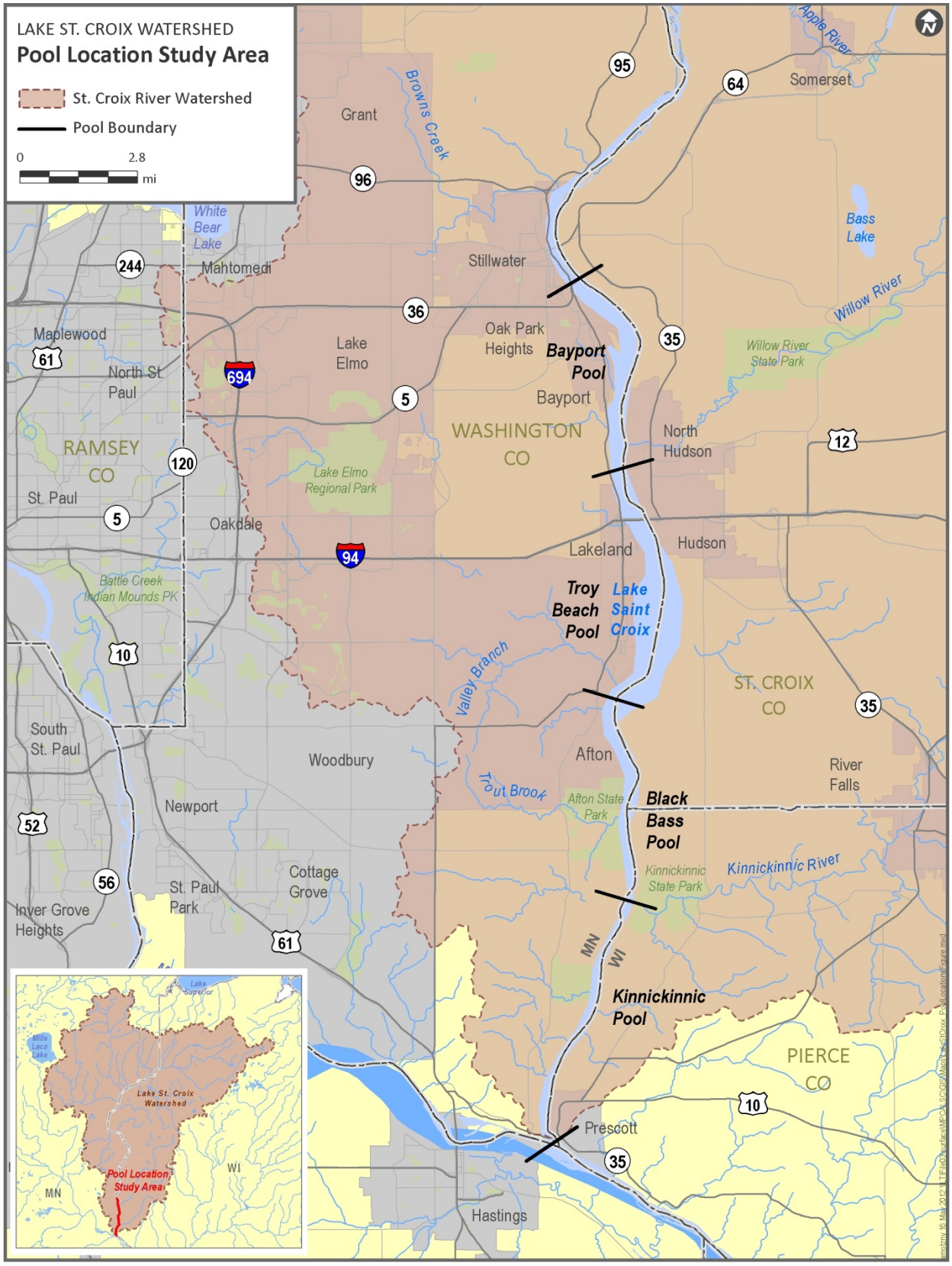

Figure 2. Lake St. Croix Location and Pools

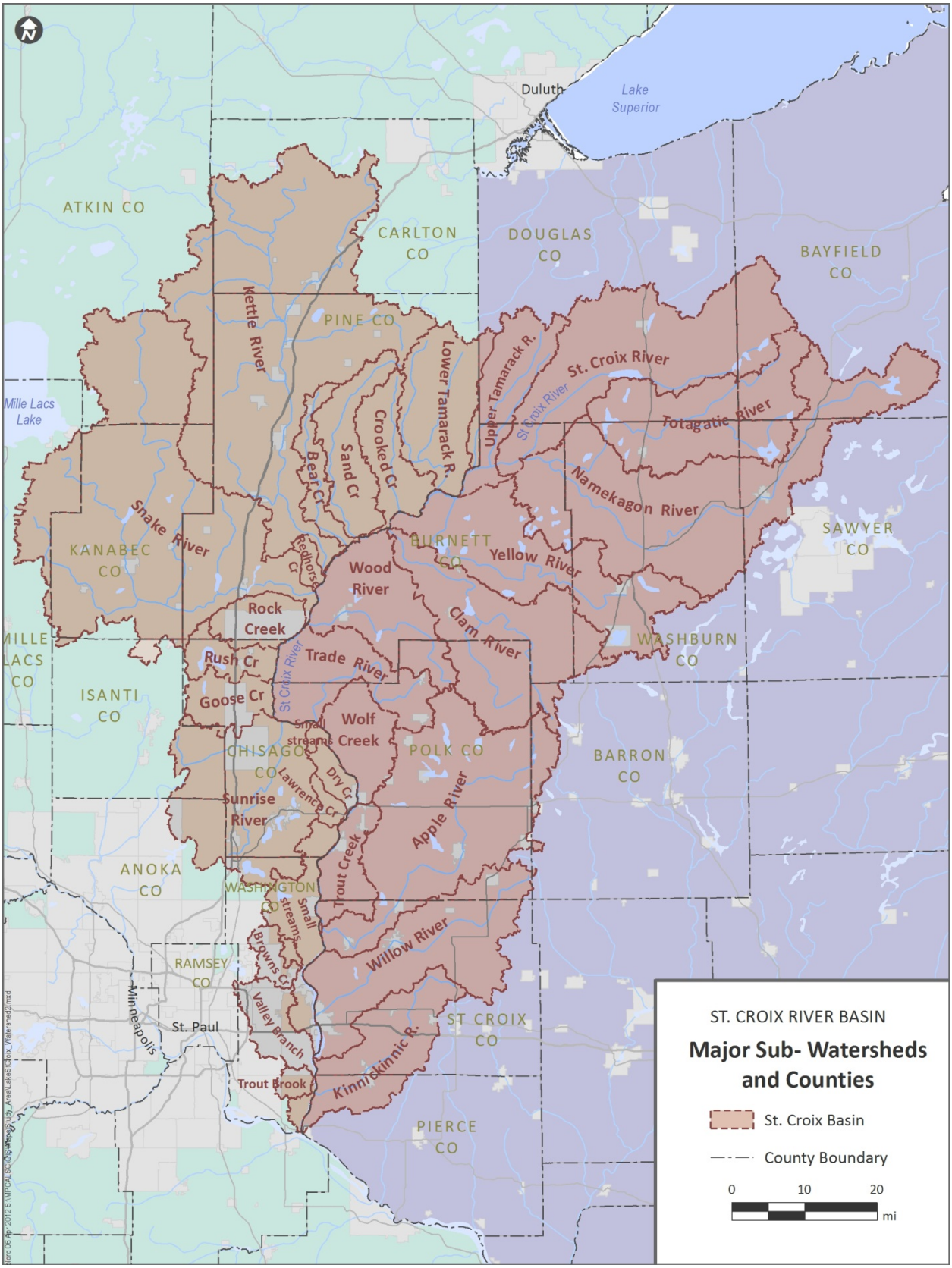

Figure 3. St. Croix River Basin

For purposes of implementation, the TMDL is described in terms of five components, listed below, and is represented numerically in Table 2:

- ***Waste Load Allocations (WLA):*** represents phosphorus loading from point sources such as permitted wastewater treatment facilities and storm water discharge from the municipalities regulated under a Municipal Separate Storm Sewer System (MS4) permit.
- ***Load Allocations (LA):*** represents phosphorus from nonpoint sources.
- ***Tribal Loads;*** represents phosphorus loads from a tribal treatment plant and runoff.
- ***Margin of Safety (MOS):*** accounts for uncertainty associated with modeling estimates and environmental variation.
- ***Reserve Capacity (RC):*** represents the portion of the load that is set aside to account for certain wastewater capacity needs specified in the TMDL report.

Table 2. Lake St. Croix TMDL Equation

TMDL Loading Capacity		=	Waste Load Allocations	+	Load Allocations	+	Tribal Loads	+	Margin of Safety	+	Reserve Capacity
metric tons per year:	360	=	39.924	+	296.604	+	0.656	+	18	+	4.816
pounds per day:	2,172.8	=	240.9	+	1,790.3	+	4	+	108.6	+	29

SOURCES OF PHOPHORUS IN THE BASIN

Sources of phosphorus in the basin include both point and nonpoint sources. At the time of the TMDL development, point sources of phosphorus in the Waste Load Allocation for the basin included:

- 52 municipal and industrial wastewater facilities;
- 25 municipalities regulated for storm water runoff by a MS4 permit; and
- 10 concentrated animal feeding operations, or CAFOs.

A complete listing of the point sources is included in Appendix A of the TMDL (MPCA Lake St. Croix TMDL Website).

Nonpoint source loads of phosphorus in the basin, which are included in the Load Allocation component of the TMDL, are the result of runoff from the various land uses. The TMDL assessed runoff for the following land use categories:

- **Agricultural** = Row Crops + Small Grains
- **Urban** = Low Intensity Residential + High Intensity Residential + Commercial/ Industrial/ Transportation, Quarries/ Strip Mines/ Gravel Pits
- **Grassland** = Grasslands/ Herbaceous, Pasture/ Hay, Urban/ Recreation Grasses
- **Forest** = Deciduous Forest + Evergreen Forest + Mixed Forest + Woody Wetlands
- **Shrubland** = Barren Transitional + Shrubland
- **Water** = Open Water + Emergent Herbaceous Wetlands

Land use in the St. Croix Basin, representing 1992 conditions, is summarized in Figure 4. Forest is the primary land use in the basin, representing 56% of the total area, and upwards of 80% to 90% in the northern portions of the basin. Grassland and agricultural land comprise another 33% of the basin, and upwards of 60% to 80% in the southern portions of the basin.

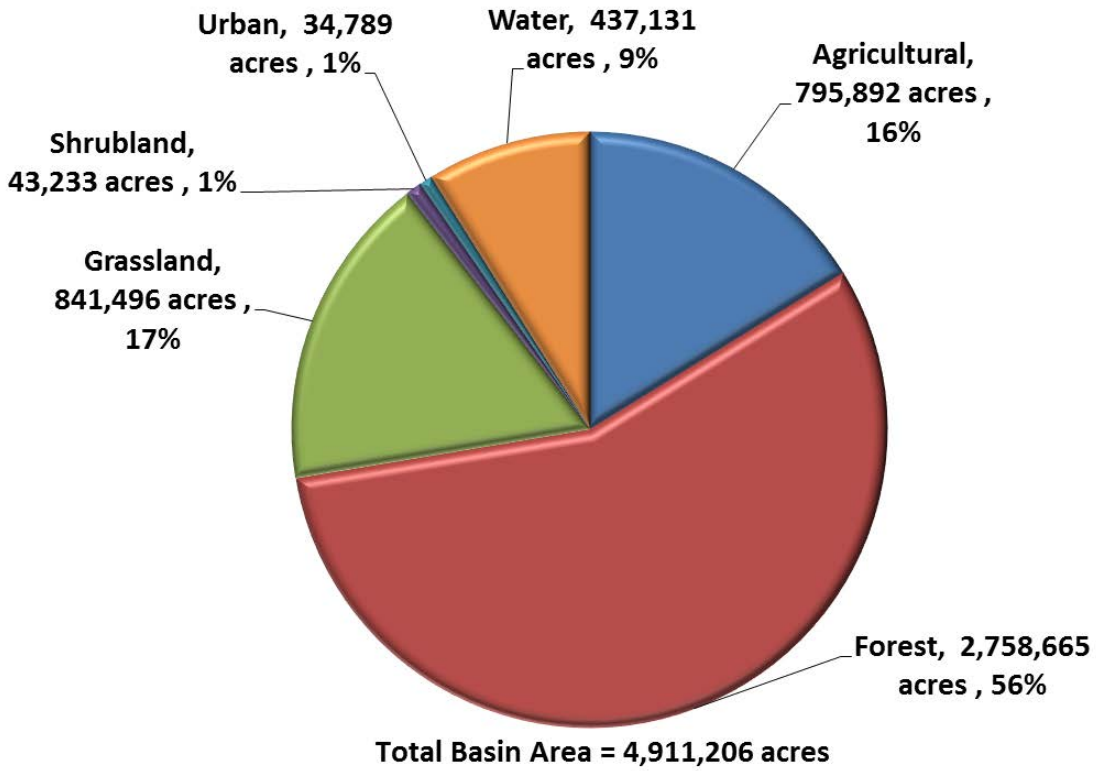

Figure 4. St. Croix Basin Land Use Summary

Phosphorus releases from the sediments in Lake St. Croix, or internal loads, were considered in the TMDL as well as phosphorus loads from atmospheric deposition. The TMDL included an estimate of the internal loading to be 7.095 metric tons/yr and the loading from atmospheric deposition as 0.441 metric tons/yr.

Tribal sources of phosphorus in the basin were considered separately in the TMDL. Tribal sources include one minor wastewater discharge and runoff from approximately 13 square miles, or 0.17% of the basin area.

BASELINE PHOSPHORUS LOADS AND REQUIRED REDUCTIONS

The TMDL estimated the amount of phosphorus from each source under baseline conditions, which was intended to represent the early 1990s. Phosphorus loads from wastewater facilities were estimated based on permit conditions for those facilities. Phosphorus loads in runoff were estimated in the TMDL by calibrating phosphorus export coefficients for each land use category.

The baseline loading to Lake St. Croix was estimated to be 460 metric tons/yr, as presented in Table 3. In order to achieve the TMDL of 360 metric tons/yr, and account for a margin of safety and reserve capacity, a reduction of approximately 123 metric tons/yr, or 27 percent, from baseline conditions is needed.

Load reductions needed to meet the phosphorus goals established in the TMDL are based on attaining wastewater facility improvements and reduced loadings of phosphorus in runoff. The TMDL did not include reductions from the Wisconsin General Permit wastewater load, internal load, atmospheric deposition, or the tribal load. The TMDL assumed reduced phosphorus export coefficients for agriculture, urban, and grassland land use categories, as presented in Table 4. However, the final means of achieving the overall reduction in phosphorus loading in runoff will be determined by local implementers when selecting the most effective projects.

Table 3. Phosphorus Loads by Source Category

	Baseline (1990s)	TMDL	Reduction from baseline to meet TMDL
Componet	**(metric tons/yr)**		
Wasteloads(WLAs)	**61.975**	**39.924**	**22.051**
Wastewater facilities	51.914	33.994	17.92
MS4 permitees	8.743	4.688	4.055
General permits - WI	1.000	1.000	0.0
Construction runoff - MN	0.159	0.121	0.038
Industrial runoff - MN	0.159	0.121	0.038
Non- Regulated Loads(LAs)	**397.369**	**296.604**	**100.765**
Watershed runoff	389.833	289.068	100.765
Internal	7.095	7.095	0
Atmospheric	0.441	0.441	0
Tribal Load (TL)	**0.656**	**0.656**	**0.0**
Watershed runoff	0.352	0.352	0
Wastewater	0.304	0.304	0
Margin of Safety (MOS)	**-**	**18.000**	**-**
Reserve Capacity (RC)	**-**	**4.816**	**-**
Total Load	**460.000**	**360.000**	**122.816**

Table 4. Phosphorus Export by Land Use Category

Land Use Category	Baseline Export Coefficient (lb/acre-yr)	TMDL Export Coefficient (lb/acre-yr)	Export Reduction
Agriculture	0.561	0.338	40%
Urban	0.561	0.338	40%
Grassland	0.197	0.143	27%
Forest	0.088	0.088	0%
Shrubland	0.088	0.088	0%
Water	0.006	0.006	0%

Note: Export coefficients were applied uniformly across basin.

The history of phosphorus loading to Lake St. Croix and the reductions required to meet the TMDL are shown in Figure 5. The phosphorus load in the mid-1800s was estimated to be 166 metric tons/yr. This load was prior to any significant changes caused by human development. By the early 1990s, the baseline loading of phosphorus to Lake St. Croix is estimated to have increased by 294 metric tons/yr to 460 metric tons/yr, nearly three times the natural conditions. The TMDL calls for a phosphorus load of 360 metric tons/yr, with 22.816 metric tons/yr of that assigned to the margin of safety and reserve capacity, leaving 337.184 metric tons/yr of allowable loading from existing sources. This is 171.184 metric tons/yr more than natural conditions but 122.82 metric tons/yr less than baseline conditions in the early 1990s. The TMDL requires a significant reduction in phosphorus load to restore and protect Lake St. Croix, but the allowable loading is still more than double the loading under natural conditions. Figure 6 presents the required reductions for the various sources the TMDL identified for reduction.

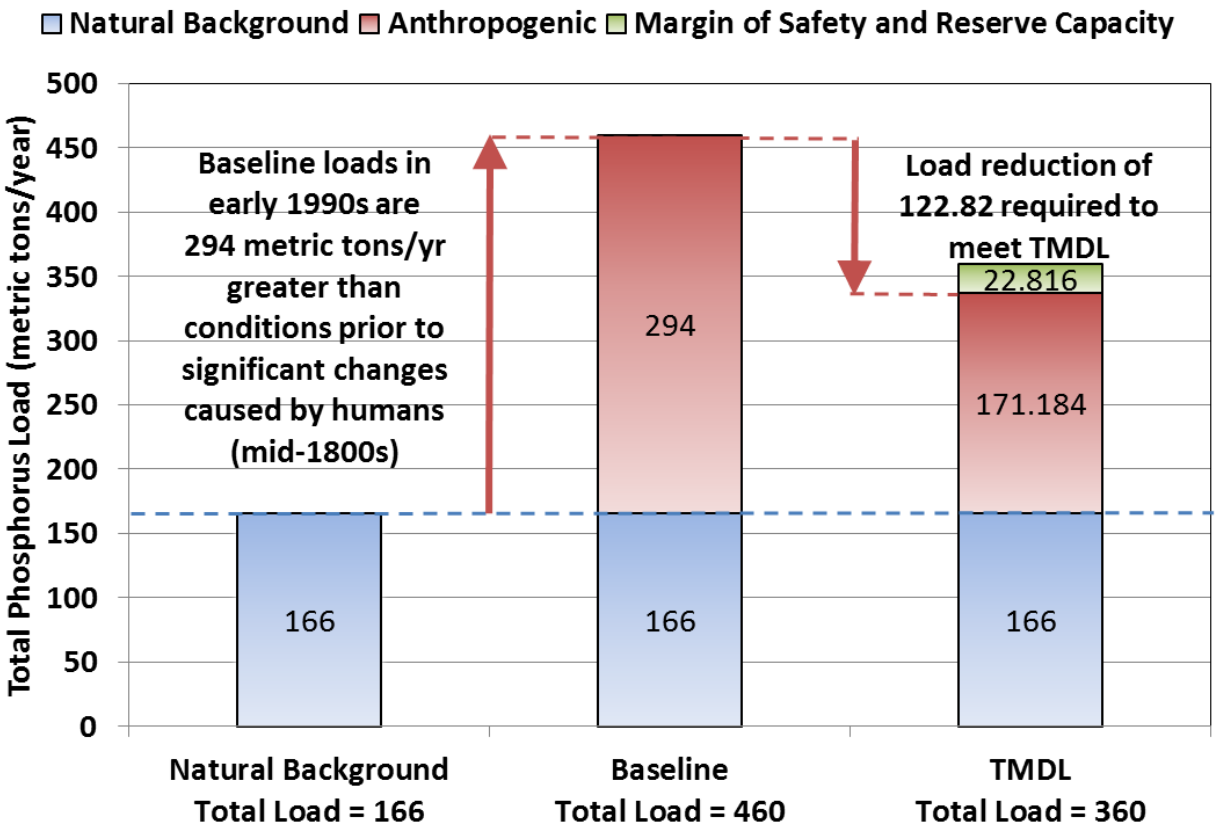

Figure 5. Loading and Load Reduction Summary

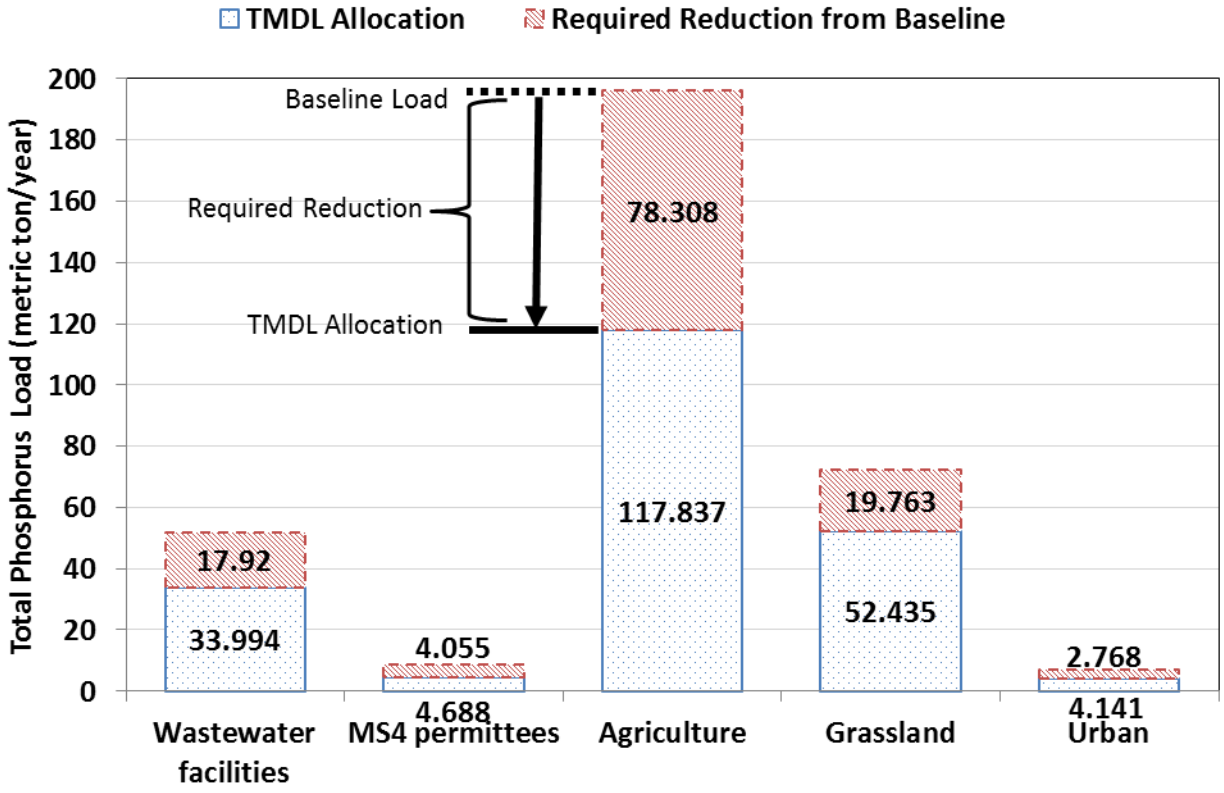

Figure 6. Load Reduction by Source

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3.0. PHOSPHORUS REDUCTION STRATEGIES

Significant progress has been made on many fronts throughout the St. Croix Basin in raising awareness and reducing phosphorus loads. However, additional efforts are needed to restore and protect this valuable resource. Phosphorus reduction strategies are discussed in this section. These include strategies for point source sectors, nonpoint source sectors, water resource education efforts, and targeting of specific projects within a sub-basin. These strategies are presented in a general format as a resource for developing specific strategies on a sub-basin, county, or local scale.

POINT SOURCES

Wastewater Treatment Plants

Required reduction of 17.92 metric tons/yr phosphorus from baseline to meet TMDL.

Wastewater treatment plants (WWTPs) are critically important for public health as well as the protection of our water resources. They play the essential role of treating sanitary wastewater in urban areas as well as treating industrial wastewater. Section 5.4 of the TMDL presents the wasteload allocation (WLA) methodology for WWTPs in the basin. Larger WWTPs were assigned a specific WLA, while smaller facilities were grouped together into an aggregate WLA.

WWTPs have made significant progress in improving the effectiveness of their facilities and removing phosphorus from their discharges. Facilities have permits that may already include phosphorus limits that are more restrictive than the WLA assigned in the TMDL. Each state will design its own permitting process which will be implemented in accordance with the following general principles:

- Each discharger will monitor and report effluent phosphorus concentrations and loads on their discharge monitoring reports, allowing for evaluation of annual loading rates from the facility.
- Where monitoring is not deemed to be feasible the permittee or the state may estimate loadings on the basis of models or other accepted methodologies.
- Permits for the individual discharger (or dischargers) exceeding their individual share of the aggregate loading cap will be evaluated for development of water quality based effluent limits consistent with the individual WLAs established by the TMDL.
- Cumulative phosphorus loads from eligible dischargers will be evaluated for compliance with the aggregate loading caps.
- Trends indicating probability of future exceedance of the aggregate loading cap (i.e. aggregate load ≥ 85% of the aggregate WLA) will trigger a data evaluation process to identify the cause for the increasing phosphorus loading trend.
- If any facility included in the aggregate load closes, or no longer meets the criteria for inclusion (due to expansion, etc.), the assigned load will be subtracted from the aggregate loading cap. The remaining dischargers will continue to share in the remaining portion of the aggregate loading cap.

WWTPs may need further reductions of phosphorus in their discharge to meet requirements other than the Lake St. Croix TMDL which are more restrictive, such as TMDLs for local water bodies, or phosphorus criteria for the stream or lake receiving the discharge.

In addition to reflecting WLAs in permits issued to wastewater treatment facilities, various strategies may be considered to further reduce the total wastewater phosphorus load, including:

- Foster local education on individual, community, and commercial efforts to reduce sources of phosphorus entering wastewater treatment systems.
- Identify the number of communities in the basin that are using phosphorus-based strategies for corrosion control in water mains, estimate the amount of phosphorus lost to receiving waters, and examine alternatives to polyphosphates.
- Promote and facilitate regionalization of wastewater treatment systems through the development of comprehensive sewage management plans for areas of the basin where existing sewage treatment practices (such as septic fields and holding tanks) are releasing excessive nutrients.

Municipal Separate Storm Sewer Systems (MS4s)

Required reduction of 4.055 metric tons/yr phosphorus from baseline to meet TMDL.

The requirement for regulated MS4 communities to meet the WLAs in the TMDL is enforced through the NPDES permitting process. Fully achieving the WLA for a regulated MS4 may take several years. Implementation for MS4s can be viewed as a 4-step process:

Step 1: Understand Existing Conditions

The MS4 should develop an estimate of the existing loading of phosphorus from the regulated MS4 land area to the St. Croix River or its tributaries. This estimate can be based on monitoring or modeling efforts of existing conditions, or a combination of both. The MS4 could also assess phosphorus load reductions based on BMPs put in place since the TMDL baseline conditions of 1992. Consideration should be given to planned projects that will result in additional phosphorus removal, as well as ordinances, rules, and other requirements that will require new development and redevelopment to reduce phosphorus loads. MS4s may also account for closed watershed areas that do not discharge to the St. Croix River or its tributaries.

Step 2: Determine Required Reductions

The TMDL WLA for MS4s is based on attaining an average annual loading rate to the St. Croix River or its tributaries of 0.338 lb/ac/yr over the regulated MS4 land area. The estimate of existing conditions from Step 1 should be compared to this TMDL WLA goal for MS4s. If existing conditions are estimated to be contributing at a higher loading rate, then additional BMPs will need to be assessed and implemented in Step 3. If existing conditions are estimated to be meeting the TMDL WLA, the MS4 should consider efforts needed to maintain compliance.

Step 3: Identify and Target Best Management Practices

With an understanding of the magnitude of reductions needed to meet the TMDL WLA from Step 2, the MS4 should identify and target BMPs for implementation. This process should include assessments of cost-effectiveness, implementability, operation and maintenance, and provision of benefits in addition to phosphorus reduction. Additional information on BMPs for urban stormwater is provided below. The MS4's Stormwater Pollution Prevention Plan (SWPPP) will need to be modified to include an implementation timeline with an end date for meeting the WLA.

Water resource education will be critical for MS4 entities to meet their load reduction goals. This may take many formats, but some of the most common will include:

1) Education, commercial advertising and social marketing to residents and other key audiences within the community to reduce widespread, small sources of phosphorus such as leaves and grass clippings in the streets.

2) Outreach and technical assistance to private landowners within the MS4 community to support implementation of targeted BMPs in critical source areas.

3) Training/Workshops for MS4 staff, contractors and builders on how to reduce phosphorus from construction and development / redevelopment (both private and municipal), parks and public grounds maintenance, road work and other common practices.

4) Education, Training/Workshops and Technical Assistance for elected and appointed officials at the MS4 to support the development and implementation of policies, ordinances, standards and practices that will reduce phosphorus loading.

MS4 permits may currently contain similar education requirements but they may not be of the scale and/or specificity needed to meet the Lake St. Croix TMDL goals.

Step 4: Demonstrate Compliance

There are two options for demonstrating compliance with the TMDL WLA: 1) monitoring; and 2) performance-based assessment. These are discussed further below.

Compliance demonstration using monitoring: If practical, the MS4 may develop a monitoring program to estimate the phosphorus loading from the MS4 regulated area. The monitoring program would need to be developed specific to the MS4 to address the layout of the MS4, drainage patterns, and relationship with the receiving waters. In a very simplistic setting where the MS4 drains to a single stream, upstream and downstream monitoring may be used to estimate the cumulative load from the MS4. Monitoring may not be practical to address all areas of the MS4 so consideration may be given to selecting representative sites and extrapolating those results to un-monitored areas.

Performance-based compliance demonstration: A performance-based approach to compliance demonstration would require the MS4 to document the BMPs that are put in-place and their estimated effectiveness at reducing phosphorus loads from existing or baseline conditions. Estimates of phosphorus reduction for specific BMPs can be taken from literature values or developed using modeling tools.

The compliance demonstration approach, whether monitoring or performance-based, should be documented and included in the SWPPP. Multiple years of demonstration covering varying climatic conditions will be needed to fully assess compliance with the TMDL WLA for MS4s.

Successful stormwater management includes implementation of local planning and zoning ordinances, codes, and policies, ideally including standards for treatment that:

- Incorporate low-impact development concepts into future land-use planning and stormwater treatment to reduce pollutant loading and maintain hydrologic integrity for all new development, redevelopment, industrial, and construction sites.
- Establish zoning regulations, such as minimum set-back distances from shorelines for new developments and redevelopment, to prevent significant disturbances which would result in increased erosion along lakes and waterways.
- Incorporate low-impact design principles into all plans for re-development or expansion and infrastructure or street replacement projects to treat existing sources of stormwater that are not subject to other permit programs.
- Where it is not feasible or cost-effective to improve the existing developed hydrology and pollutant loadings, other options for providing regional management of stormwater runoff should be explored.

The St. Croix Minimal Impact Design Standards (MIDS) Pilot Community Project was established to help St. Croix Basin communities meet state water quality regulatory requirements and provide a real testing ground for the application of the performance goals, credits and calculators, and the community assistance package in the Minnesota MIDS approach. The Pilot Community Project involves regional and focused community assistance in the form of education, training, review and consultation services, and tools and resources such as model ordinances; all with the intent to apply the MIDS package. Education and training includes NEMO – Nonpoint source Education for Municipal Officials programming and Stormwater U – technical training for staff and consultants. Up to three pilot communities will receive free education, training, and consulting services to update plans, ordinances and codes to protect their local water resources and ultimately the St. Croix River. The MIDS Pilot Community Project is managed through the Washington Conservation District with input from a Steering Committee. While the MIDS project is being conducted with the purpose of achieving improvements in water quality, it does not include a specific goal of meeting load reduction requirements for the Lake St. Croix TMDL. Additional efforts beyond MIDS may be required to meet TMDL goals.

MS4/Urban Stormwater Runoff Resources:

- Minnesota Minimal Impact Design Standards
- Minnesota Stormwater Manual
- Northland NEMO
- University of Minnesota Stormwater Education Program
- University of Minnesota Stormwater Research
- Wisconsin Stormwater Manual
- EPA's National Menu of Stormwater BMPs

Construction and Industrial Runoff

Required reduction of 0.076 metric ton/yr phosphorus from baseline to meet TMDL.

Construction stormwater activities in are considered in compliance with provisions of the TMDL if they obtain a Construction General Permit under the NPDES program and properly select, install and maintain all BMPs required under the permit, including any applicable additional BMPs required for discharges to impaired waters, or meet local construction stormwater requirements if they are more restrictive than requirements of the General Permit.

Industrial stormwater activities are considered in compliance with provisions of the TMDL if they obtain an industrial stormwater general permit or General Sand and Gravel general permit (MNG49) under the NPDES program and properly select, install and maintain all BMPs required under the permit. Therefore, implementation for construction and industrial stormwater includes confirming continued operation in compliance with their permit conditions.

Concentrated Animal Feeding Operations

No required reduction of phosphorus from baseline to meet TMDL.

At the time the TMDL was written, there were ten permitted concentrated animal feeding operations (CAFOs) in the St. Croix Basin (see Appendix A of the TMDL). The number of CAFOs is expected to fluctuate as farms expand, change operation, or stop production. Implementation actions for these facilities include confirming their continued operation is in compliance with their permit conditions.

Although these facilities have the potential to contribute phosphorus from manure stored on site, their permits do not allow the release of any runoff containing pollutants from their production areas. One exception is the Emerald Dairy in St. Croix County, Wisconsin that does have a discharge with a

phosphorus limit authorized in its permit. The TMDL includes the Emerald Dairy discharge in the aggregate WLA for WWTPs.

Permitted CAFOs in Wisconsin and Minnesota are also required to comply with manure and nutrient management requirements for croplands associated with CAFO operations, such as Natural Resources Conservation Service (NRCS) Conservation Practice Standard 590.

NONPOINT SOURCES

Shoreline/Riparian Landowners

No required reduction of phosphorus from baseline to meet TMDL.

Shoreline and riparian landowners have a direct link to water quality based purely on proximity. These individuals play an important role in reducing phosphorus export to Lake St. Croix through thoughtful decision making on a small scale.

Sources: Oftentimes, shoreline and riparian landowners do not realize the negative impact that their everyday household management practices may have on water quality. The degree of impairment to water bodies as a result of the following practices will vary depending upon the magnitude and frequency of each action.

- Overuse of fertilizers
- Inadequate buffer between developed land and surface water body
- Failing /damaged septic systems
- Pet/animal waste

Opportunities to reduce phosphorus inputs: Shoreline areas of both Minnesota and Wisconsin are protected to a certain degree by the enforcement of shoreline ordinances established at state and local levels. These rules limit shoreline and riparian landowners to specific building codes, vegetation management and possible detrimental activities within riparian areas. Small changes in land use practices can have large impacts on overall water quality in Lake St. Croix. Several reduction strategies exist that are designed to attenuate the amount of phosphorus entering adjacent surface waters. Many of these strategies are cost-effective and small-scale.

- Installation/construction of shoreline buffers
- Reduction/elimination of fertilizer application
- Repair failing/damaged septic systems
- Installation of rain gutters along rooftops to limit soil erosion around buildings
- Erosion control measures
  - Plant trees/shrubs to stabilize shoreline & riparian areas, especially along steep slopes
  - Limit land clearing/grading near shorelines
- Increase infiltration
  - Remove/reduce impervious surfaces near shoreline/riparian areas
    - Gravel driveways/walk paths in place of pavement
    - Use of paving stones for walkways in place of concrete
  - Installation of rain gardens to absorb water runoff from buildings/houses and paved areas thereby promoting slow infiltration

Water Resource Education will also be critical to reducing phosphorus loading from shoreline/riparian owners. This may include:

- Education, commercial advertising and social marketing to address widespread, small sources of phosphorus such as overuse of fertilizers and minor erosion.
- Outreach, civic engagement and technical assistance to enable larger and more expensive reduction strategies such as installation of shoreline buffers and repair of failing septic systems.

Shoreline/Riparian Landowner Resources: The following websites contain information on lakeshore ordinances and best management practices for shoreline and riparian landowners.

- EPA's Lake Shoreland Protection Resources
- Minnesota DNR Shoreland Management Resources
- Wisconsin DNR Safeguarding Our Shorelands for the Future
- University of Minnesota - Extension Shoreland BMPs

Agriculture

Required reduction of 78.308 metric tons/yr phosphorus from baseline to meet TMDL for row crop and small grain land uses. Required reduction of 19.763 metric tons/yr phosphorus from baseline to meet TMDL for grassland land uses.

For much of the St. Croix Basin, and especially those watersheds that drain directly to Lake St. Croix, agriculture is the dominant land use and provides critically important economic and social value. Significant improvements in agricultural practices, such as nutrient management, conservation tillage, and buffer strips, have provided opportunities for farmers to make changes that can reduce the amount of phosphorus leaving their lands and entering the adjacent waters. The TMDL estimated a baseline 1992 phosphorus loading rate from agricultural land of 0.561 lbs/ac/yr and set a load allocation goal of 0.338 lbs/ac/yr, a 40% reduction from baseline conditions. How much progress has been made since 1992 is uncertain and needs further assessment. However, additional efforts should be continually assessed and implemented to reduce phosphorus loads.

Sources: Cropland and livestock operations, if not managed properly, can create conditions resulting in increased phosphorus entering surface waters. Factors affecting phosphorus export include:

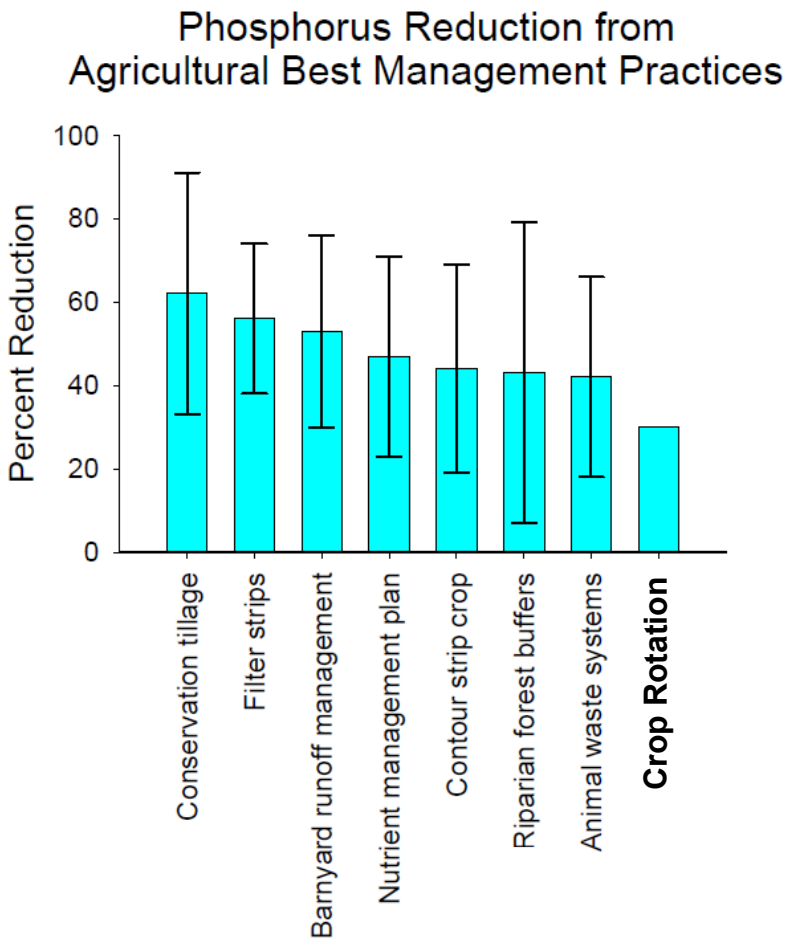
- Soil erosion
  - Tillage in sensitive areas
  - Cultivation of steep slopes
  - Streambank destabilization and sloughing
  - Increased tile drainage leading to streambank destabilization and sloughing
- Animal waste
  - Lack of adequate containment and storage systems
  - Frozen ground land application
  - Grazing in riparian areas
  - Feedlot runoff
- Fertilizer application
  - Over application
  - Timing

Opportunities to reduce phosphorus inputs: Throughout much of the basin, agricultural production systems and practices have changed significantly over the past twenty years. This evolution is largely due to the development and utilization of best management practices with respect to agricultural operations. These practices include:

- Use of conservation tillage and no-till practices
- Vegetative filter strips and field buffers among row crops
- Implementation of rotational grazing pastures
- Implementation of crop rotation
- Cover crops
- Nutrient management plans - proper use (i.e., amount) and timing of fertilizer applications
- Ditch management to mitigate phosphorus/sediment inputs to surface waters
- Proper containment and management of animal waste
- Vegetative filters strips near barnyards and milkhouses
- Exclusion of livestock from sensitive areas
- Installation of riparian buffers between crops/livestock areas and adjacent surface waters
  - Prevention of animal grazing in these areas
  - Plant trees/shrubs to stabilize banks thereby preventing erosion
- Retirement of cropland located in areas known to have a disproportionately high contribution to phosphorus export.
- Wetlands restoration.

While many of these phosphorus reduction strategies for agriculture are well known, significant financial support is needed to identify, conduct outreach to, and provide technical assistance for agricultural producers within critical source areas in order to increase adoption of these practices. Civic engagement and broad-scale education will help to support these efforts.

A literature review of the potential phosphorus reduction efficiencies from various agricultural BMPs is shown in Figure 7, with reductions generally ranging from 40% to 60%, but with significant variability. These results indicate that the TMDL goal of 40% reduction of phosphorus load from agriculture is achievable.



Gitau, M.W., W.J. Gburek, and A.R. Jarrett. 2005. A tool for estimating best management practice effectiveness for phosphorus pollution control. J. Soil Water Conservation. 60(1):1-10.

Figure 7. Phosphorus Reduction Potential for Agricultural BMPs.

Agriculture Resources: The following sources contain an abundance of information regarding phosphorus reduction strategies and best management practices for the agricultural community.

- Wisconsin Department of Agriculture Trade and Consumer Protection
- Minnesota Department of Agriculture
  - Ag BMP Assessment and Tracking Tool Project
  - The Agricultural BMP Handbook for TMDLs in Minnesota
- Discovery Farms
- University of Wisconsin Ag. Extension
- University of Minnesota Ag. Extension

Forestry

No required reduction of phosphorus from baseline to meet TMDL.

Forest management activities are an important part of the state economies of both Wisconsin and Minnesota. Reductions in phosphorus loadings from this sector are attainable and should be considered.

Sources: Forestry management activities, especially in the northern portions of the St. Croix Basin, can represent a significant phosphorus load contribution to surface waters. Increased phosphorus loadings from forestry are typically the result of:

- Accelerated erosion from land surface and riparian areas; and
- Increased terrestrial organic matter inputs directly to waterways.

Opportunities to reduce phosphorus inputs: Careful planning of forest management activities and mindful consideration of potential water quality impacts during road construction, harvesting and other management practices can significantly reduce phosphorus inputs to surface waters from forestry related activities. Such activities and practices include:

- Maintenance of riparian management zones (RMZs)
  - Limit entry/light harvesting in proximity to riparian areas
  - Maintenance of long lived riparian tree species
- Proper planning, construction and maintenance of road/skid trail waterway crossings
- Proper planning and management of prescribed burning activities
- Proper methods and application of chemicals
- Avoiding excessive addition of organic material and debris to surface waters
- Minimize surface erosion
  - Proper road location and planning
  - Winter harvesting in sensitive areas
  - Installation of erosion control practices
    - Crowned roads
    - Water bars
    - Sediment capture basins
    - Proper ditching and culvert placement
  - Post-harvest vegetation of skid trails and roads

As with agriculture, phosphorus reduction strategies for forestry are known, but financial support is needed to identify, conduct outreach to, and provide technical assistance for forest managers within critical source areas. Civic engagement and education will help to support these efforts.
State and national tax incentive programs and third party certification groups also provide opportunities for improved forestry practices:

- Wisconsin Managed Forest Law Program
- Minnesota Forest Stewardship Program
- Sustainable Forestry Initiative
- Forest Stewardship Council
- American Tree Farm System

Forestry Resources:

- Wisconsin's Forestry BMPs for Water Quality
- Sustaining Minnesota Forest Resources

Urban and Rural Residential Runoff – Non-MS4

Required reduction of 2.768 metric tons/yr phosphorus from baseline to meet TMDL.

Urban and rural residential areas, other than what is included in MS4 regulated areas, provide opportunities for reducing phosphorus loads in the basin. Many small communities, especially within the northern half of the basin, make up this sector, along with increasing development of land that was previously used for agriculture.

Sources: Urbanization and development has the potential to significantly alter the hydrology of the landscape resulting in significant changes to the flow and volume of stormwater runoff. Impervious surfaces are widely distributed in urban environments leading to reduced rates of infiltration and increased opportunities for incorporation of phosphorus into stormwater runoff. Other factors that contribute to increased phosphorus loadings in developed areas:

- Overuse of fertilizers
  - Golf courses, commercial and private lawn care
- Pet/animal waste
- Lawn and yard waste (i.e., retention of leaves/grass on pavement, car washing)
- Sediment erosion/erosion from small construction sites
- Failing septic systems
- Road maintenance activities

Opportunities to reduce phosphorus: Rural communities can follow the 4-step process outlined previously for MS4 communities. There are also many small-scale modifications to practices in developed environments that provide opportunities to reduce phosphorus loadings to surface waters. These include:

- Stormwater pollution prevention planning and implementation for small (non-MS4) communities and towns
- Proper use of fertilizers or use of fertilizers with no phosphorus
- Proper disposal of pet waste
- Reduced impervious surfaces
- Installation of rain gardens/wetlands/retention basins that absorb excess runoff and promote ground infiltration
- Installation of rain gutters that control flow from rooftops thereby redirecting stormwater away from impervious surfaces
- Proper containment/prevention of sediment erosion
- Collection and disposal of lawn waste
- Proper design and inspection/maintenance of community and individual wastewater treatment systems (septic systems) to assure compliance with applicable standards; priority for rehabilitation of noncompliant systems should be given to those with direct surface or subsurface connections to excess nutrient-impaired waterbodies and to systems that contribute excess phosphorus to the impaired waterbody through the surface water drainage network
- State-of-the-art BMPs for street and road construction, reconstruction, subdivision development, and redevelopment in non-MS4 communities and towns

The water resource education techniques needed to reduce runoff from urban and rural residential areas will be similar to those used in MS4 communities, including:

1) Education, commercial advertising and social marketing to residents and other key audiences within the community to reduce widespread, small sources of phosphorus such as fertilizers and lawn waste.

2) Outreach and technical assistance to private landowners within the community to support implementation of targeted BMPs within critical source areas.

3) Training/Workshops for county and municipal staff, contractors and builders on how to reduce phosphorus from construction and development / redevelopment (both public and private), parks and public grounds maintenance, road work and other common practices.

4) Education, Training/Workshops and Technical Assistance for county and city elected and appointed officials to support the development and implementation of policies, ordinances, standards and practices that will reduce phosphorus loading.

Urban and Rural Residential Runoff Resources: Many of the resources for MS4s also apply to non-MS4 developed areas. The following resources provide additional guidance:

- University of Minnesota - Extension Lawn Care
- Clean Water Minnesota Yard Care
- University of Wisconsin - Extension Home & Yard Publications

WATER RESOURCE EDUCATION

Continuing education of citizens on water resource issues is critical in achieving support for implementation activities and achieving progress, especially for nonpoint source reductions. The Washington Conservation District (WCD) of Washington County, MN summarized the many forms water resource education may take. Understanding how these different categories of education work together with other forms of education and implementation efforts is important in achieving progress with nonpoint source reductions. WCD's list of potential educational activities that should be considered in the St. Croix Basin is presented below. Leadership at the basin level in the development of water resource education materials, expertise, and examples will have the benefit of providing consistent and reliable resources for those focusing on implementation at the watershed, county, and local levels.

Environmental/Water Resource Education - A learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action. (UNESCO Tbilisi Declaration, 1977). Education increases awareness, provides link to deeper learning opportunities, and enhances receptivity to behavior change. Examples include: newspaper articles; events; newsletters; brochures; posters; and classroom sessions.

Public Outreach - The process of connecting with a specific group of people. Outreach does not always have a strong informational component as its primary goal is to build relationships. Examples include public meetings and personal contact.

Public Involvement - Obtaining public input to meet specific legal requirements - generally part of a planning or permit review process. Examples include citizen advisory committees and public hearings.

Public Participation – Programs that involve the public in specific activities in which the government entity plans and organizes the activity and the public merely participates. Public participation can be a component of or a stepping stone to civic engagement. Examples include storm drain stenciling, stream cleanups, and invasive species removal activities.

Civic Engagement – Activities that develop the combination of knowledge, skills, values, and motivation of the public to take a leadership role in promotion of water quality goals. Civic engagement promotes a 'grass roots' approach to getting the public involved. Examples include lake associations or watershed groups, nonprofit advocacy groups, and citizen advisory committees. Additional discussion of civic engagement is presented in Section 4 of this Implementation Plan.

Commercial Advertising - Commercial styled approaches to increase name recognition, build awareness, and connect on an emotional level to create receptivity to social marketing and promote civic engagement. Can be used to drive the audience to a source for more information like a website. Examples include public service announcements and advertising in papers or billboards.

Social Marketing - Targeted activities designed for a specific audience to elicit behavior change (such as land use practices that reduce pollutant loads). To be most effective, social marketing is designed to connect with broader awareness building (through education outreach, and advertising). Social marketing recognizes that initiatives are most successful at changing behavior when they are at the community level and involve direct contact with people. Social marketing is also most effective when it provides incentives and removes barriers.

Training/Workshops - Training on water quality and how to implement management practices. Can be designed for varying audience knowledge levels. Can be used as a technique to create receptivity to behavior change or may precipitate behavior change.

Technical Assistance - Individual assistance to support design, implementation and maintenance of management practices. Also serves as 1-on-1 education and training (e.g. site visits with landowners). Technical assistance must be paired with public education and outreach, commercial marketing, and community-based social marketing approaches to motivate individuals to seek available assistance.

Education and Outreach in the St. Croix Basin

Leadership at the basin level is critical to the success of education and outreach activities throughout the watershed and will guide and provide support for education activities conducted at the county level. The Basin Team maintains a subcommittee focused on education and outreach in the basin. The education and outreach subcommittee is in the process of developing an education and outreach plan with the following objectives which will enable the adoption of phosphorus reduction strategies within each sector as outlined earlier in this section:

1. *Stay Focused- Keep outreach and education activities focused on the goal of reducing phosphorus delivery to the St. Croix. Review and share model outreach and educational plans from successful TMDL projects prior to development of the St. Croix outreach and education plan.*
2. *Target- Segment the audience*
    i. *Geography - Target outreach and education resources on those sources or landscapes within the basin that contribute the highest phosphorus loads to the St Croix River. Continue to use modeling and monitoring to focus outreach and education efforts.*
    ii. *Demographics- Target specific demographic segments with appropriate messages. This would include organizational affiliation and land ownership (agriculture, water front owners, recreational, industrial forest, etc.).*

    Understand the audience(s) – Use census statistics, surveys, interviews, and focus groups to gain insights about various audiences to better understand barriers and benefits to adoption of appropriate best management practices to reduce phosphorus. Use information gained to develop and deliver outreach and educational materials that address gaps in knowledge, overcome barriers, reinforce benefits, and help direct implementation efforts not just to areas of high phosphorus contribution, but also to those areas where participation may be more likely.
3. *Program Design and Delivery- Develop appropriate messengers, messages, and delivery medium (field days, workshops, tours, newsletters, podcasts, websites, and farmer lead councils). Use trusted messengers. Share existing education and outreach materials, and success stories across the St. Croix Basin (e.g. WaterShed Partners, NEMO Program, BlueThumb, Stormwater U), so that successful outreach methods get wider distribution.*
4. *Measure Impacts- Develop and incorporate an effective evaluation plan within the outreach and education plan. Design evaluation tools to measure increased awareness, attitude changes, and adoption of best management practices. Utilize evaluation results to modify implementation planning with the goal of increasing participation.*

Creating widespread interest in water quality and engaging the larger population so that "*everyone can contribute and make a difference*" is a substantial challenge. For this to occur in the St. Croix Basin, significant investment is needed. Developing a baseline data set of social indicators and tracking progress in these respects is critical for assessing effectiveness of education strategies and adapting for improved performance.

Education and Outreach Resources:

- Watershed Partners Clean Water Minnesota Media Campaign
- Example of an Outreach and Education Plan or the Bronx River, NY
- Getting in Step, a U.S. EPA Guide for Conducting Watershed Outreach Campaigns
- Four Keys to Effective Education and Outreach Plans, The Ohio State University

TARGETING CRITICAL SOURCE AREAS FOR IMPLEMENTATION EFFORTS

Small portions of the agricultural or urban landscape can have a disproportionately large impact on water quality. These are commonly called "*Critical Source Areas*." Identifying these areas is essential if clean water goals are going to be met. Current research suggests that if conservation practices are targeted to the most vulnerable areas of the landscape there may be a greater reduction of pollutants than if practices are evenly spread out across the landscape. Therefore, developing and implementing a prioritization framework for targeting phosphorus reduction efforts is critical for achieving the Lake St. Croix TMDL with the limited human and capital resources available. One effort to address this need is a project the Minnesota Department of Agriculture is leading to develop a strategy for prioritization and targeting within a watershed:

- Minnesota Department of Agriculture Priority Management Zone Project

Upon completion, the results and guidance produced from this project should prove to be a valuable resource for decision-making within the St. Croix Basin. This comprehensive, ecosystem approach will integrate water quality, recreation, wildlife, and economic interests and ultimately better leverage the current federal, state, and local resources available to support action on the ground. Furthermore, the prioritization protocol will provide critical information for local implementers about where to target education, technical assistance, and incentive programs.

Existing assessment and targeting tools are also available in both Minnesota and Wisconsin based on a phosphorus index (PI), which is a planning and assessment tool for managing runoff phosphorus losses from cropland. The phosphorus index uses readily available information to evaluate the potential for phosphorus in runoff from a specific field.

- Wisconsin Phosphorus Index
- University of Minnesota Phosphorus Source Assessment Tool

Water quality models of watersheds may also be useful tools in identifying and targeting critical sources areas. The St. Croix Watershed Research Station has developed modeling tools for the Sunrise River in Minnesota and Willow River in Wisconsin that are being applied to support the targeting of implementation efforts.

- St. Croix Watershed Research Station Reports on Watershed Modeling

Key factors for consideration in targeting phosphorus reduction efforts within the St. Croix Basin include:

- Land use/land cover, including crop and tillage practices
- Soil type
- Slope of land surface
- Soil phosphorus concentration
- Manure application
- Proximity/connectivity to the St. Croix River
- Landowner consent
- Opportunities for multiple benefits from efforts, such as ecological or recreational benefits

Assessing priority management zones or critical source areas can be conducted at various scales, from the sub-watershed scale, to a farm scale, to a field scale, and, if needed, to a specific location on the edge of the field. Geographic information can be overlayed to help identify potentially critical areas, or models can be used to simulate higher loading areas in the watershed. More information on targeting projects can be found at the following links:

- National Institute of Food and Agriculture Conservation Effects Assessment Project
- The Wisconsin Buffer Initiative

4.0. CIVIC ENGAGEMENT AS A KEY STRATEGY FOR RESTORING AND PROTECTING LAKE ST. CROIX

***"Civic Engagement** means making resourceFULL decisions and taking collective action on public issues through processes of public discussion, reflection and collaboration."*

--University of Minnesota Extension --Leadership and Civic Engagement

The Basin Team and several local partners spent several months during 2011 exploring the issue of civic engagement and how it could be utilized within the river basin to improve water quality outcomes. This section describes the Basin Team's aspirations and its goal to augment existing watershed management activities with greater levels of citizen engagement. It also presents a civic engagement strategy that can inform actions the Basin Team members take over the next several years. Appendix A provides some civic engagement theory, tools and resources that may be useful to local partners who wish to expand traditional public participation activities to more robust civic engagement actions.

For many years, government efforts to address pollution through regulation have focused on the application of technological tools for reducing pollutant loadings. The use of technology and natural resource management expertise has, in fact, resulted in impressive achievements in reducing municipal and industrial pollution. Regulation has also played a central role in achieving water quality improvements. However, nonpoint sources of pollution now pose the greatest remaining challenge to ensuring that waters meet water quality standards. Because nonpoint sources must be addressed through the voluntary actions of citizens, applying best practices to those problems will require establishing trusting relationships with the public and at the right scale so that water goals are achievable and measurable.

The pollution problems that remain require new solution strategies – ones that encourage and support collaboration, citizenship, transparency, and accountability at all levels of government. While recognizing individual interests, this work must strive to instill and draw upon a common sense of purpose and obligation to protect important water resources.

Over the past 30 years, the federal, state and local organizations that make up the Basin Team have collaborated to study the physical, chemical, and biological systems within the St. Croix River Basin. Each participating organization has made unique and important contributions to these studies. The willingness of Basin Team members to collaborate and to share knowledge has helped to ensure that limited research dollars were utilized effectively, that important research was completed, and that good ideas and innovations were able to surface to move the Basin Team's work forward.

Building upon this history of collaboration and partnership, members of the Basin Team will look outward to the communities within the river basin, striving to work more closely and intentionally with the many stakeholders, citizens, and local partners in the St. Croix River basin. Looking outward to the community means that members of the Basin Team will strive to engage, dialogue and partner with interested citizens so that the best ideas for addressing water problems are allowed to find voice and influence the direction of water policies for each river or stream we work on.

This new approach acknowledges that citizens are key collaborators in achieving water quality goals, whether it is in the policy-making realm or when implementing Best Management Practices (BMPs) on the ground. Believing that civic engagement is a core strategy for successful management of water resources, members of the Basin Team will endeavor to move beyond customary methods of public participation. Within government institutions, this will require making a greater effort at building effective and trusting relationships with citizens and shifting the culture and philosophy that has driven public involvement processes in the past.

Replacing the traditional top-down model of decision-making with one that is more participatory will require citizens to shift their role as well – from one that is more passive to one that seeks a greater role in policymaking for the common good. This will require staff of agencies and organizations to intentionally and effectively create genuine civic engagement opportunities for citizens AND that citizens take a more active role in watershed planning. Creating and building the civic capacity for citizen participation and problem-solving is an important first step toward the ultimate goal of a cleaner river system.

Civic engagement must not be viewed simplistically as a set of disconnected activities, but rather a lens through which organizations view their day-to-day work within the community. Most importantly, civic engagement must be based on transparency and openness about water governance as well as the belief that people, when given the opportunity, will help government agencies solve their community's water problems.

WHO IS RESPONSIBLE FOR PROVIDING CLEAN WATER?

Most of the responsibility for providing direction, policy, and solutions for ensuring a sustainable supply of clean water has been placed on government agencies even though citizens play a critical role in the success of identified solutions. As government organizations have taken on the bulk of the responsibility, civic capacity for solving water quality challenges has diminished (Citizens League, 2009). As a result, government organizations have developed watershed plans and policies on their own, often with minimal involvement from citizens and stakeholders. When a few willing citizens do participate, they are typically given a good deal of information, but often do not have the ability to influence policies or plans in meaningful ways. The interested and willing individuals that do attend meetings are often overburdened, leading to stakeholder burnout or fatigue.

The public involvement that is needed to help resolve water issues is missing because citizens that we need to help us solve complex water problems are less and less willing to participate in traditional public involvement venues (e.g., public meetings, etc.). Additionally, citizens are becoming increasingly skeptical of experts (Yankelovich and Friedman, 2010) further complicating efforts toward civic engagement. It is by recognizing and fostering the critical partnership between the public and government agencies when addressing public issues that effective water management will occur. Basin Team members embrace this reality and are poised to change course and provide meaningful venues for citizen involvement. New intentional strategies to civic engagement will need to focus on discussion in the form of dialogue and deliberation as the means to purposeful problem-solving in addition to opportunities for collaboration and reflection (U of MN Extension, 2012).

Dialogue that incorporates opportunities to learn about individual life experiences, values, emotions and aspirations fosters the development of a shared sense of responsibility for restoring and protecting water quality.

Members of the Basin Team wanting to keep pace with changing public opinions and expectations are exploring new ways to improve interactions with the public in the policy-making realm. New water management approaches that embed civic engagement as a strategy to support communication among diverse interests will encourage trust within these relationships. Research supports the premise that trust builds relationships and strong relationships are needed to get work done.

There is a significant body of social science research that supports the notion that civic engagement and the development of social capital (the value of social relations and the role of cooperation and confidence to get collective results in a community) can lead to a number of benefits for community members. These benefits include increasing citizen awareness, greater civic involvement, trust between organizations and individuals, collective problem-solving, and better communication among a diverse group of individuals (Mae Davenport, 2010).

GROUNDING CIVIC ENGAGEMENT IN THE SOCIAL SCIENCES

Just as natural resource management depends upon science and data to guide implementation actions in the field, civic engagement must be similarly grounded in the social sciences, planned strategically and driven by outcomes. While rigor and strategic thinking are important goals when working to engage the public, civic engagement actions must also be designed in an authentic way so that they provide voice to the values, hopes, and aspirations of a community. These approaches should spark the creativity and leadership capabilities within citizens that may be waiting for the right opportunity to surface.

By combining scientific research in the natural sciences with data about people, community relationships and institutions, it is hoped that greater progress in solving the St. Croix River water problems will result over time. Appendix A offers some social science theory and guidance to local officials interested in expanding civic engagement actions in their communities.

Planning and execution of successful civic engagement incorporates principles drawn from the social sciences which includes development of skills at designing effective group process and decision-making exercises, coordination of civic leadership training, when needed, and the ability to coach local planning teams as they take initial or more sophisticated steps to engage and educate citizens.

ST. CROIX CIVIC ENGAGEMENT STRATEGY – THE NEW APPROACH

Basin Team Civic Engagement Goal

The Basin Team consists of representatives from a diverse group of state, regional and local governmental units and non-governmental organizations convened for the purpose of coordinating watershed management planning and implementation. The Basin Team operates at the intersection of various jurisdictional mandates and organizational missions, some of which are ready to support a more substantial shift from customary education and outreach actions to a more robust and meaningful civic engagement process.

The Basin Team members recognize that civic engagement provides new opportunities to make greater progress in protecting the St. Croix River Basin. The following civic engagement goal reflects the aspiration of the Basin Team to move forward in expanding civic engagement activities while offering flexibility within its membership to align their own programs and activities according to the needs of individual programs.

Goal: *Develop sustainable and meaningful relationships with the citizens and stakeholders that live, work, and recreate within the St. Croix River basin to restore and protect water quality.*

Goal Strategy: *Build the community capacity for collaborative decision-making within St. Croix River watersheds.*

Operating Principles

Members of the Basin Team have demonstrated their support for civic engagement in their 2011 St. Croix Basin Water Quality Planning Team Strategic Plan, which states that the Basin Team "supports civic engagement and enhanced public participation in watershed projects in the St. Croix Basin".

Members of the Basin Team have a civic governance philosophy that is grounded in a belief in the following principles:

1. **Democracy;**
2. **Human capacity to govern for the common good;**
3. **Active citizenship which calls citizens to govern for the good of the whole**;

4. **Political competence within the citizenry so that all can effectively define problems, produce solutions, and establish policies;**
5. **Institutional efficacy to sustain democracy and develop active citizenship**

Roles and Responsibilities for Better Engagement

There is a variety of public and private organizations within the river basin that have important roles to play in shaping civic engagement approaches and in interacting with citizens every day.

Figure 8 depicts the key players that need to coordinate and cooperate to achieve the greatest positive impact on water quality. This diagram illustrates the need to build a system of collaboration and civic problem-solving that touches all levels within the river basin.

Figure 8. Civic Governance in the St. Croix River Basin

a. The Role of Citizens and Stakeholders

The foundation of civic engagement is of course, the citizen. Citizen volunteering in Minnesota and Wisconsin are at the impressive levels of 39% and 37% respectively. However, many citizens have come to believe that their role in the water policy making realm is limited to volunteering in river clean-ups, citizen monitoring efforts, etc. (Corporations for National and Community Service, 2012). In many cases, our sense of citizenship has become one-dimensional; that is to say, being limited to voting or volunteering for good causes, but often remaining on the periphery of real decision making.

For those citizens that are interested in developing their own civic skills, Basin Team members can encourage these efforts and support them to the degree possible. Active citizens, given the ability to strengthen their civic skills, will become assets to basin-wide efforts to restore and protect water quality in the river. Basin Team members can play a critical role in connecting the pockets of change that exist across the basin so that small grassroots organizations see themselves as active players within a larger-scale project and as partners with government agencies, rather than outside of government processes.

Citizens today are busy people, with limited time to allocate to activities such as watershed planning and in changing practices that might be impacting water quality. Therefore, it is very important to design effective strategies that ensure that interactions with the public are meaningful, efficient, interesting and provide authentic opportunities to impact policies and other decisions. Good process design is essential if government agencies expect citizens to return to the table again and again to help us resolve problems.

b. The Role of Local Governments

Local governments, more often than not, will be responsible for designing and managing the lion's share of civic engagement work. Counties, cities, townships, watershed districts, lake improvement districts, and others have the role of crafting an approach that suits local needs and budgets. Providing flexibility to local partners in accomplishing this work will be essential. Many local governments have been doing some form of civic engagement for years and may only need to tweak current approaches. Others may want to take further steps in this direction. The Basin Team will endeavor to support their ideas and to share success stories with others doing similar work across the river basin.

c. The Role of Federal and State Government Organizations

It should be noted that all federal and state agencies are responsible for ensuring that existing rules and regulations (e.g., water quality standards, water appropriations, drinking water standards, etc.) are upheld and enforced. However, in developing new rules and regulations and in determining how best to implement them within a watershed context, public agencies can expand the degree to which they open rulemaking processes to the public and consider the ideas, concerns and recommendations of the people that will be impacted by these rules.

Federal and state agencies will work to stay in step with emerging environmental issues and concerns within the river basin. As they do so, they can also set a different tone and direction for civic engagement in watershed projects. Where assistance is requested by local governments and as resources permit, The National Park Service, The Wisconsin Department of Natural Resources, Wisconsin Extension Service, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Minnesota Board of Water and Soil Resources, University of Minnesota Extension and many other organizations may be able to provide tools, coaching, funding, advocacy, connect people, provide training, and create opportunities for peer-to-peer learning among interested individuals. In addition, with their grant-making authority, some agencies may be able to focus available funds on citizen engagement actions.

In the future, federal and state agencies can strive to model good engagement practices when developing permits, policies, and key planning documents that impact local governments, stakeholders, and citizens. The Basin Team acknowledges that at present, civic engagement is funded in a limited way at all levels of government. As we experiment in our projects and learn more about what it will take to be successful in this work, a stronger case may be made to apply additional support and resources as time goes on. In the meantime, projects are the laboratories where we can learn and adapt our approaches for greater effectiveness.

d. The Role of Non-Governmental Organizations/ Nonprofits

Non-governmental organizations (NGOs) have an essential role to play in water quality protection and civic engagement. Oftentimes, non-profits organizations have outstanding rapport and trust within communities. This allows them to create effective bridges between government agencies and citizens, identify unique partnership opportunities, integrate the work of multiple organizations into comprehensive strategies, create networks for information sharing within communities and convene diverse audiences that may not traditionally intersect. There are many examples of NGOs within Minnesota and Wisconsin which have added immeasurably to collective problem-solving. For example, the St. Croix River Association has been a key collaborator and member of the Basin Team and has helped to create awareness of St. Croix basin issues and has developed important alliances within the river basin.

Government agencies that are members of the Basin Team see NGOs as close and important partners to collaborate with in areas where they do not have the staff, capabilities, or trusting relationships with the citizens and stakeholders that they need to work with.

e. The Role of Business

Businesses have a critical role to play in protecting water quality and in active problem-solving in a community. Good water quality impacts the bottom line of many businesses in the St. Croix Valley. Business practices also can impact those living downstream. Therefore, it seems imperative that they have a place at the table whenever local organizations convene citizens and stakeholders in watershed planning processes. This project aims to create new opportunities for businesses to become leaders in the development of strategies and solutions around water quality concerns or around the need to protect high quality waters in communities where they operate.

Short-Term Civic Engagement Strategy

A logical progression for the Basin Team is to move from a civic engagement philosophy to practice in real projects. Members of the Basin Team have decided to focus their civic engagement strategy on strengthening the capacity to engage citizens in collective action and problem-solving at all three levels of government.

Beginning in 2012, some organizations within the Basin Team will take initial steps toward engaging citizens in a more focused and intentional manner. The desire is to build capacity for collaborative decision-making at multiple levels. The longer-term goal will be to create a functioning network of organizations working collaboratively toward the same vision – a healthy St. Croix River system.

1. Building Citizen-Level Capacity for Problem-Solving and Collaboration

Civic Organizing Training --In 2012-2013, if funding can be secured, Civic Organizing, Inc. and The Citizens League will offer one year of free training to up to 6 grassroots organizations within the St. Croix River Basin. The training is aimed at building organizing and leadership skills within citizen-based organizations. This training is grounded in the belief that we must develop the civic infrastructure needed to support sustainable citizen engagement. Civic leaders participating in this project would build their own skills for organizing people and, working in partnership with the Basin Team and local government partners, work to achieve water quality goals.

Civic Organizing and the Citizens League will establish a clear relationship between civic practices and achieving water quality goals. Based on the outcomes of this project, there may be opportunities to expand this approach statewide in both Minnesota and Wisconsin.

Targeted, Farmer-Led Performance-Based Watershed Management Projects– Building upon the success of a similar model in Iowa, the Wisconsin Department of Natural Resources (WDNR) is planning to support the implementation of five watershed projects that put farmers in a leadership position when developing pollutant reduction strategies, which reward performance in reducing pollutant loadings to waterways, and which bring farmers and government agencies into a collaborative arrangement to achieve water quality goals. Additional information on the Iowa efforts can be found at the following link:
Iowa State University Leadership & Performance-based Watershed Management

When deciding which watersheds to select for this initiative, WDNR will target funds to high pollutant-loading areas within the St. Croix River watersheds.

Sunrise River Watershed Agricultural Environmental Quality Assurance (AgEQA) Program - The overall goal of this project is to prioritize conservation practices that will improve the overall water quality of the Sunrise River, a tributary to Lake St. Croix. Whole farm assessment conservation plans will be developed for 10 agricultural producers in the Sunrise Watershed. The conservation plans will be used by the farmer and the Chisago SWCD to develop an action plan to address the resource concerns identified as part of the AgEQA program. The template developed through these initial efforts will create a template for other farmers in the Sunrise River Watershed.

2. Building Local Government Capacity

Chisago County, Minnesota - Civic Engagement in Water Planning – In an effort to model a greater commitment to civic engagement in water planning, the Chisago County Zoning and Environmental Service Department has voluntarily agreed to collaborate with MPCA staff and other civic engagement practitioners to design and implement new civic engagement actions as part of its County Water Plan Update Process. This includes making greater use of the expertise of the Water Plan Policy Team, gathering community data to inform water priority development, creating and disseminating a citizen survey, as well as organizing community interviews and conversations to collect public input for their planning and prioritization process.

Minnesota Watershed Projects, Incorporating Civic Engagement - The MPCA is pursuing a statewide initiative that will redirect public involvement into a comprehensive, outcomes-based, data-driven approach to engaging citizens and other stakeholders in watershed restoration and protection planning. All local government organizations developing watershed plans are encouraged to incorporate civic engagement strategies into their project work plans. Limited funding is available to plan and implement civic engagement actions each of the first four years of a WRAP process.

Wisconsin Extension Service County Leadership Program and Lake Leadership Programs - These programs seek to build leadership capacity among citizens that wish to advocate for issues that impact lakes and other community issues. These programs will be continued in the coming years.

3. Building Basin-Level Capacity

Speaker Series – Desiring to learn more about civic engagement as a strategy for watershed management, the Basin Team invited a series of speakers to present civic engagement-related materials to Basin Team members and other interested parties over a period of five months. This foundational work sparked dialogue and deliberation among Basin Team members, resulting in their shifting some of their focus to supporting the human dimension of watershed management work.

Annual Conference- Building on what was learned during the Speaker Series, the Basin Team decided to make civic engagement the core theme of the April 2012 St. Croix River Annual

Conference. In the past, the target audience for this conference was technical experts and people representing regulated communities within the river basin. The intent for the 2012 conference was to build understanding about civic engagement at all levels and within multiple jurisdictions within the river basin.

In the future, there is the potential for convening a river conference for all citizen organizations working to restore and protect the St. Croix and its tributaries, especially if stakeholders and citizens are willing to help in planning such an event.

Red Cedar Annual Conference --Each year, a Red Cedar River Conference is held in Wisconsin that attracts many citizens, stakeholders and scientists within the watershed. This conference presents opportunities for citizens and scientists to learn, mingle and create the relationships needed to advance water quality restoration projects within that watershed.

Basin Team's Long Term Strategy

This civic engagement plan attempts to put into place a set of expectations that ensure greater intentionality and continuity in approach among projects in two states and which enables performance tracking and adaptive learning over time. While members of the Basin Team can independently work to set the right tone and environment for better civic engagement in the present, local governments will be left to determine the level of effort that is put forth toward this end at a community or watershed level. Over the longer term, members of the Basin Team can each work to become more strategic in advancing civic engagement within their own jurisdictions. This work might include:

- **Developing an Annual Basin-Level Strategy for Civic Engagement--** The Basin Team will continue to reflect on its roles and responsibilities for advancing civic engagement as a strategy to improve water quality over the coming years.
- **Community Assessment –** These analyses enable integration of human and biophysical information in watershed planning and provide the foundation for creating a strategic and intentional civic engagement strategy. Depending on project capacity, this may range from a simple but standard and systematic analysis done by a project team to a sophisticated investigation by a consultant.
- **Local Planning Consultation** - MPCA staff and civic engagement and planning experts can assist local government organizations in designing new ways to collaborate with citizens, engage community officials, and work with other professionals in order to protect, preserve, and restore waters and landscapes and their related cultural, natural, and environmental resources. Many watersheds teams are experimenting with new initiatives in civic engagement. Their successes and challenges can be shared with those just getting started.
- **Seeking Funding to Build a Civic Engagement Learning Cohort** --Over the coming years, there may be real value in creating a learning community (or cohort) of practitioners around this issue. This could be a cross-boundary organization, bringing in practitioners from both states. This will require securing funding to bring local professionals together on a regular basis.
- **Taking Advantage of Spontaneous Opportunities to Build Civic Opportunities--** Not all civic engagement happens because of strategic planning activities. Oftentimes, interesting opportunities arise that could not have been predicted or anticipated. Members of the Basin Team will endeavor to be open to and support ideas and opportunities that organically and spontaneously arise, when they seem to make sense and fit within the Basin Team's plans.

Evaluation and Performance Tracking

Appendix A includes samples of possible desired outcomes of civic engagement (which are based on a social science model) and some corresponding indicators of progress that can be used to track progress

made toward them. Because the St. Croix Civic Engagement strategy is focused on developing organizational capacity at multiple levels, these indicators may be useful to help Basin Team members track the performance of individual projects which adopt elements of this strategy. As these indicators are identified and measured, tracking of the indicators should be included in annual status reports.

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5.0. IMPLEMENTATION ON A COUNTY BASIS

The Lake St. Croix TMDL presents a summary of phosphorus loading and required load reductions by major sub- watershed. For purposes of implementation and management of nonpoint source reduction measures, phosphorus loadings were calculated for each of the 19 counties within the Basin. Table 5 and Figure 9 present county-by-county baseline loadings and reduction goals.

The Basin Team agreed in 2004 to reduce the phosphorus load to Lake St. Croix by 20% by 2020. This goal remains the basis of efforts within the basin and serves as an interim goal for attaining the required TMDL reduction of 27%. An annual goal for phosphorus reduction projects was developed to guide counties in their efforts. This goal was based on attaining the 20% by 2020 goal over a 10 to 30 year period so a range for the annual goal is presented in Table 5. The actual goal will depend on how much progress has been made since baseline conditions in the early 1990s.

Table 5. County Load Summaries and Reduction Goals

County	Basin Area (acre)	State	Phosphorus Load (lbs/yr)	Phosphorus Reduction Goal (lbs/yr)	20% by 2020 Goal (lb/yr)	Annual Reduction Goal (lb/yr per yr)
Aitkin	200,665	MN	18,955	3,700	16,217	91 to 274
Anoka	36,912	MN	4,931	1,607	3,742	40 to 119
Barron	35,545	WI	7,738	2,447	5,927	60 to 181
Bayfield	185,089	WI	16,902	1,615	15,707	40 to 120
Burnett	562,172	WI	87,975	21,419	72,125	528 to 1,585
Carlton	229,671	MN	26,928	4,136	23,867	102 to 306
Chisago	279,247	MN	68,168	21,812	52,027	538 to 1,614
Douglas	365,876	WI	34,368	1,945	32,929	48 to 144
Isanti	51,492	MN	12,142	3,721	9,388	92 to 275
Kanabec	329,189	MN	50,293	10,763	42,328	265 to 796
Mille Lacs	64,781	MN	6,053	1,313	5,081	32 to 97
Pierce	38,448	WI	14,580	5,479	10,526	135 to 405
Pine	884,545	MN	117,329	20,947	101,828	517 to 1,550
Polk	605,513	WI	160,976	52,759	121,934	1,301 to 3,904
Ramsey	636	MN	214	61	169	1.5 to 4.5
Sawyer	96,119	WI	11,832	1,544	10,689	38 to 114
St. Croix	335,485	WI	132,626	48,781	96,528	1,203 to 3,610
Washburn	434,610	WI	61,979	10,660	54,091	263 to 789
Washington	173,093	MN	47,032	15,710	37,626	314 to 941
Basin Total	4,909,088	---	881,021	230,419	712,731	5,610 to 16,829

While each county is assigned an allowable load and reduction goal in this Implementation Plan, there are opportunities for redistributing the allowable loads and reductions. Individual counties may identify cost-effective opportunities to go beyond these goals, or local water bodies may have water quality goals requiring greater reductions than what is required by the Lake St. Croix TMDL calls. Other counties may face challenges that result in meeting reduction goals being cost-prohibitive or simply not possible. Effective evaluation and targeting of reduction opportunities, tracking of implementation activities, and

monitoring of improvements will be necessary to assess the need for and/or benefits of redistribution of the allowable loads.

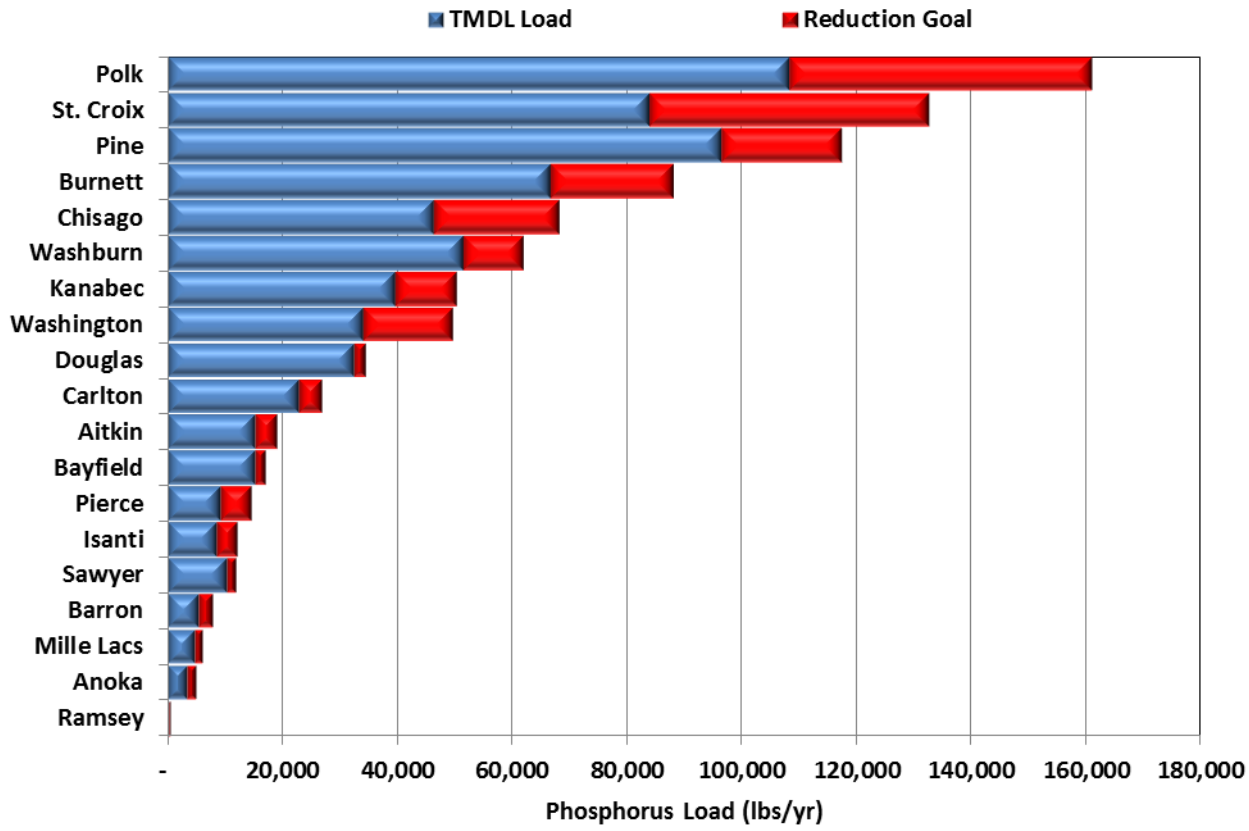

Figure 9. County Phosphorus Loads and Reduction Goals

Each county was given the opportunity to participate in the development of this Implementation Plan by contributing to the development of an implementation section specific to their county. These county sections contain a summary of:

- Phosphorus loads by subwatershed within the county;
- Reductions needed to meet interim and final TMDL goals;
- Estimated progress since baseline conditions;
- Planning efforts and activities;
- Factors considered in targeting efforts;
- Key players within the county for implementation;
- Planned activities to inform, educate, engage, motivate and enable citizens; and
- Anticipated needs to make sufficient progress.

These county implementation plans are included in Appendix B and are intended to be the primary means of guiding county efforts and monitoring progress. Counties are encouraged to revisit and revise these sections on an annual basis.

6.0. MONITORING, TRACKING, AND ADAPTIVE MANAGEMENT

The efforts required to restore and protect Lake St. Croix and the lakes and rivers within the Basin will take time and involve many different people, organizations, and agencies. Assessing basin-wide progress along the way will be critical for a number of reasons, including:

- Informing stakeholders and policymakers of progress;
- Understanding the benefits of the efforts being made;
- Focusing resources where they can provide the biggest benefit; and
- Adapting the Implementation Plan and efforts in response to knowledge gained.

Three key ingredients that are needed to make the most of lessons learned throughout implementation include:

- Water quality monitoring;
- Implementation tracking; and
- Adaptive management.

These items are discussed the following sections.

WATER QUALITY MONITORING

An efficient water quality monitoring program in the St. Croix River Basin is essential for the success of this Implementation Plan. A comprehensive, well-planned monitoring program supports implementation by answering the following questions:

- ***Where do we stand today and how much further do we have to go?*** The Lake St. Croix TMDL relied on the best available information at the time it was developed. This information was used to estimate baseline conditions representing land uses and practices from the early 1990s and required reductions from those conditions to meet water quality goals. Many changes have occurred since the early 1990s across the basin that impact phosphorus loadings. Monitoring is necessary to firmly establish current conditions.
- ***Where should we prioritize our efforts?*** The St. Croix River Basin is large and diverse. Monitoring at a few locations is not enough to inform where the biggest loadings are coming from and where implementation efforts should be focused. Monitoring in Lake St. Croix, along the mainstem of the river upstream, and in tributary streams is needed to understand spatial variability and to target implementation efforts for maximum benefit.
- ***How effective are the implementation efforts and are refinements to the plan called for to improve efficiency?*** There is no simple formula to calculate, with a high level of confidence, how much phosphorus loading to Lake St. Croix will be reduced by any single implementation project or combination of efforts. Continued monitoring is needed to track progress as implementation takes place. As understanding is gained of the benefits of implementation activities, the implementation plan should be revisited and revised to improve performance and efficiency.
- ***How will we know when we get there and if we continue to maintain our goals?*** The long-term recovery and protection of all the streams and lakes in the St. Croix River Basin will be dependent on continued monitoring. Land uses and practices will continue to change in the basin. Climate changes may also be a factor. Monitoring is needed now and over the long-term to inform implementation efforts to restore and protect this resource.

The Monitoring and Assessment Committee of the Basin Team has developed a comprehensive Monitoring Plan for the St. Croix River. The most recent update to this plan occurred in 2010. The plan, produced by committee members from various public agencies with expertise in water quality monitoring and the St. Croix River Basin, presents a sound technical basis for specific water quality monitoring activities. The key water quality monitoring objectives of the Lake St. Croix Implementation Plan include:

- Determine ***existing*** water quality and ***trends*** in Lake St. Croix (total phosphorus, Secchi transparency, and chlorophyll-a);
- Determine ***existing*** phosphorus loading and ***trends*** in the mainstem of the St. Croix River; and
- Determine ***existing*** phosphorus loading and ***trends*** in the major tributaries.

If these key water quality monitoring objectives are met, informed decisions can be made which lead to efficient expenditures of limited human and capital resources. If these water quality monitoring objectives are not met, there is a risk of spending resources on efforts which produce little benefit. The key components of the plan are presented below. For more details, the reader should refer to the complete Monitoring Plan for the St. Croix River: 2010.

Lake St. Croix: The Metropolitan Council Environmental Services (MCES) leads a volunteer monitoring effort in Lake St. Croix. Volunteers are trained and collect samples at seven locations spanning Lake St. Croix. The volunteers take measurements and collect samples every other week from May through October. This data has been compiled on an annual basis from 1999-2002 and 2005-2011.

Mainstem St. Croix River: Five monitoring sites in the mainstem of the St. Croix River are needed to understand spatial variability in phosphorus loadings. Continuous flow gaging and routine water quality monitoring is required to develop existing load estimates and trends at these sites. Monthly baseflow samples as well as storm event samples are required. The five monitoring sites include:

- Danbury;
- Norway Point;
- St. Croix Falls;
- Stillwater; and
- Prescott.

Tributary Streams: Up to 23 monitoring sites are needed in tributary streams to the St. Croix River to effectively determine existing phosphorus loads and trends. Continuous flow gaging and routine baseflow and stormflow samples are required. Highest priority monitoring sites include:

- Kettle River;
- Snake River;
- Sunrise River;
- Apple River;
- Willow River; and
- Kinnickinnic River.

The above monitoring components are critical to a successful and cost-effective implementation effort encompassing the St. Croix River Basin. Additional monitoring efforts beyond those listed previously will increase the efficiency of the implementation effort and the confidence that real progress is being made. These additional monitoring efforts include the following:

- ***Measurement of biological indicators in tributary streams and Lake St. Croix pools***: Biological monitoring will help build an understanding of the response of the aquatic life to changes in water quality.
- ***Localized monitoring to assess focused efforts in the watershed:*** Monitoring at tributary mouths, in the mainstem of the St. Croix River, and in Lake St. Croix is effective in assessing the cumulative impact of implementation efforts within the basin or major sub-watersheds.

However, data gathered at these sites will not provide information on the benefit from a specific project or efforts within a targeted sub-basin. Therefore, where possible and where funding allows, additional monitoring in targeted sub-basins and at the project-scale can aid in understanding the benefits gained and inform future decision-making on project selection.

- ***Sediment coring and analysis in Lake St. Croix:*** Sediment coring and analysis in Lake St. Croix was critical to the development of the water quality goals. Repeating this effort on a decadal scale would be useful in assessing the cumulative long-term benefits of the implementation efforts and inform potential adaptions to the goals or efforts being made.

Finally, maintaining and assessing the monitoring data to track progress and inform adaptive management decision-making will require the application of sound statistical tools and understanding of year-to-year variability due to climate. Long-term trends will be more reliable indicators than yearly results. Continued involvement of knowledgeable scientists will be critical in maximizing the benefit and reliability of the information gained from monitoring.

IMPLEMENTATION TRACKING

Measuring water quality in Lake St. Croix and monitoring phosphorus loads in the Basin are critical to understanding progress toward the ultimate goal of a restored and protected Lake St. Croix. However, these types of measurements will not be able to distinguish the project-by-project accomplishments taking place throughout the Basin. Tracking of each individual project is needed to document the changes taking place on the landscape, take credit for making progress, and identify areas where additional effort is needed.

In the past, keeping track of conservation projects has been inconsistent and estimating phosphorus reductions associated with projects has not been common practice. Today, greater attention is being given to implementation tracking as the benefits resulting from expenditures of public dollars are undergoing heightened scrutiny. As a result, efforts are underway in both Minnesota and Wisconsin (described below) to improve implementation tracking. Both of these efforts will benefit the implementation efforts for the Lake St. Croix TMDL.

In Minnesota, the Board of Water and Soil Resources (BWSR) has maintained a geospatial database called eLINK. Entities receiving state funding for projects have been required to report project information in eLINK. The database has been an effective tool for state agencies and local governments to plan, evaluate, and track projects. BWSR is currently making improvements to eLINK to enhance its usefulness for implementation tracking. Agencies and local governments in Minnesota should continue to use eLINK to track projects relevant to the Lake St. Croix Nutrient TMDL.

In Wisconsin, the Kinnickinnic River Land Trust (KLRT) has undertaken a project to develop a geospatial tool to track implementation projects. The goals for this effort include development of a method for measuring and reporting conservation progress over time that would be endorsed by the Basin Team and used as a model for other entities in the Basin.

While the implementation tracking efforts in Minnesota and Wisconsin are being developed, projects in the basin should be documented. A sample project tracking form is included in Appendix C. This type of form can be completed in a word processor or spreadsheet enabling efficient compilation in a database.

On an annual basis, the Implementation Committee of the Basin Team will solicit information from counties on progress made in the previous year and activities planned for the upcoming year. The Implementation Committee will compile the county information and prepare a status report which will be made available on relevant websites. Appendix C contains a sample Annual Status Report table listing the counties in the basin, their baseline phosphorus loads, the phosphorus reduction required to meet the TMDL, placeholders for reductions achieved in each year, and a running tally of remaining reductions needed.

ADAPTIVE MANAGEMENT FRAMEWORK

Implementation of a large watershed phosphorus reduction plan which includes two states, nineteen counties, and a variety of land use patterns can only be accomplished by maintaining flexibility and adaptability within the overall approach. It should be understood that the water quality goals, phosphorus loads, and needed reductions presented in this plan are estimates based on the best available science.

Adaptive implementation is an approach that allows TMDL implementation to proceed in the face of potentially large uncertainties, by allowing for the implementation plan to be adjusted in response to information gained from future monitoring data. The adaptive implementation process begins with initial actions that have a relatively high degree of certainty associated with their water quality outcome. Future actions are then based on continued monitoring of Lake St. Croix and other locations in the basin to determine how it responds to the actions taken.

The Lake St. Croix Nutrient TMDL is a prime candidate for an adaptive implementation process for a number of reasons. First, the scale, complexity, and uncertainty of phosphorus sources within the basin make a traditional implementation plan (i.e., one that identifies the specific implementation activities required to attain the TMDL) impractical. Second, there will likely be a time lag between reduction of external loads and the response of the system, and there will be year-to-year variability in the monitoring results. Finally, the TMDL focused on the problem of excess phosphorus and its current sources. However, restoration and protection of Lake St. Croix will require a planning framework that recognizes potential future threats such as changing land use patterns, zoning and ordinance changes, climate change, and invasive species. For these reasons, implementation for the Lake St. Croix Nutrient TMDL will be conducted within an adaptive framework. The primary steps in the adaptive management framework are presented in Figure 10.

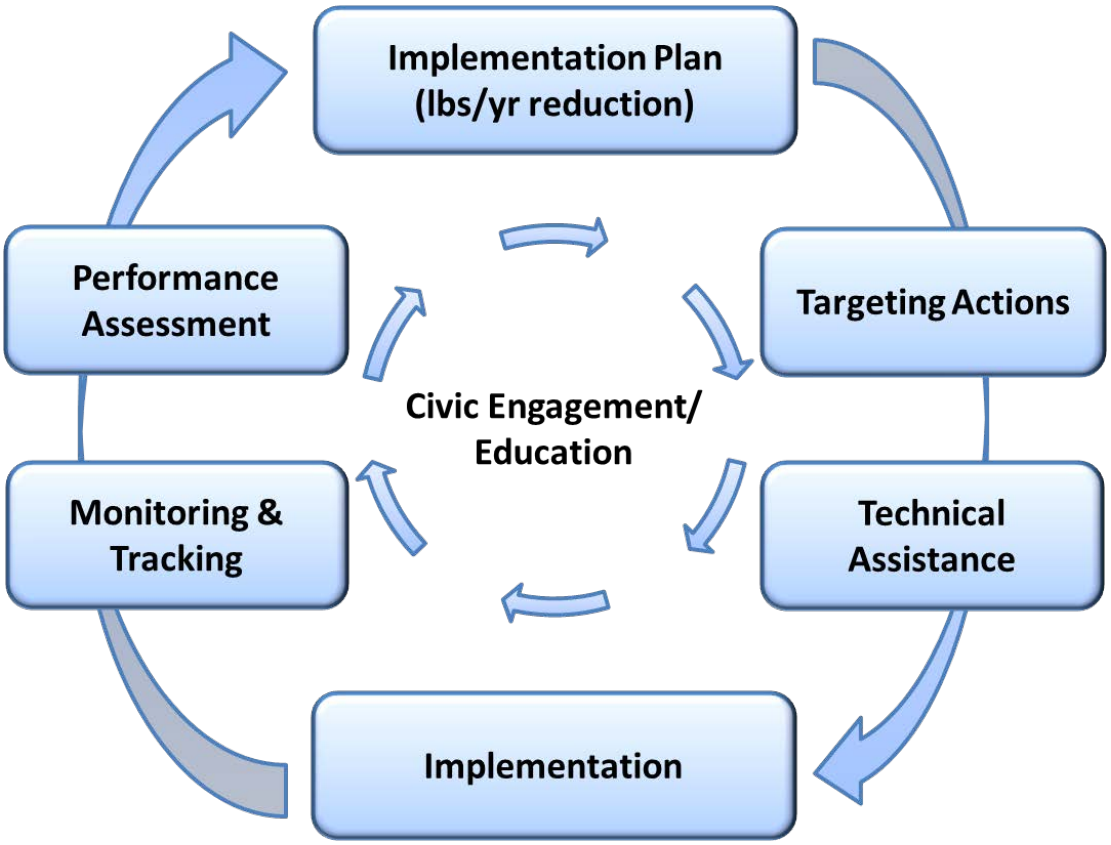

Figure 10. Implementation Adaptive Management Framework
Adapted from Washington County Conservation District

Performance Assessment

A key step of an adaptive implementation plan is performance assessment, which includes the decision-making process in response to updated information. Figure 11 provides a flow chart that describes a potential adaptive performance assessment process. The first decision to be made is whether water quality is responding in a manner consistent with the expected benefits of implementation activities. If water quality is responding as expected, no adaptation is necessary. If water quality is not responding as expected, the next decision pertains to whether the lack of response is caused by loads not being reduced as quickly as planned. If loads are not decreasing as quickly as expected, potential implementation efforts should be reassessed to identify the obstacles to implementation and determine if or how those obstacles can be overcome through adaptive implementation. If no option appears available to adjust load reduction efforts, the only option may be to adjust expectations regarding when water quality goals will be attained.

If water quality is not responding as expected, but loads are being reduced as expected, this will require reassessment and potential refinement of the water quality goals and relationship to loadings.

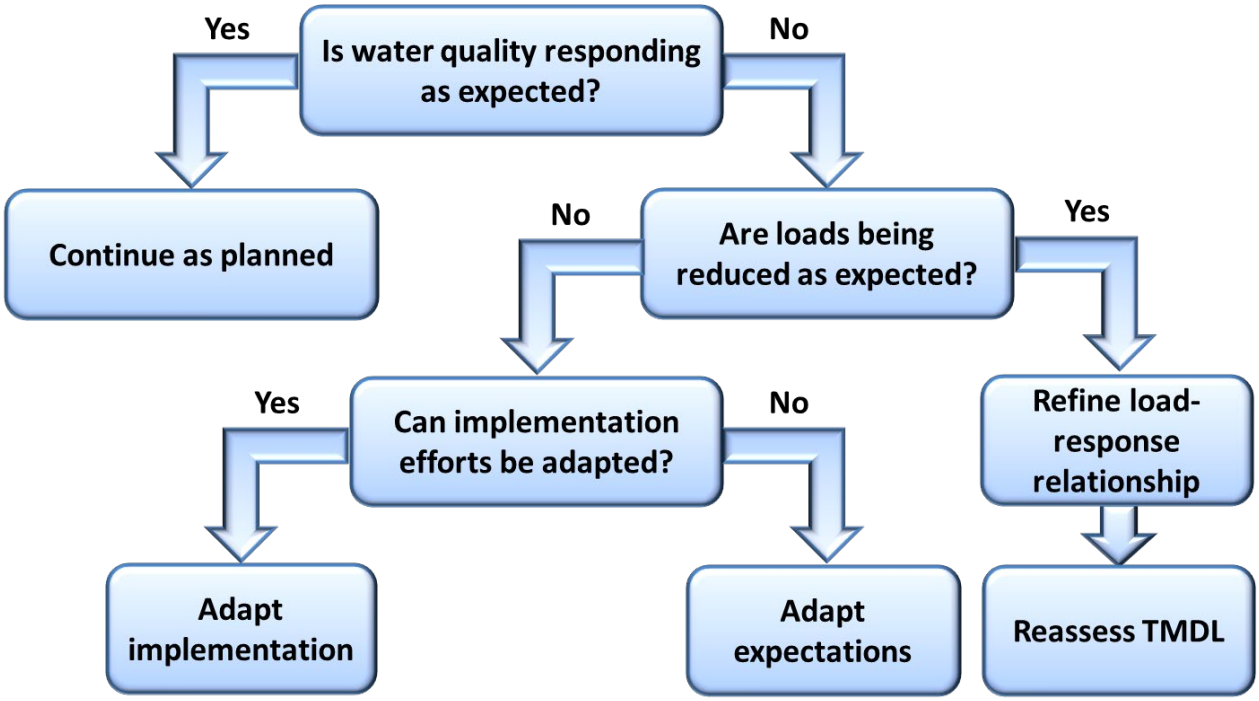

Figure 11. Example Adaptive Performance Assessment Process

Civic Engagement in the Adaptive Management Framework

A Civic Engagement model designed by the University of Minnesota Extension is presented in Figure 12 and in detail in Appendix A. This model is a helpful guide for local governments in designing their own unique civic engagement strategies and allowing for adaptive management to be practiced within water quality management. By integrating use of this model in watershed management, the goal is to:

- Create an awareness and understanding that meetings involving the public are opportunities to be designed and managed as civic engagement;
- Encourage planners to create a strategy of interconnected and synergistic civic engagement actions that are enabled and driven by data about the community rather than by hunches. Emphasize the need for evaluating civic engagement efforts using that data; and
- Adapt future actions and practices based on the results of this evaluation.

By recognizing the uniqueness of each situation and providing local partners with an array of tools, resources, and technical and moral support to implement engagement activities, our ability to practice adaptive management and conduct authentic and appropriate civic engagement will be increased leading to co-creation through discussion, reflection and collaboration. If performance in implementing civic engagement actions is not as expected over time, the project team may decide to adapt their course of action. People do not always act as expected. Civic engagement actions may not have been as effective as hoped. Civic engagement is an emerging field, requiring project teams to change and adapt as learning occurs. A project team should expect to continually adapt as plans unfold.

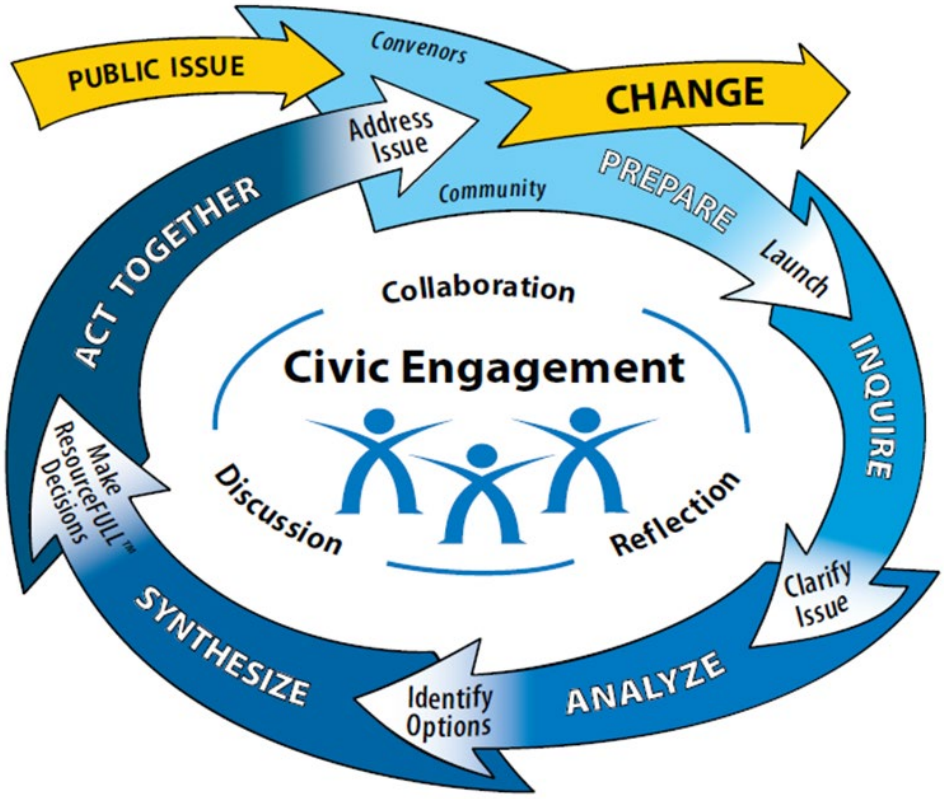

Figure 12. Civic Engagement in the Adaptive Management Framework

For more information go to **www.extension.umn.edu/community**

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APPENDIX A
Civic Engagement Planning Guide

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MPCA

2012

Civic Engagement Planning Guide

PART I: MOVING INTENTIONALLY TOWARD COLLABORATION

While significant and measurable progress has been made in improving water quality in many of our lakes and streams over recent decades, the pollution problems that remain require new solution strategies – ones that encourage and support public participation, collaboration, citizenship, transparency, and accountability at all levels of government. In short, civic engagement as this work must strive to create and draw upon a common sense of purpose and obligation to protect this important resource while providing for differing interests and values to be recognized and respected, allowing people to consider self- interests at the same time.

For many years, government efforts to address pollution through regulation have focused on the application of technological tools for reducing pollutant loadings. Application of technology and natural resource management expertise has, in fact, resulted in impressive achievements in reducing municipal and industrial pollution. Regulation has also played a central role in achieving water quality improvements. However, nonpoint sources of pollution now pose the greatest remaining challenge to ensuring that waters meet water quality standards. Because nonpoint sources must be addressed through the voluntary actions of average citizens, applying best practices to those problems will require support and buy-in from the public. Support and acceptance are best attained when those impacted by a problem or those needed to implement solutions are able to co-create those solutions. This requires building trust and relationships between the public and governmental/organizational entities to get the work done.

Working together to accomplish water quality goals will require changes in how citizens think about their civic obligation to their community as well as changes in how government sets the stage for community problem-solving efforts. The need to come together to address public problems is no longer an option but a right approach given the interconnectedness and complexity of today's issues creating a shared power world (Crosby, 1992), Using a collaborative approach to governing may require a deeper commitment and a stronger pledge to work for the common good at all levels than current approaches require of us.

Most of the responsibility for providing direction, policy, and solutions for ensuring a sustainable supply of clean water has been placed on government agencies even though citizens have a critical role in the success of indentified solution. As government organizations have taken on the bulk of the responsibility, civic capacity for solving water quality challenges has diminished (Citizens League, 2009). As a result, government organizations have developed

watershed plans and policies on their own, often with minimal involvement from citizens and stakeholders. When a few willing citizens do participate, they are typically given a good deal of information, but often do not have the ability to influence policies or plans in meaningful ways. The interested and willing individuals that do show up at meetings are often tapped over and over again, leading to stakeholder burnout or fatigue.

The public involvement that is needed to help resolve water issues is missing because citizens that we need to help us solve complex water problems are less and less willing to participate in traditional public involvement venues (such as public meetings, etc.) and are becoming increasingly skeptical of experts (Yankelovich and Friedman, 2010). It is by recognizing and fostering the critical partnership between the public and government agencies when addressing public issues that effective water management will occur. Basin Team members recognize this reality and are poised to change course and provide meaningful venues for citizen involvement. New approaches to civic engagement as an intentional strategy will need to focus on discussion in the form of dialogue and deliberation as the means to purposeful problem-solving, along with opportunities for collaboration and reflection (U of MN Extension, 2012). Dialogue which is designed to incorporate an opportunity to learn of individual life experiences, values, emotions and aspirations creates an opportunity to develop a shared sense of responsibility for restoring and protecting water quality.

Citizens are now more vocal, skeptical, and critical of government, are more highly educated, and have more access to information than in years past (National League of Cities, 2012). As the public's dissatisfaction with the expert model of governance rises and their expectations of government increase, the argument for a more collaborative model of governance will likely gain traction throughout all levels of government. Continuing to develop policies and regulations in a "business as usual" manner and not paying attention to public sentiment and the growing distrust between technical experts and citizens will not serve us well in the future. Our ability to solve problems and implement solutions will continue to be challenged or stalled. If government organizations continue on as they have in past decades, they will not be tapping the knowledge, talents, energy, creativity and leadership skills of citizens interested in water quality issues across the region.

Seeing the Challenge as an Opportunity

Watershed management has evolved over many years. During that time, a tension has existed between developing the science and technology needed to assess natural environments and creating the right conditions for collaborative decision-making. This tension has been treated as a paradox, resulting in policy makers and managers feeling the need to choose between the two. This should not be viewed as a paradox, but rather as an opportunity -- one that recognizes the critical role of both policy makers and citizens in accomplishing our goals.

Focusing on the biophysical study of a watershed and not placing equal emphasis on the social dimension of watershed management is now recognized as a probable weakness in the existing way we address water issues. Professionals in other disciplines, such as education, social services, and health care are reaching similar conclusions about the need to collaborate with

the public – that those impacted by a problem should be involved in defining the problems and in helping to create solutions to correct them.

Over many years, federal, state and local organizations have created numerous opportunities for the public to take part in their decision making activities. Over that time period, few agencies have been expected to go beyond customary levels of public involvement such as public meetings, public hearings or open houses. Reacting to changing public expectations and to the need to make additional progress on protecting our waters, federal, state, local governments and others are exploring ways to improve interactions with the public in the policy-making realm. There is an increasing recognition that we must move away from temporary public engagement efforts (public meetings, open houses, etc.) to more stable, durable and sustainable ways of promoting participatory, inclusive, deliberative and collaborative decision making (National League of Cities, 2012).

To create a more productive, long-term relationship with the public, government organizations at all levels have an opportunity to do things differently. By creating intentional, well-conceived strategies for collaborating with the public in water planning activities, citizens can have a more meaningful role in the policy-making realm, and can become problem-solvers alongside government staff. By building civic capacity for policy making within organizations and among individual members of a community, a sustainable community infrastructure can then be tapped over and over again as we cycle through multiple watershed planning efforts. Government organizations that support public deliberation, who are effective at mobilizing citizens and who are willing to take their ideas into consideration or even to share authority with them may reap the benefits of those efforts (Fagatto and Fung, 2009).

There is a significant body of social science research that supports the notion that civic engagement and the development of social capital (the value of social relations and the role of cooperation and confidence to get collective results in a community) can lead to a number of benefits for members of a community. These include (Mae Davenport, 2009):

1) Increased citizen awareness, understanding and a sense of responsibility for the common good;
2) Engagement in environmentally responsible behaviors and civic action;
3) Building a shared identity and trust between government institutions, citizens; stakeholders, businesses and non-profits in the river basin;
4) Building local capacity to problem-solve and organize others;
5) Improving program effectiveness through solicitation of local knowledge, improving transparency, and improving accountability;
6) Citizens coming to understand and appreciate views they do not hold themselves;
7) Improving collaborative decision making skills;
8) Adaptive learning and flexibility;
9) Better communication between collaborators; and
10) Identification of citizens interested in change and who are willing to lead those efforts.

Civic engagement must not be viewed simplistically as a set of activities, but rather a lens through which organizations view their day-to-day work within the community. More than anything, it must begin with a philosophy about water governance that is open and transparent to the public.

The Role of Outreach and Education Programs in Collaborative Decision-Making

A critical part of encouraging meaningful public engagement in any policymaking setting is ensuring that people have access to good information upon which to make decisions. Over the past several decades, the number of public policy controversies that require some scientific or technical knowledge for effective participation has been increasing (Science Daily, 2007). Many public issues, including addressing water pollution, point to the need for an informed citizenry in the formulation of public policy. Civic engagement not grounded in good scientific information may result in unjust or poor public judgments. Consequently, educators will be important partners in helping to translate scientific research and expert opinion into something that the average citizen can understand and deliberate upon.

It is important to note that only 28 percent of American adults currently qualify as scientifically literate (Michigan State, *2007)*. Our challenge will be to communicate key scientific research to all citizens, regardless of their ability to follow data-rich presentations, or to understand jargon or complex decision making models. Data visualization may become increasingly important in order to provide a good foundation for dialogue and deliberation between scientists and the public that cares about water.

Support for Civic Engagement in Civic Problem-Solving is Growing

In recent years, there has been an increasing call for greater civic engagement within other public policy fields and disciplines (National League of Cities). Wherever there is an interface between government and average citizens and stakeholders, there are possibilities for better engagement strategies, whether the work is in the field of health care, poverty, education or natural resource planning. Civic engagement is being seen more commonly as a business strategy in private institutions as well.

In 2009, The Clean Water Council, appointed by the Governor of Minnesota, aspired to reach the following civic engagement outcomes:

1) *More Minnesotans understand their own role in achieving and maintaining healthy lakes, rivers and wetlands, and act accordingly.*
2) *A greater proportion of individuals become responsible for changing personal behaviors that impact water quality.*
3) *More residents become active leaders and participants in the democratic process of creating water restoration plans for their watershed.*

In recent years, the Minnesota Legislature has been encouraging state agencies and private entities to expand their efforts to engage citizens in watersheds and in the development of TMDLs. The Legislature developed this charge:

> *In accordance with the federal Clean Water Act, the MN Clean Water Legacy Act states that "Public agencies and private entities...shall encourage participation by the public and stakeholders, including local citizens, landowners and managers, and public and private organizations in the identification of impaired waters, in developing TMDLs and in planning, priority setting and implementing restoration of impaired waters." (2007 MN Statute Section 114D.35)*

PART II: GROUNDING COLLABORATIVE DECISION MAKING IN PRINCIPLES

Operating Principles

Before any work is done to collaborate or engage citizens, it is important for the project team to have a set of principles or beliefs that guide their efforts. A project's civic governance identity or philosophy can be grounded in something as robust as the following principles:

1. **Democracy**: Our democracy asks that all citizens assist in governing for the common good. Stakeholders and citizens work to organize a civic infrastructure to govern for the commons and produce justice in the tension between individual self interest and the common good.
2. **Human Capacity to Govern for the Common Good** (of Clean Water) – Every citizen is a policy maker with the capacity to know what is important, to grow in that knowledge, to help to govern for the common good and to organize to achieve this outcome.
3. **Active Citizenship** (Civic Leadership) – Democracy obligates citizens to govern for the good of the whole. An active citizen is a governing member in society, no matter where they live or work. In return, citizens share in the rewards of a fair and just system and protection of common goods, like clean water. Civic leaders are supported in their efforts to organize the infrastructure needed to encourage active citizenship in their own jurisdiction (family, business, places of worship, etc.)
4. **Political Competence** (The mindset and skills needed to carry out the obligation of active citizenship) – Politics means the "work of the citizen". Citizens are responsible for developing the political skills needed to help to define problems, produce solutions, and establish policies.
5. **Institutional Efficacy (**Building the civic infrastructure needed to sustain democracy and develop active citizenship) –Institutions of family, work, community, learning, faith and governance sustain the democracy we live in. Civic leaders and active citizens understand their obligation to produce the civic infrastructure and institutions necessary to sustain our democracy and common resources, like Lake St. Croix.

They can also be as simple as the City of Portland, Oregon's Civic Engagement Principles:
(City of Portland, Oregon, 2012,
http://www.thataway.org/files/Expanded_Core_Principles_Public_Engagement.pdf)

- **Partnership**
- **Early involvement**
- **Building Relationships and Community Capacity**
- **Inclusiveness and Equity**
- **Good Quality Process Design and Implementation**
- **Transparency**
- **Accountability**

Once these principles are developed, they can be used in a variety of settings, for example, when recruiting people to be part of a watershed planning process or used in local newsletters or websites to convey that a new direction in governance is being established.

Civic Standards Guide Civic Engagement Planning and Actions

Civic standards are commonly agreed upon ways of working that guide civic practice (Peg Michaels, 2010). It is likely that leaders of all kinds and at all levels of government will need to develop civic skills to meet these standards. Each project team can consider whether the following standards resonate with them and become part of their process:

- Those impacted by the problem will help to define the problem in light of civic principles (above) and the realities of their situation.
- Citizens and stakeholders are accountable for contributing resources (leadership/time, knowledge, constituencies and dollars) to solve the problem.
- Citizens and Stakeholders are engaged in decision-making and policy-making that contributes to the common good of clean water.
- Citizens and stakeholders implement policies or actions grounded in civic principles in the places where they have the authority to act (at home, at work, in organizations). This simply means encouraging citizens to act within their personal sphere of influence.

PART III : SOCIAL SCIENCE SUPPORTS CIVIC ENGAGEMENT WORK

The Idea of Building Civic Capacity is Based on a Social Science Model

It has become increasingly evident to science and policy experts that healthy ecosystems and healthy social systems are interdependent and mutually supporting. Building a community's capacity for collaborative decision making is an important step in ensuring that democratic processes (such as developing watershed plans) are successful.

Dr. Mae Davenport of the University of Minnesota has adapted a model (Figure 1) which outlines four major areas of community capacity that along with a set of conditions reflecting the perception of fairness and legitimacy in the watershed management processes support a community's ability to solve complex public problems, such as water pollution, over time. This model is based on extensive literature reviews in the fields of psychology, sociology, natural resource management and public health, as well as through empirical research and ongoing interactions with water resource professionals working on the ground. The model can be used to assess a community's existing assets and challenges, its core capacities for collective problem-solving and levels of individual awareness and concern, all of which are important to water quality problem.

1. **Individual Capacity** – Encompasses a community member's awareness of and knowledge about water issues, as well as their personal commitment to change practices that may be negatively impacting water quality. Altogether, these attributes contribute to individual conservation stewardship and civic action.
2. **Relational Capacity –**The degree to which interpersonal relationships, trust and social networks exist within communities. These are important attributes that promote information and idea exchange.
3. **Organizational Capacity** –The effectiveness of non-governmental and public organizations at working together in a collaborative framework. This considers whether organizations are working effectively together for the common good, whether they are communicating effectively among themselves, pooling resources for greater efficiency, providing strong leadership, applying adaptive learning, and coordinating within and across communities.
4. **Programmatic Capacity** – Relates to conservation, education and civic engagement actions that communities create and maintain to sustainably manage water resources. Programs should address collective needs, have clear goals and objectives, encourage collective action, and include appropriate monitoring and program evaluation.
5. **Fairness and Legitimacy** – Reflects the degree to which trustworthy relationships exist between government programs and the community, government programs are perceived as consistently and equitably applied, and local knowledge and values are incorporated into decisions regarding application of the program locally.

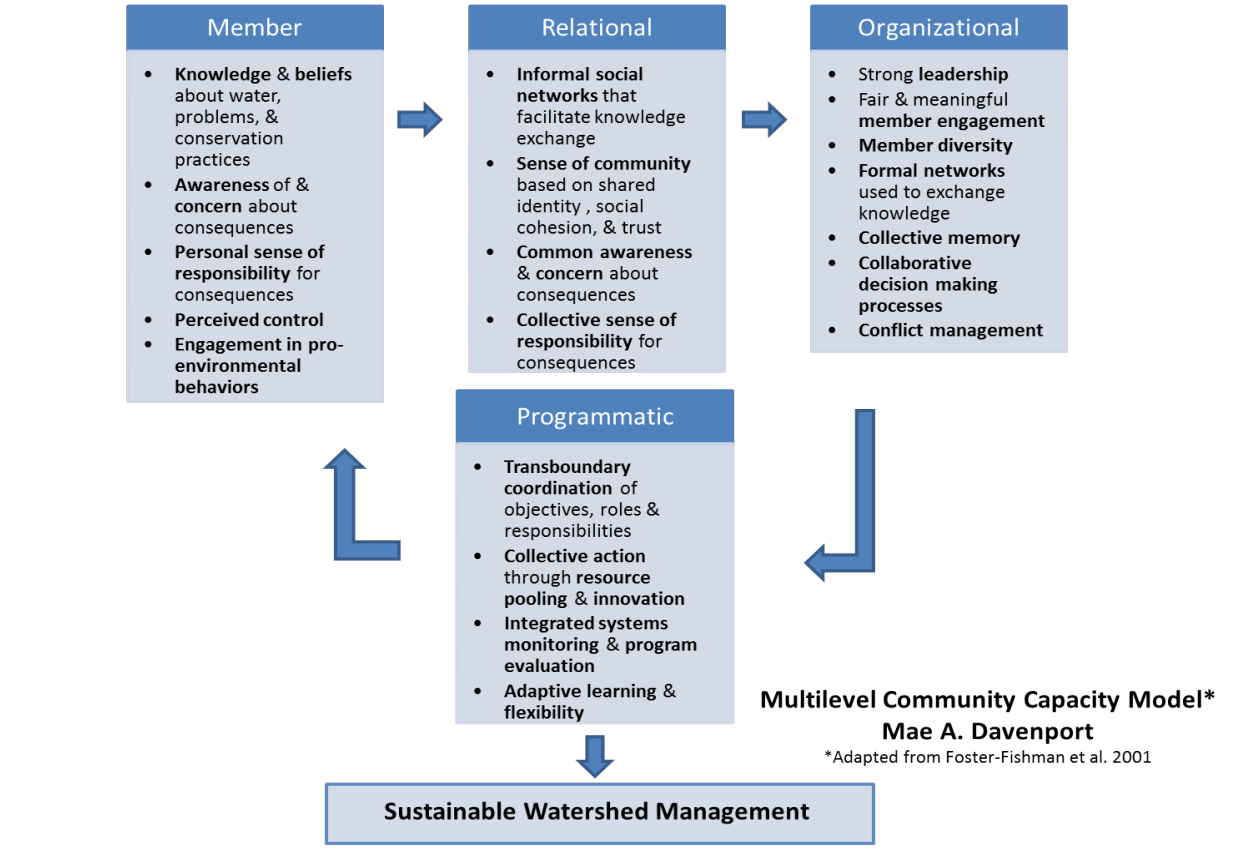

Figure 1: Davenport, Mae, 2010, adapted from Goodman et al., 1998; Chaskin et al., 2001 Foster-Fishman et al., 2001).

This model provides a consistent way to talk and think about community capacity for problem-solving, to encourage a greater understanding of the importance of community capacity in watershed planning, to assess existing levels of capacity within watersheds or communities, and to evaluate improvements in capacity building over time. The ideal situation is to have high capacity within all four areas. Should this situation exist, it will be more likely that there will be a sustainable local network that can be brought to bear on solving water quality problems. Therefore, it will be important to build greater capabilities at all levels of the community over a period of time.

Building the Capacity of Civic Leaders and Organizers to Collaborate Will be Important
A citizen who sees him/herself as having an investment in the success of a given process (because he/she has invested his time and energy in making it work) will work harder to ensure that the process is not derailed or thwarted by others seeking to force a given outcome. A citizen needs to "own" the process just as much as she/he needs to "own" the outcome.

It is important for an organization or agency entrusted to work on public issues to recognize the connection between genuine civic engagement in creating trust and relationships with the public. It is trust that leads to relationships and relationships are responsible for getting work

done. Having the capacity to create public settings that foster a sense of partnering and co-creation of solutions is becoming more and more important in our roles as agency staff. Authentic civic engagement can lead to collective action based on decisions that are informed and that has a public purpose, competence, resources, and buy-in and support…a resourceFULL decision (University of MN Extension, 2012).

Civic Leaders have primary responsibility for creating and sustaining an open and transparent process while achieving outcomes (Peg Michaels, 2009). They are organizers, educators and policymakers within their own jurisdictions which can influence other jurisdictions (business, neighbors, government, nonprofits, etc.).

Harvard University researchers Archon Fung and Elena Fagatto argue in a recent report that the most successful of civic engagement efforts are those that address not only particular public issues such as water quality, poverty, violence, or education, but also improve the quality of local democratic governance at the same time (Fung and Fagatto, 2009). Building civic skills among local government staff and citizens alike will be important if we are to increase local capacity for organizing and advocating for clean water. Civic skills can be developed within the context of businesses, schools, homes, places of worship, government institutions, etc. However, these skills are not traditionally taught in any public or private venues.
For this reason, it will be important to provide training opportunities for interested citizens who wish to build their leadership and organizing skills. Having new skills may make citizens more effective at advocating for, participating in, and leading local change initiatives. In the end, by mastering new skills, citizens will likely feel more committed to achieving important civic goals and outcomes.

PART IV: BUILDING SUSTAINABLE CIVIC ENGAGEMENT REQUIRES CREATING GOOD PROCESS DESIGN APPLIED THROUGH ADAPTIVE MANAGEMENT PRACTICE

There is no mandated predetermined or prescribed way to engage citizens and stakeholders. In Minnesota, MPCA has found the research-informed Civic Engagement model designed by the University of Minnesota Extension helpful to guide local governments in designing their own unique civic engagement strategies. This model provides a "map" for thinking and planning while allowing an individual project team maximum flexibility in designing a strategy that works for their community. The model allows for adaptive management to be practiced within water quality management. By integrating this model to water quality management, the goal is to:

- Create an awareness and understanding that meetings involving the public are opportunities to be designed and managed as civic engagement
- Encourage planners to create a strategy of interconnected and synergistic civic engagement actions that are enabled and driven by data about the community rather than by hunches.
- Emphasize the need for evaluating civic engagement efforts using that data; and
- Adapt future actions and practices based on the results of this evaluation.

The research of Archon Fung, Barbara Crosby and others has informed the development of this model. Core to effective civic engagement is discussion in the format of dialogue and deliberation, reflection and collaboration. Additionally, there are five civic engagement components in which the dialogue and deliberation occur. This five components are 1) Prepare, 2) Inquire, 3) Analyze, 4) Synthesize and 5) Act Together. Below are explanations developed by the U of MN Extension/Leadership and Civic Engagement program area:

In **Prepare**, convenors and the community come together to dialogue on the context/community environment in which the issue will be addressed. Dialogue may occur on issue perception, social capital, human capital, past and current efforts to address the issue, etc. Deliberation then occurs around the decision to launch an effort to work on the issue.

At **Inquire**, the community and convenors dialogue to better understand the issue content. Here the presenting issue is explored to determine underlying issue(s) and clarify and re-frame the issue. Education may occur on the issue to raise awareness and understanding. Deliberation occurs to frame the issue.

In **Analyze**, the focus of the convenors and community will be to explore options to address the issue. Dialogue will occur to explore and understand various perspectives and viewpoints in relationship to addressing the issue. Deliberation will occur in identifying various options to address the issue.

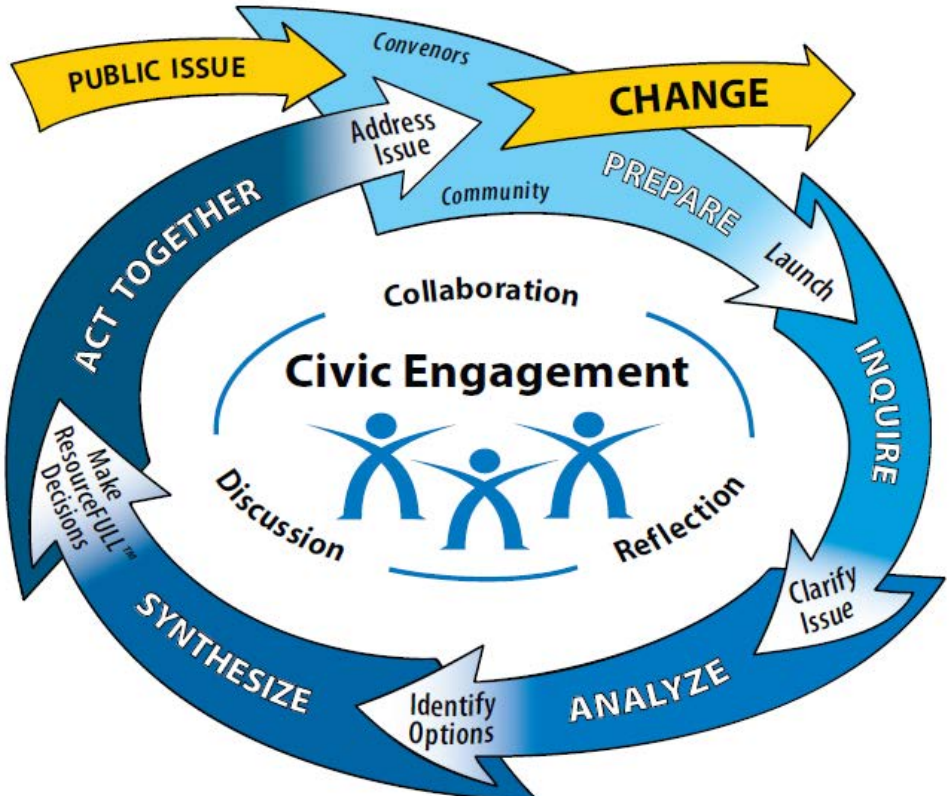

Figure 2: Civic Engagement Process Design and Adaptive Management Model
Research-informed model being piloted in civic engagement cohorts and programming in collaboration with MPCA and other organizations. For more information go to www.extension.umn.edu/community or contact Barbara Radke at radke008@umn.edu

At **Synthesize stage**, community and convenors dialogue on the issue framed in Inquire stage and the options generated in Analyze stage to synthesize a plan of action. Deliberation occurs in reaching a resourceFULL decision and plan. According to Archon Fung, a decision may be deficient in "lack of knowledge, competence, public purpose, resources, or respect necessary to command compliance and cooperation. Authentic citizen engagement can result in knowledge generation and the building of trust and relationships. The building of trust and relationships can create a network of resources including human capital/competence. Overcoming deficient decisions results in a resourceFULL decision. A resourceFULL decision is a decision that has collected the information necessary to make an informed decision along with competence, resources, public purpose, and respect to provide for cooperation and compliance. This is so because those affected by the decision or action will have been provided an opportunity for authentic civic engagement in a role of sharing information and/or decision-making while using processes to foster trust and relationships through respectful dialogue, deliberation and reflection.

With a plan developed in Synthesize, the final component is **Act Together**. Again, because those affected by the decision or action will have been provided an opportunity for authentic engagement, the likelihood for buy-in and support is increased.

This model encourages project teams and citizens to plan their civic engagement activities strategically, based on an accurate assessment of a community's history, values, beliefs, and assets determined in the Prepare stage. The model emphasizes the collection of information about the community as a first step in planning for civic engagement. This data can be used as a baseline against which to evaluate changes in community capacity for civic engagement and the degree to which the strategy mobilized citizens and resources in the community over time.

The model also guards against the tendency of individuals or teams to jump to solutions too quickly (a common problem in projects). It invites planners and project managers to develop actions and plans based on contextual data collection important to informing the project.

When circumstances prevent ideal completion of each phase of civic engagement planning, projects are encouraged to accomplish what is feasible now and to gradually expand synergistic civic engagement efforts over time through adaptive management.

PART V: DEVELOPING A CIVIC ENGAGEMENT STRATEGY or WORK PLAN

To actually build a meaningful and sustainable civic infrastructure, theory and models presented above must be applied to citizen engagement at a number of scales – from basin-level policy making (for example, development of the Total Maximum Daily Load Study (TMDL) and the TMDL Implementation Plan), community-level dialogues, in one-on-one technical assistance or as part of a neighborhood clean-up project to restore water quality. The challenge will be to create *public settings that incorporate engagement process* which encourage and motivate individuals to be contributors and co-creators of solutions; one that respects the uniqueness of every watershed from a physical and cultural perspective to find common ground upon which to engage diverse sectors in collective action. Applying a "cookie-cutter" selection of civic engagement tools and resources would likely fail. By recognizing the uniqueness of each situation and providing local partners with an array of tools, resources, and technical and moral support to implement engagement activities, our ability to practice adaptive management and conduct authentic and appropriate civic engagement will be increased leading to co-creation through discussion, reflection and collaboration.

Local organizations or governments will develop most of the civic engagement strategies to be incorporated into a Watershed Restoration and Protection Strategy or into an individual project work plan developed in support of that strategy. Laying out the work according to the 3 focus areas listed below enables cost tracking and forecasting according to the 3 elements of an adaptive management routine: Plan, Do, Check/Act. The details and emphasis of activities included will change depending on, among other things, the stage of the 10-year watershed management cycle underway, whether or not biophysical and/or human dimension studies (data collection and analysis) already exist, the stage of the civic engagement cycle (Figure 2) and the desired outcomes of the strategy or project (Figure 1). Additional information regarding the components of each focus area are provided below.

Focus Area 1 activities ensure evidence-based decisions and a shared vision among project partners:

1. *Community assessment* to enable integration of human and biophysical information in watershed planning and to provide the foundation for creating a strategic and intentional civic engagement strategy. Depending on project capacity, this may range from a simple but standard and systematic analysis done by a project team to a sophisticated investigation by a consultant.
2. *Select operating principles* which aim to ground the project team's civic engagement decisions and set clear expectations for what citizens can expect from public processes.
3. *Define civic engagement outcomes and goal* that clearly articulate the focus and intention for planning and executing Focus Area 2 activities and conducting adaptive/performance management (Focus Area 3). Utilizing a social science model to guide this task ensures civic engagement actions will be grounded in the embedded research and field standards, thus enabling better performance and adaptive management. Applying a consistent social science model, like the "Multilevel

Community Capacity Model" (Davenport, 2011) ensures continuity across watershed projects statewide and through time and enables aggregation of results from multiple projects.

4. *Issue framing* that reflects community concerns and aspirations for a waterbody.
5. *Governance & stakeholder recruitment* to ensure accountability and diverse representation.
6. *Compiling and reviewing current documentation* representing current status and history regarding biophysical and human dimension of the watershed management work.

Focus Area 2 activities entice more citizens to actively participate in the watershed management planning process and make them want to return time and again when designed for the specific project outcomes identified in Focus Area 1 activities. Following process design models like MN Extension's "Civic Engagement: ResourceFULL™ Decisions and Collective Action on Public Issues" (2012) to plan Focus Area 2 activities sets the stage for successful execution consistent with desired outcomes defined as part of Focus Area 1 activities. Deliverables (products, services, processes) and resource / time allocations are associated with these activities or groups of these activities. Examples of Focus Area 2 activities include:

1. *Customary education, outreach and communication strategies*.
2. *Civic engagement tools and processes* like friendship tours, community dialogs, community arts initiatives, social media strategies, farmer-led watershed projects, civic engagement process design, and networking and partnering strategies that incorporate opportunities for meaningful dialog and informed or collaborative decision-making.
3. *Building local civic capacity* to assist community members, organizations and programs to find common ground for collective action in support of watershed management goals.

Focus Area 3 activities encourage an adaptive management approach to civic engagement and allow for the aggregation of civic engagement results statewide. A project will use the results of a community assessment in relation to clearly articulated outcome statements (both Focus Area 1 activities) as a baseline for conducting performance management. In this way, project and phase management proceeds according to an adaptive management model. Measureable outcomes defined as part of Focus Area 3 activities refer to changes in knowledge, skill, ability, attitude (values, beliefs, perspectives) [KSAA] and practices (environmental, land use, civic, etc.).

Community Assessment

A community assessment **provides the community context in which the water quality management will occur, It will** help to determine community readiness to collaborate on water issues and to understand where community capacities may need to be strengthened over time before moving ahead. Just as gathering and analyzing water quality and geomorphic data is a critical first step to understanding the possibilities for technical remedies, the community assessment process forms the foundation for planning the engagement strategy.

While some watershed projects and organizations may have the resources or capacity to conduct full-blown community assessments involving statistically rigorous sampling and analysis plans (for instance, conducting key informant interviews, surveys, focus groups, scenario workshops and corresponding analytical and interpretive services prepared by specialists), many are only positioned to use more rudimentary human data collection and analysis tools. The latter may involve a simple stakeholder analysis exercise or an asset mapping exercise to identify those important stakeholders and citizens that will be essential partners in collaborative watershed projects as well as the community assets that could be built upon to benefit water quality. Or it may involve creating a map of social and professional networks within the community that could be leveraged.

However simple or robust the community assessment and analysis is, the project team can use this activity to grow their networks, build trust, and delineate common ground within the community. The data and information can ultimately used for evidence-based civic engagement process design and project evaluation and adaptive management. The MPCA is currently developing workshops to help local partners complete such a suite of exercises.

Project Outcomes & Goals

Begin by identifying the project team's desired civic engagement outcomes. The outcomes selected will be based on the local situation and constraints revealed during the community assessment as well as on the water issues which must be addressed. The project goal will be, in part, a statement encompassing the overall intent of these outcomes.

Just as biophysical investigations and strategies use hydrologic models to ensure continuity and consistency in outcomes based in sound science, social science models like Davenport's Community Capacity Model provides this structure and grounding for civic engagement outcomes.

The project outcome statements will be used to frame and design community assessment instruments like surveys, key informant questionnaires and focus groups, etc. A simple project performance management or evaluation plan can be developed by selecting a limited number of these outcomes to track over time and to report on in project annual reports.

In making these decisions, the project team will have a chance to develop a shared understanding of how important civic engagement is as a strategy to achieve water quality goals and what is feasible within existing constraints. While a watershed assessment may indicate the importance of developing community capacity in all four categories of Davenport's "Level of Community Capacity Model," it may be feasible to strengthen or build capacity in only one or two focus areas, leaving the other identified areas to be tackled during a future phase of work. What is important to recognize is that by integrating intentional, synergistic (not piecemeal) and authentic civic engagement tools and processes into water quality management, community capacity can be influenced in a positive way.

Operating Principles

Developed by the project team, Operating Principles provide a framework or philosophical basis for civic engagement work that occurs at the project or community scale. Principles describe the project team's beliefs about the role of citizens in public decision making processes and why citizen involvement is considered important to the project. Operating Principles guide everything the team does when engaging citizens in policymaking and they become a key informational piece that can be shared with your community. A definition of civic engagement often accompanies Operating Principles. Use one to provide people with a common language and shared understanding of their overarching focal point.

Local project teams may wish to incorporate the Operating Principles presented earlier in this document into project work plans. Some alternates include the International Association for Public Participation core values (http://iap2usa.org/corevalues), The Seven Core Principles for Public Engagement (National Coalition for Dialogue & Deliberation (NCDD), the International Association for Public Participaction (IAP2), the Co-Intelligence Institute (http://www.thataway.org/files/Expanded_Core_Principles_Public_Engagement.pdf) or something very simple, such as the City of Portland, Oregon's Civic Engagement Principles (http://www.portlandonline.com/oni/index.cfm?c=51069&a=312804).

Governance - Identify Convening Organizations

The inter-watershed or inter-basin organizations, the local governmental units, non-governmental organizations and the citizens and stakeholders who collaborated in the initial community assessment are likely to serve as the core governing body for the watershed project. The community assessment may have identified additional organizations, outside those typically tapped as part of watershed management initiatives, to cultivate as part of the governing body. Identify members of these organizations who have designed and/or executed successful collaborative processes.

Stakeholder Development -Identify Collaborative Networks Across Disciplines and Agencies:

Networks of individuals and organizations are essential to watershed planning and implementation projects. During the community assessment, look for past and existing initiatives and civic engagement successes in the community and build upon them. Prepare and execute a recruitment plan for a local work group, stakeholder group or advisory group.

Understanding the issue content

It has been said that if you ask the wrong question, you will get the wrong answer. Similarly, if you don't dialogue and deliberate to clarify the issue(s), you may find yourself addressing the presenting issue when there are underlying issues that need to be addressed. Framing the watershed management issue and the desired change in condition with help from the community is important. The community holds wisdom and experiences important to the issue. Align the issue and change in condition with respect to civic engagement strategy according to the specific stage of biophysical technical study underway. As part of this process, the project team may want to employ an interest-difference exercise to help hone in on the issue at hand.

Compiling Documentation

Review partners, contact list and key stakeholders. Review current and past watershed projects. Review local water and comprehensive plans (schedules and priorities. Review monitoring history (site location, period of record, data) with technical team. Work with GIS technician(s) assigned to compile watershed base layers in existing or desired maps. Contact water permitting staff (NPDES facilities, municipal stormwater, feedlots) regarding existing documents or permitting schedules.

Exploring Options

Convene a diverse group of stakeholders to reflect as a community upon the issues of concern. This exercise could be part of a charge to a local work group, stakeholder group or advisory group. Generate ideas for engaging a diverse public from within the larger community and targeted audiences to identify common ground for collective action and to foster local active participation and leadership. This also ensures that efforts to address the issue are respectful of the hopes, concerns and aspirations of that community. For each idea, identify individuals and organizations willing to commit to developing the idea further and someone willing to take responsibility for convening this smaller group to pursue the idea and to help carry it towards fruition.

Consider actions that will advance civic engagement as a strategy. The focus may be on closing gaps in human dimension data, capacity building, and/or convening the community to help reflect, analyze or consult regarding watershed management issues, priorities and policy. Think about how the options for encouraging more citizen involvement will help solve water quality issue(s) and achieve the outcomes chosen for this project. Attachment B provides a small example of the many types of tools available for engaging citizens and stakeholders in watershed projects. We encourage an innovative mindset when selecting actions and tools so that citizens see that there is a real difference between civic engagement now and "business as usual" approaches to engagement.

Consider addressing these key ideas in local civic engagement strategies:

a) **Dialogue and Bridging Events**: Most people want to be heard and to contribute in an authentic and meaningful way and will do so when the right conditions have been created. By bringing diverse groups of individuals and perspectives together, greater understanding can be achieved among participants. In well-designed processes, participants can experience personal transformations when confronted by ideas that are different from their own. To achieve a sustained level of productive engagement, civic engagement strategies should incorporate as many opportunities for citizens and stakeholders to dialogue together as possible. These public forums will build trust that will carry citizens through the often difficult times that come with collaborative problem-solving activities. See Attachment A and B.

b) **Ongoing Network Development**: Once stakeholder or other work groups have been convened and are underway, engagement has only just begun. These groups will

require new members and energy over time as well as support and coordination. Consider that a great deal of additional work will occur outside these formal groups. Informal networks are equally as important as those that are more visible to the community and may also require support.

c) **Customary Education and Outreach**: A critical part of encouraging meaningful public engagement in any policymaking setting is ensuring that people have access to good information upon which to make decisions. Over the past several decades, the number of public policy controversies that require some scientific or technical knowledge for effective participation has been increasing (Science Daily, 2007). Many public issues, including addressing water pollution, point to the need for an informed citizenry in the formulation of public policy. Chrislip, in Collaborative Leadership, had identified credible data as one of three important elements for effective collaboration. Civic engagement not grounded in good scientific information may result in unjust or poor public judgments. Consequently, educators will be important partners in helping to translate scientific research and expert opinion into something that the average citizen can understand and deliberate upon.

It is important to note that only 28 percent of American adults currently qualify as scientifically literate (Michigan State, 2007*)*. Our challenge will be to communicate key scientific research to all citizens, regardless of their ability to follow data-rich presentations, or to understand jargon or complex decision making models. Data visualization may become increasingly important in order to provide a good foundation for dialogue and deliberation between scientists and the public that cares about water.

Part of your civic engagement strategy will likely involve development of education and outreach materials related to your overall project and for interested citizens who wish to change land use practices. Be certain to research the most effective tools for reaching your desired audience. In many cases, individual one-on-one interactions are preferable for citizens to reading informational material alone.

d) **Communication Strategy**: A good communication strategy will require an effective communication network, if a diverse public is to be engaged. Creating a "healthy information environment" allows people to become informed and engaged, and to address issues they care about. However, not just any information will do. A single source of information will seldom work effectively. Rather, it is more effective to create many varied opportunities for people entering public life and becoming involved in community issues (Harwood, 2011).

e) **Capacity Building-** During the community assessment, both the readiness of the community to engage and the readiness of the local convenors to bring the public into water planning processes will become clearer. The results of this analysis may find that citizens and convenors alike may need or desire training on how to be most effective at working within a civic setting. Very few people are taught civic skills in existing institutions. Building leadership and organizing skills at multiple levels of the

community may be a good investment in improving the quality of local governance, which in turn can support watershed management activities.

Developing a Plan

Synthesize the approaches selected by the community representatives into a civic engagement strategy or project work plan. This can be developed in a simple spreadsheet or as a brief document.

Collective Action

Ensure adequate human and financial resources to sustain civic momentum and project follow-through. Review your civic engagement strategy to determine if the intentionality and synergy in tool and process selection will provide a foundation to create collective action and resourceFULL decisions.

Execute Strategy Through Performance and Adaptive Management

Once your strategy for engaging citizens is completed, the implementation work begins. As you go forward the data/information collected as part of the community assessment may become the benchmarks against which you mark improvements in the capacity of the community to collaboratively address water quality issues. Consider the following concepts as you develop methodologies for tracking progress:

a) ***Adaptive Management*:** If performance in implementing civic engagement actions is not as expected over time, the project team may decide to adapt their course of action. People do not always act as expected. Civic engagement actions may not have been as effective as hoped. Civic engagement is an emerging field, requiring project teams to change and adapt as learning occurs. A project team should expect to continually adapt as plans unfold.

b) ***Tracking Mechanisms**:* As mentioned above, the rigor used in tracking performance over time may be minimal depending on project resources and capacity. If a project team chooses to document progress in engaging citizens using narrative data (e.g., personal stories or interview quotes), a plan for recording this data against specific outcomes and performance indicators must be implemented from the outset, just as a project team would if they were collecting numeric data. The rationale for selecting one methodology of performance tracking over the other must be transparent to those whom expect progress reports.

   Government institutions are increasingly facing skeptics and critics who want greater accountability from public institutions regarding the ways they are spending public dollars in general and against specific legislative mandates. This is occurring at all levels of government. Consequently, it is important to create methodologies for evaluating outcomes from civic engagement that can be tracked over time and consistently across states.

c) ***Reporting*:** While the actual community assessment may include many lines of data and inquiry, only a few outcomes and indicators are likely to be selected by the project team

for purposes of performance management and reporting. Select these parameters according to the different audiences expecting or requiring reports of progress and performance from you.

Resources

MPCA St. Paul Watershed Program Civic Engagement staff is in the process of developing and/or compiling a workbook of exercises and exploratory conversations, an interactive Internet site and other programmatic infrastructure and systems to assist projects requiring more strategic civic engagement. For more information about MPCA's civic engagement activities, contact:

MPCA Civic Engagement Program Development and Technical Assistance
Lynne Kolze in St. Paul -- 651-757-2501
Cindy Hilmoe in St. Paul -- 651-757-2437
MPCA Regional Civic Engagement Coordinators:
Larry Gunderson in St. Paul (Representing Mankato Office) -- 651-757-2400
Mike Kennedy in MPCA's Duluth Office --218-302-6629
Shaina Keseley in MPCA's Rochester Office -- 507-206-2622

ATTACHMENT A

Potential Tools for Encouraging Civic Engagement in Watershed Projects

Community Assessment Tools

- Community Asset Mapping
- One-on-one meetings
- Citizen Surveys
- Kitchen Table meetings
- Focus Groups
- Voice Quilt™ – For Gathering Local Stories
- Appreciative Inquiry Interviews
- Social Capital Assessment
- Civic Leadership Assessment

Dialogue and Deliberation Tools

- A World Café Meetings
- Appreciative Inquiry
- Study Circles
- Ketso (interactive community planning tool)
- Futures Games (playing with future scenarios in a watershed context)
- Samoan Circles
- Open Space Technology Meetings
- Town Meetings
- Maine Community Foundation's –Cultivating Community Connections
- Town Eating (community conversations using pot luck events to draw people)
- Design Charettes
- Friendship Tours (CURE)

Civic Engagement in Decision Making

- Community Watershed Advisory Groups
- Citizen Panels
- Blue Ribbon Panels
- Fish-Bowl Planning
- Citizen Juries
- Citizen Assemblies
- Farmer-led watershed projects
- Scenario Planning
- Implications Mapping

Social Media/Internet

- Citizing™ (Citizens League Public Comment On-line Platform)
- Community-Based Art Projects
- Social Networking Sites (Facebook, Twitter)
- Subwatershed web sites

Civic Leadership Skills Training

- Civic Organizing, Inc. -Citizenship and Community Organizing Training
- Citizen Leadership Development (MN Extension)
- Civic Engagement Capacity Building (U of MN Extension)
- Community and Coalition Building (U of MN Extension)
- Work Team Development and Committees That Work (U of MN Extension)

Information/Outreach

- Public Kiosks
- News Conferences/Press Packets
- Interviews
- Kitchen Table meetings
- Focus Groups
- Field Tours
- Public Meetings
- Open Houses
- Newsletters
- Videos
- Radio Call-in Shows
- Citizen Monitoring
- Canoe/boat Outings
- Fishing Contests
- River/Lake/Community Clean-up events
- Citizen-hosted events

ATTACHMENT B

PROMISING APPROACHES FOR ENGAGING THE PUBLIC IN COMMUNITY PROBLEM-SOLVING FOR WATER QUALITY

Over the past year, the Basin Team held a speaker series which brought in civic engagement practitioners from around the State of Minnesota. These innovators shared their most effective civic engagement actions and strategies. Several of these concepts are worthy of additional attention and experimentation. There are other models that seem promising as well. Some of these include:

- **Social Media:** When attempting to engage large numbers of people, it may be necessary to look at how, why and where they want to spend their time interacting with government organizations (Wilson and Casey, 2008). Increasingly, informal social networks are valuable ways to access particular groups of people who do not usually interact with formalized processes or governance. It should not be assumed that citizens are anxiously waiting for an opportunity to engage with a central planning process. Rather is it important to reach out into existing networks and invite participation directly (Wilson and Casey, 2008).

- **Peer to Peer Learning:** An area that deserves more attention and which holds great potential is peer-to-peer learning among citizens. Rather than having government staff serve in an expert capacity educating citizens, citizens teach one another about new practices and BMPs that could improve water quality.

  Research indicates that peer learning activities typically result in: (a) team-building spirit and more supportive relationships; (b) greater psychological well-being, social competence, communication skills and self-esteem; and (c) higher achievement and greater productivity in terms of enhanced learning outcomes.

  Although peer-learning strategies are valuable tools for educators to utilize, simply placing citizens in groups and telling them to 'work together' will not automatically yield results. The educator/coordinator must consciously orchestrate the learning exercises and choose the appropriate vehicles for it. Only then will participants effectively engage in peer learning and reap the benefits discussed above (Christudason, 2003).

  This model of information exchange and learning has proven effective within Farmer-Led watershed projects in Iowa and Minnesota. Peer-to-peer learning allows people to develop their talents and supports their desire to be autonomous, achieve personal mastery of an issue, and to work toward a goal that gives purpose and meaning to their lives. These are key ingredients that result in greater satisfaction and motivation among people when working to accomplish complex tasks (Pink, 2011).

- **Friendship Tours**: For many years, there have been conflicts between environmentalists and farmers that have come to a head over issues of water quality. To date, these

conflicts have often been addressed through lawsuits, one-upsmanship, and unsatisfying communications in public meetings.

Clean Up the River Environment (CURE) worked to bring upstream farmers and downstream environmentalists together to talk about these problems and to seek a common vision and process for addressing them. More than 50 people took part in the tours, spending several days together traveling around the Minnesota River Basin, learning, listening and talking together in an attempt to create understanding among all participants. The tour organizers provided structured and unstructured opportunities for dialogue, which ultimately helped to build bridges between parties that heretofore had engaged in blame-laden exchanges at public hearings and in the media.

- **Farmer-Led Watershed Projects:** Farmers in the Whitewater River Watershed in Minnesota and in several watersheds in Iowa are taking the lead in water quality improvement through Farmer-Led Councils. The Council Chairs lead their neighbors in developing water quality improvement plans and encouraging implementation of land practices that could improve water quality. These Councils address the self-interests of farmers while also encouraging a concern for the common good. Participation in these Councils has been high and participants have largely been satisfied with their experiences. In many cases, participation in these Councils has allowed farmers to save money while at the same time work to improve water quality in their community.
- **Civic Engagement Capacity Building:** Authentic civic engagement can provide for collective action and decisions which are informed, have a public purpose, create buy-in and support, have the resources (including human), and competence...a resourceFULL decision. Building the skill set in individuals, leaders and organizations to design and manage public settings to create and build trust and relationships to address nonpoint sources of water pollution will be important to water quality management.
- **Community Dialogues:** Given that civic skills and dialogue are practiced at the community level less and less, community dialogues provide an opportunity for average citizens of vastly different backgrounds and perspectives to come together to explore ideas. In this case, community dialogues revolve around the topic of water. Meetings allow people to discuss ideas for protecting water quality, their goals, hopes and aspirations for improving their local water resources, etc. These community forums provide safe environments for conversations that have a purpose – asking all who participate to listen empathically, suspend judgment, and consider the ideas of others. Community dialogues that are thoughtfully designed often result in increased levels of good will and an openness to work together on addressing specific water issues within the community.

- **Interactive Watershed Planning Tools (games and hands-on tools):** Traditional meetings often mean sitting and listening to someone else speak and not having an opportunity to fully participate in problem-solving. If a person can relate to an event by experiencing and actively participating in an event they will get a broader understanding than a spectator who is passively watching the event.

  Games and other hands- on interactive community planning tools can provide unique opportunities for people to become more intellectually and physically involved in problem-solving. Each require people to move around, to visually and physically interact with the planning tools and provide opportunities for participants to experience team work in a positive way.

- **Integration of Citizens and Technical Experts in Advisory Committees:** Traditionally, Advisory Committees have been separated into Technical and Citizens Advisory Committees. This approach often leaves the Citizens Advisory Committee cut off from real policy-making activities and the ability to influence decisions by experts. By combining citizens and technical experts in the same committee, the technical experts have the ability to learn from citizens and citizens from the experts. By merging the two, we can better tap the talents, ideas and creativity of all, ensuring that government remains accountable and open to citizen inquiries and that citizens are exposed to the real challenges and constraints faced by government as it works to improve water quality.

  The goal is move away from citizen participation as outside of or separated from real decision-making. The underlying belief must be that citizens deserve a real voice and opportunity to influence government policy.

- **Community Arts:** People learn and experience things in very different ways. Rather than focusing on attracting people to water quality projects by appealing to them from an intellectual perspective alone, the arts can create unique opportunities that appeal to their emotions as well. Using the arts within watershed projects recognizes that people are multi-dimensional and complex. By appealing to the whole person, it seems likely that more will be drawn to this work. Music, community arts projects, theatre, poetry, history and so on can be used to make water quality projects more engaging and fun. Natural resource agencies have not explored this avenue for appealing to the public to the extent they could. There are numerous examples where these projects have been used successfully to move people and activate their interests in water quality.

- **Civic Skills Training:** Many people see their role as a citizen narrowly – as a voter. Civic skills are diminishing as are citizen interactions within the public sphere. Learning civic skills in leadership and organizing can build up the knowledge, skills and abilities of the citizens we wish to convene as well as our own as public servants. Skill development in this emerging field of civic engagement will undoubtedly be needed if we are to collaborate effectively with one another in doing work for the common good.

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APPENDIX B

County Implementation Plans

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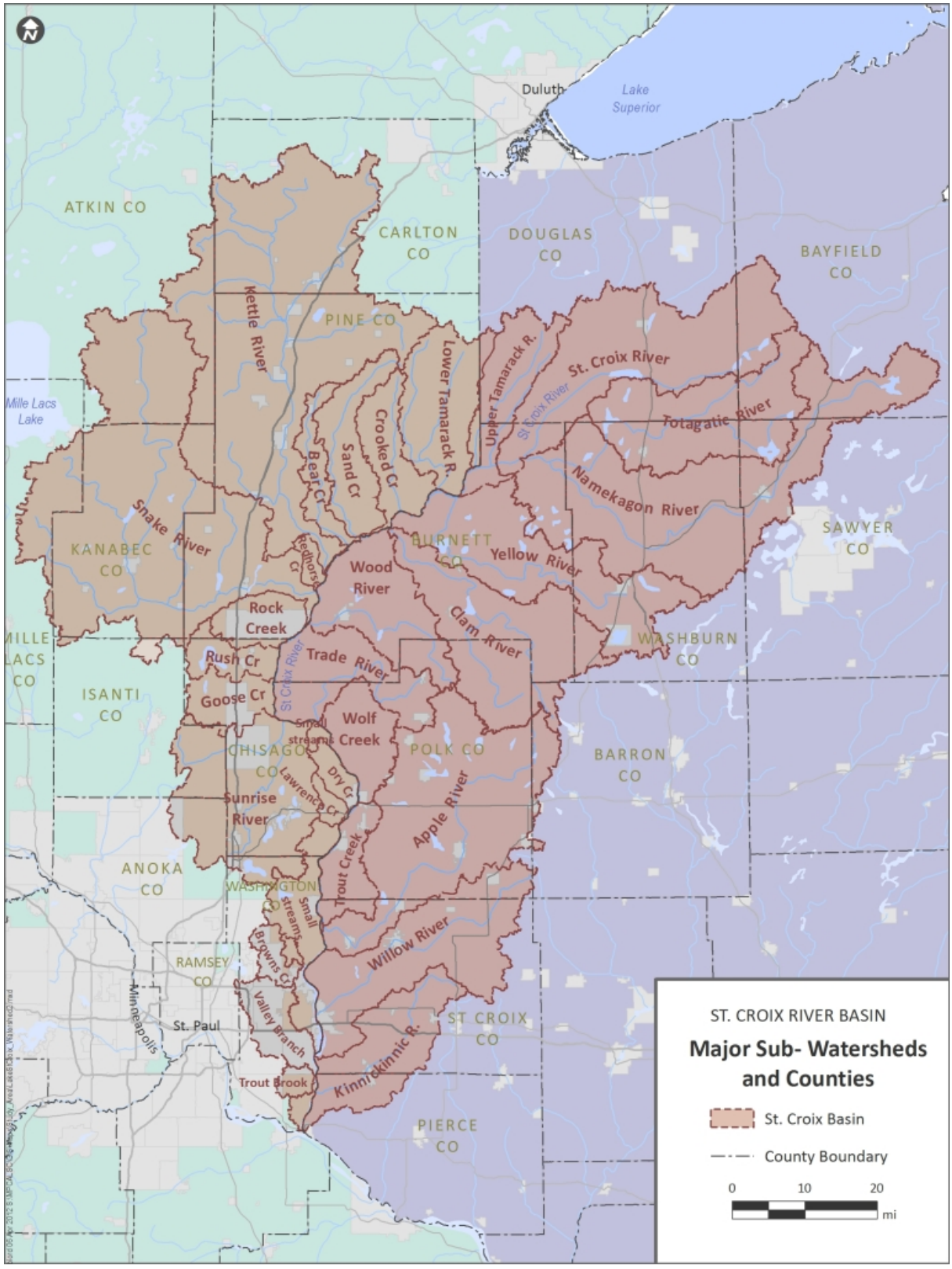
ST. CROIX WATERSHED MAP



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SUMMARY OF COUNTY PLANS

Common approaches among counties:

- Working with landowners to implement nutrient reduction strategies
  - No-till planting practices, rotational grazing strategies
  - Field borders, buffer strips, streambank stabilization
  - Restoration of native vegetation along shorelines
- Urban Best Management Practices
  - Installation of rain gardens, clean water diversions
  - Creation or restoration of waterfront recreational areas
  - Minimize impacts from road construction/maintenance
- Community outreach
  - Newsletters (e-mail and paper mailings), newspaper articles, web videos
  - One on one interactions with farmers, loggers, landowners
  - Exhibits at county fairs
  - Town meetings
  - Adult education classes
  - Opportunities to educate and engage youth (water festivals, poster contests)

Examples of noteworthy approaches:

- Anoka County:
  - Lakeshore restoration projects and retrofit stormwater systems
  - Provides education and assistance to assist homeowners with failing septic systems
- Burnett County:
  - Cattle Exclusion Project: Stream buffer establishment (100-1000 ft) between grazing and loafing areas and two direct tributaries entering the St. Croix River.
  - Shoreline Incentive Program for restoration and preservation of shoreline areas. Since 2000, 659 parcels covering 46 miles of lake and river shoreline have been preserved.
- Chisago County:
  - Implemented a program to eliminate nearly 100% of septic systems characterized as "Imminent Threat to Public Health Septic Systems"
- Douglas County:
  - Hold annual orientation for local officials regarding zoning and conservation practices
- Kanabec County:
  - Extensive coordination on local TMDLs with local organizations
- Pine County:
  - Pine City installed pervious piping and/or rain gardens in street reconstruction projects
  - City of Sandstone commercial rain gardens at a car wash and a new grocery store
  - Conduct workshops on rain garden design and planting
- St. Croix County:
  - Targeting using Phosphorus Index (PI) and watershed modeling
- Washington County:
  - Water Resource Education partnership with local players
  - BMP retrofit program, addressing 100+ BMPs each year
  - Extensive monitoring of local tributaries establishing existing conditions and in some cases demonstrating compliance with TMDL goals

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AITKIN COUNTY

County Goals

The TMDL allows for 15,300 lbs/yr of phosphorus to be loaded to the St. Croix River from Aitkin County. This requires 3,700 lbs/yr of reduction from the estimated TMDL baseline load of 19,000 lbs/yr in the early 1990s. Aitkin County's required reduction ranks 12th largest among the 19 counties in the basin.

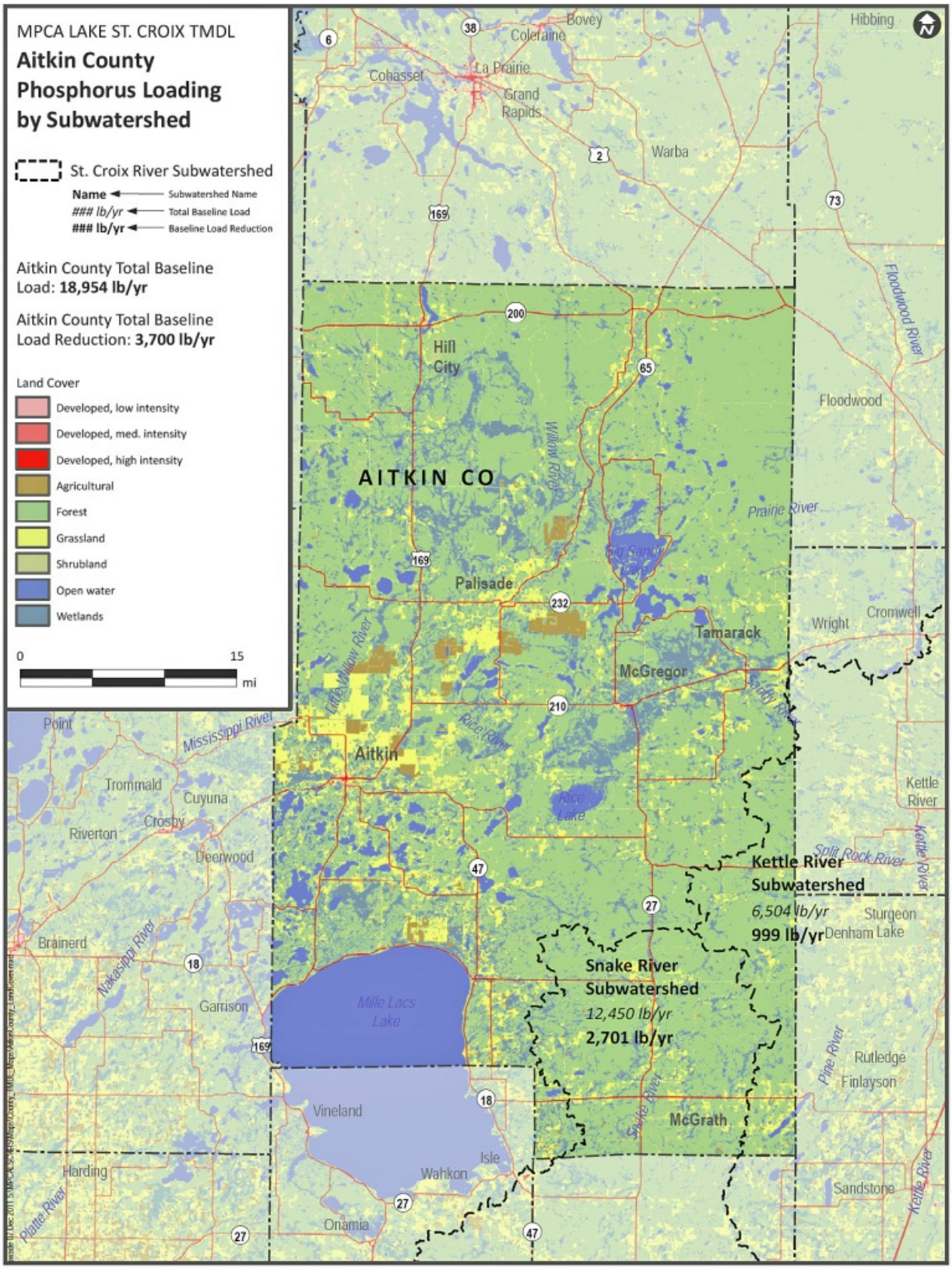
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Aitkin County needs to reduce loadings by 2,700 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 100 lbs/yr over 30 yrs, or 270 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Aitkin County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Aitkin County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Aitkin	200,665	2,066	163,556	14,319	2,168	558	17,999	
Subwatersheds	100%	1%	82%	7%	1%	0%	9%	
Kettle River	67,296	783	56,722	4,786	446	135	4,425	
Snake River	133,368	1,283	106,834	9,533	1,722	423	13,574	
Baseline Loading (lb/yr) * **		**By Landuse (1992 NLCD)**						**TMDL Load Reduction****
County	**Total**	**Ag**	**Forest**	**Grassland**	**Shrubland**	**Urban**	**Water**	
Aitkin	18,955	1,158	14,362	2,820	190	313	112	3,700
Subwatershed	100%	6%	76%	15%	1%	2%	1%	20%
Kettle River	6,504	439	4,981	942	39	75	28	999
Snake River	12,450	719	9,381	1,877	151	237	85	2,701

NOTES:
*Landuse areas derived from GIS based 1992 NLCD dataset
**TMDL load reduction= sum of landuse area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load= sum of landuse area * baseline TMDL phosphorus export coefficient



Aitkin County tributary, land cover and phosphorus loading.

ANOKA COUNTY

County Goals

The TMDL allows for 3,300 lbs/yr of phosphorus to be loaded to the St. Croix River from Anoka County. This requires 1,600 lbs/yr of reduction from the estimated TMDL baseline load of 4,900 lbs/yr in the early 1990s. Anoka County's required reduction ranks 16th largest among the 19 counties in the basin.

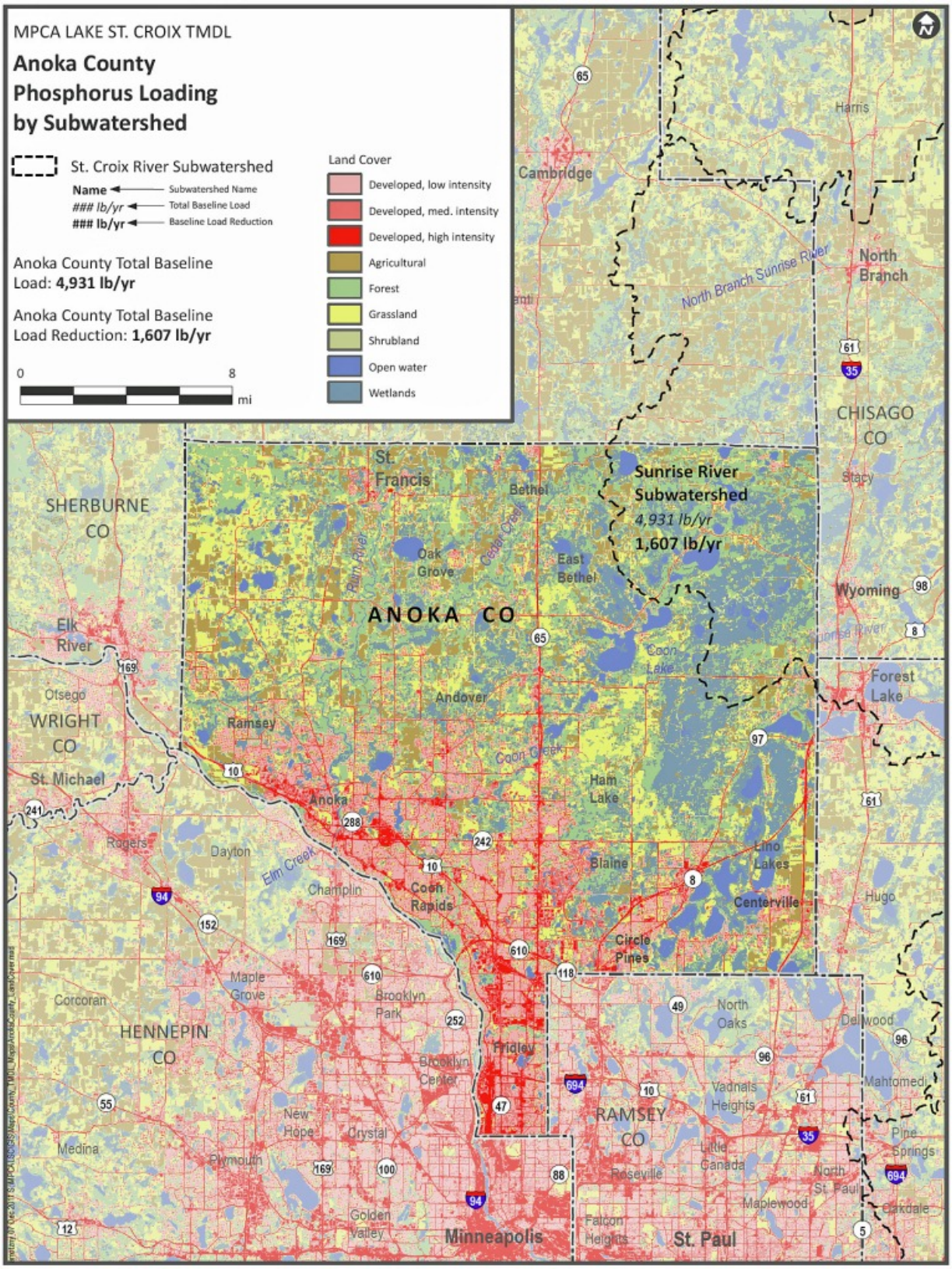
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Anoka County needs to reduce loadings by 1,200 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 40 lbs/yr over 30 yrs, or 120 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Anoka County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Anoka County contributing area and baseline phosphorus loading by subwatershed

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Anoka	36,912	4,228	13,262	5,136	0	533	13,753	
Subwatersheds	100%	11%	36%	14%	0%	1%	37%	
Sunrise River	36,912	4,228	13,262	5,136	0.0	533	13,753	
Baseline Loading (lb/yr) * **		**By Land use (1992 NLCD)**						**TMDL Load Reduction****
County	**Total**	**Ag**	**Forest**	**Grassland**	**Shrubland**	**Urban**	**Water**	
Anoka	4,931	2,371	1,165	1,011	0	299	86	1,607
Subwatershed	100%	48%	24%	21%	0%	6%	2%	33%
Sunrise River	4,931	2,371	1,165	1,011	0.0	299	86	1,607

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction= sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Anoka County tributary, land cover and phosphorus loading

Where we stand today

Quantifying changes in phosphorus loadings to the St. Croix River since the TMDL baseline conditions of the early 1990s is difficult. The most notable changes are related to land use conversions and stormwater management.

Land use conversions: Since the 1990's, portions of the St. Croix River basin encompassing Anoka County have seen modest changes from forested or agricultural land to residential. The amount of development has been limited by prevalence of wetlands and publicly owned lands.

Population trends serve as one way to gauge land use conversion to residential. Population tracking is done on a municipal basis by the Metropolitan Council. Linwood Township comprises the majority of the Anoka County portion of the St. Croix basin, and all of Linwood Township is in the basin. The population of Linwood Township has increased from 3,588 in 1990 to 5,123 in 2010 (42.8% increase). Less than a 5% increase in population is forecasted from 2010 to 2030.

The impact of most residential land use conversions to water quality has probably been minor in this area. With a few exceptions, large lot sizes of at least two acres have been used and most neighborhoods have had neighborhood-level stormwater treatment where most stormwater is infiltrated. In these sand plain soils, little stormwater runoff reaches waterways that have a direct hydrological connection with the St. Croix River. It is possible that the conversion of agricultural land to residential may have even reduced phosphorus export.

At the same time, it is worth noting that shore land areas have been a hotspot for new development and redevelopment. In many cases, small seasonal cabins have been converted to large year-round homes. In other cases, new development has occurred. Because of the small lot size and proximity to open water, stormwater runoff impacts are likely even with the sandy soils.

Stormwater management: Since the 1990's, new stormwater regulations for municipalities, construction and industrial sites have been implemented. These have required a higher level of treatment for new development and protections from erosion during construction processes. In some cases, there are local limitations too, such as limits on impervious surfaces in shore land areas.

Phosphorus reduction plans

The Sunrise River Watershed Management Organization's (SRWMO) watershed management plan sets a goal of reducing phosphorus export from their jurisdiction by 20%. The plan also sets the following applicable goals:

- Make progress toward the Lake St. Croix, Sunrise River, and Martin and Typo Lakes TMDL goals.
- Manage rough fish populations that are affecting water quality.

- Work in coordination with local units of government toward achieving septic system compliance.

The SRWMO watershed management plan is available at: www.AnokaNaturalResources.com/SRWMO

The following table presents a general listing of the planned activities, including a timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Resources Needed (approximate)	Status
Stormwater retrofitting, particularly around Martin and Coon Lakes	2011-2015	15-30 lbs	$40,000 for project installations $17,000 for stormwater assessments	Martin Lake stormwater assessment complete. 3 Martin Lake area rain gardens installed (2 lbs P).
Rough fish management	2012-2015	752 lbs	$169,939	Funding secured, implementation to begin in 2012.
Lakeshore restorations	2012-2019	1-10 lbs	$50,000	New efforts underway to increase landowner interest.
Septic systems – Education and assistance programs to assist homeowners with failing ISTS and improve maintenance. Focus on shore land areas.	2012-2013	Undetermined	$15,000 plus use existing regional assistance programs that may total approximately $50,000	U of M Extension doing landowner workshops. Other local programs suspended indefinitely due to lack of local financial resources.
Wetland management or restoration	None planned	Undetermined	Unknown – best estimate $50,000	

Methods of prioritization

- Sunrise River Watershed Management Organization (SRWMO) watershed management plan.
- Anoka Conservation District comprehensive plan.
- TMDL's for Lake St. Croix, Sunrise River, and Martin and Typo Lakes.

Key players in implementation

- Sunrise River Watershed Management Organization (SRWMO)
- Anoka Conservation District.
- Martin Lakers Association
- Municipalities of East Bethel, Columbus, Ham Lake, and Linwood Township.
- USDA Natural Resources Conservation Service
- MN Department of Natural Resources
- Minnesota Pollution Control Agency

Activities to inform, educate, engage, motivate and enable citizens

- Staff presentations to local lake and river associations, schools, community groups, local boards and educational workshops.
- Occasional newspaper articles, often highlighting implementation projects.
- Web videos.
- SWCD and county websites.
- Municipal newsletter articles, particularly those written to meet MS4 stormwater permit education requirements.
- Neighbor-to-neighbor communications prompted by one party being exposed to any of the above.

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BARRON COUNTY

County Goals

The TMDL allows for 5,300 lbs/yr of phosphorus to be loaded to the St. Croix River from Barron County. This requires 2,400 lbs/yr of reduction from the estimated TMDL baseline load of 7,700 lbs/yr in the early 1990s. Barron County's required reduction ranks 13th largest among the 19 counties in the basin.

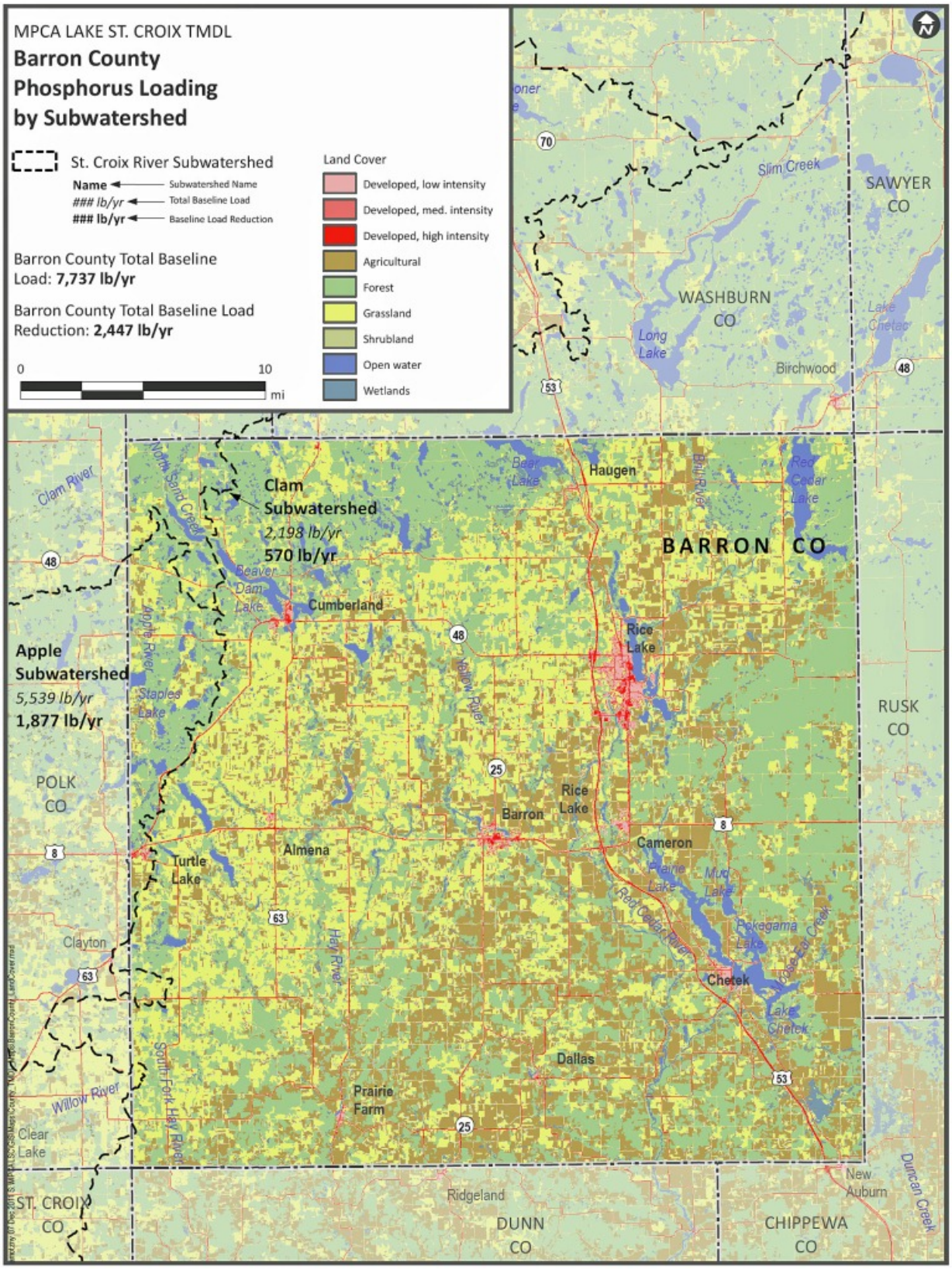
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Barron County needs to reduce loadings by 1,800 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 60 lbs/yr over 30 yrs, or 180 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Barron County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Barron County contributing area and baseline phosphorus loading by subwatershed

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Barron	35,545	8,344	17,013	7,484	8.5	133	2,561	
Subwatersheds	100%	23%	48%	21%	0%	0%	7%	
Apple	23,416	6,348	10,109	5,124	2.9	129	1,703	
Clam	12,129	1,996	6,905	2,361	5.6	4	858	
Baseline Loading (lb/yr) ***		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Barron	7,738	4,678	1,494	1,474	1	75	16	2,447
Subwatershed	100%	60%	19%	19%	0%	1%	0%	32%
Apple	5,539	3,559	888	1,009	0.3	73	11	1,877
Clam	2,198	1,119	606	465	0.5	2	5	570

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Barron County tributary, land cover and phosphorus loading

Where we stand today

In the past 30 years, there has been a considerable reduction in the number of barnyard runoff sites in the county through the installation of management systems and changes in the farming community.

Phosphorus reduction plans

We are working with farmers to implement Nutrient Management Plans and to increase practice of no-till planting. Any site that has runoff from a confined animal area will be addressed.

Methods of prioritization

Barron County has worked to reduce the runoff from agricultural sites, through the practices mentioned above, in all areas of the County. With the majority of the land and cropland in the Red Cedar Basin, which also has a TMDL, this will be our priority, although we will address any specific site problems in the St. Croix Basin.

We are working on developing a system to target the sites with the highest levels of phosphorus production.

Key players in implementation

The Barron County Soil & Water Conservation Department works closely with the USDA Natural Resource Conservation Service to locate and treat runoff situations.

Activities to inform, educate, engage, motivate and enable citizens

Personal contact with farmers has been and will continue to be the primary method of engagement.

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BAYFIELD COUNTY

County Goals

The TMDL allows for 15,300 lbs/yr of phosphorus to be loaded to the St. Croix River from Bayfield County. This requires 1,600 lbs/yr of reduction from the estimated TMDL baseline load of 16,900 lbs/yr in the early 1990s. Bayfield County's required reduction ranks 15th largest among the 19 counties in the basin.

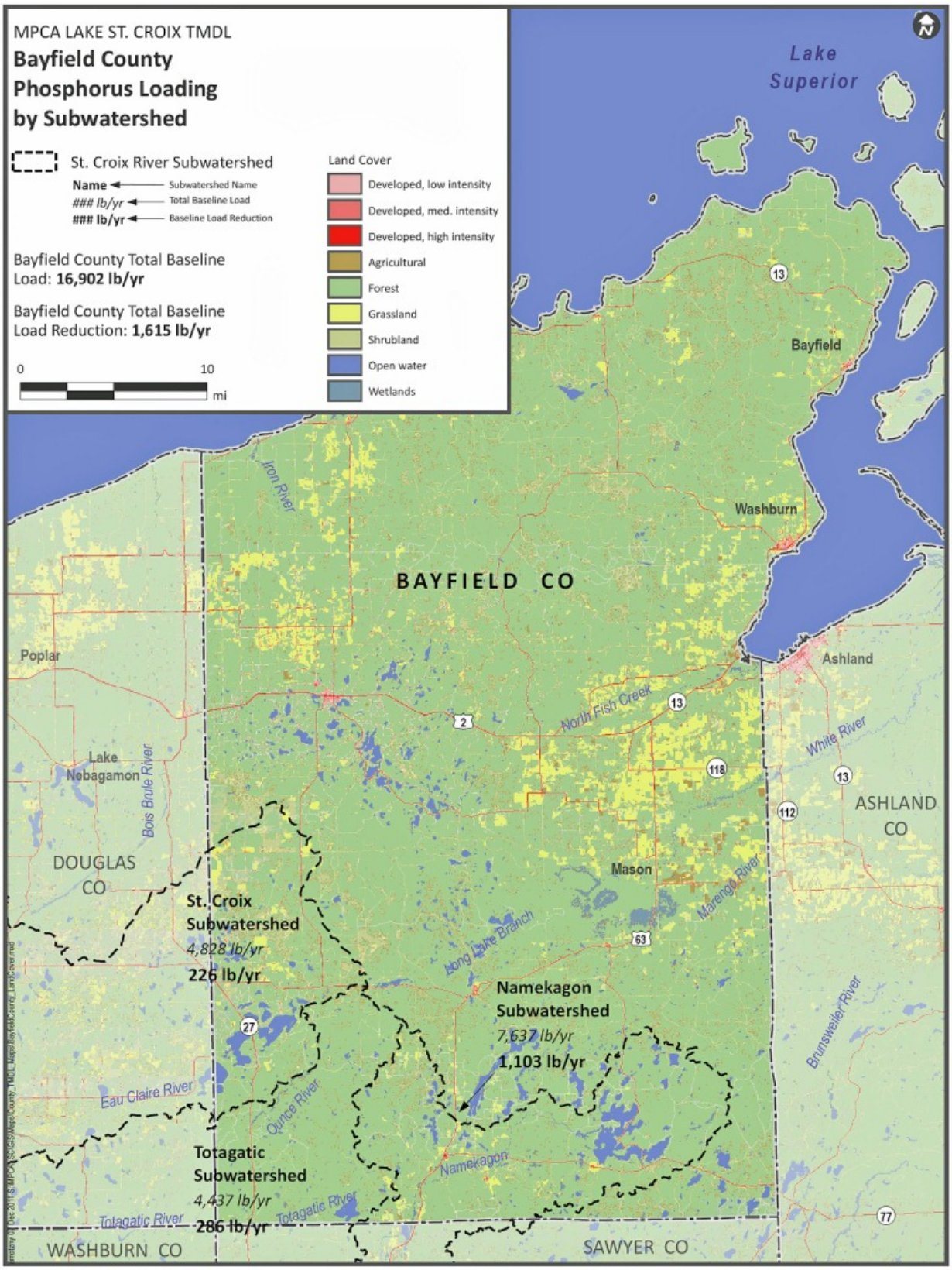
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Bayfield County needs to reduce loadings by 1,200 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 40 lbs/yr over 30 yrs, or 120 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Bayfield County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Bayfield County contributing area and baseline phosphorus loading by subwatershed

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Bayfield	185,089	2,703	162,808	3,527	1,632	294	14,124	
Subwatersheds	100%	1%	88%	2%	1%	0%	8%	
Namekagon	80,292	1,947	67,644	2,503	126	93	7,979	
St Croix	54,936	453	47,641	719	1,493	161	4,469	
Totagatic	49,861	303	47,524	305	12	40	1,677	
Baseline Loading (lb/yr) ***		By Landuse (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Bayfield	16,902	1,515	14,296	695	143	165	88	1,615
Subwatershed	100%	9%	85%	4%	1%	1%	1%	10%
Namekagon	7,637	1,092	5,940	493	11	52	50	1,103
St Croix	4,828	254	4,183	142	131	90	28	226
Totagatic	4,437	170	4,173	60	1	23	10	286

NOTES:
*Landuse areas derived from GIS based 1992 NLCD dataset
**TMDL load reduction= sum of landuse area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load= sum of landuse area * baseline TMDL phosphorus export coefficient



Bayfield County tributary, land cover and phosphorus loading.

BURNETT COUNTY

County Goals

The TMDL allows for 67,000 lbs/yr of phosphorus to be loaded to the St. Croix River from Burnett County. This requires 21,000 lbs/yr of reduction from the estimated TMDL baseline load of 88,000 lbs/yr in the early 1990s. Burnett County's required reduction ranks 4th largest among the 19 counties in the basin.

To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Burnett County needs to reduce loadings by 16,000 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 500 lbs/yr over 30 yrs, or 1,600 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Burnett County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Burnett County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Burnett	562,172	76,450	347,563	60,157	17,095	1,565	59,343	
Subwatersheds	100%	14%	62%	11%	3%	0%	11%	
Clam	137,354	21,958	84,197	18,593	1,386	590	10,629	
Namekagon	50,718	1,871	38,324	1,480	1,019	28	7,996	
St Croix	26,708	696	20,405	492	4,620	0.4	495	
Trade	64,029	12,360	30,849	9,247	5,161	12	6,400	
Upper Tamarack	22,019	1,439	18,468	1,333	183	53	544	
Wolf	692	237	111	334	0.0	0.0	10	
Wood	116,501	22,550	56,641	20,431	3,153	412	13,313	
Yellow	144,151	15,339	98,567	8,247	1,572	470	19,957	

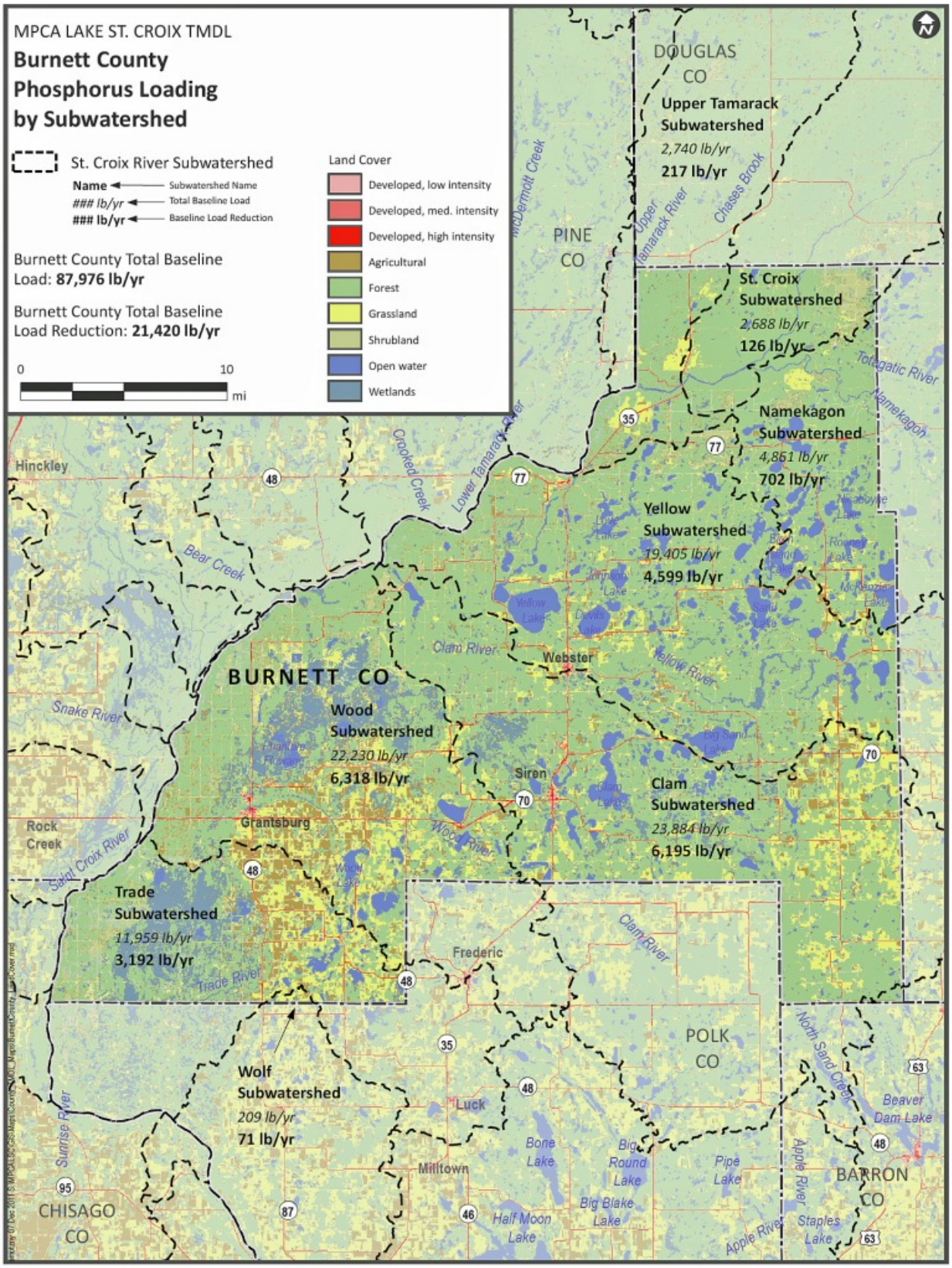
Baseline Loading (lb/yr) ***		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Burnett	87,975	42,862	30,519	11,846	1,501	878	370	21,419
Subwatershed	100%	49%	35%	13%	2%	1%	0%	24%
Clam	23,884	12,311	7,393	3,661	122	331	66	6,195
Namekagon	4,861	1,049	3,365	291	89	16	50	702
St Croix	2,688	390	1,792	97	406	0.2	3	126
Trade	11,959	6,930	2,709	1,821	453	7	40	3,192
Upper Tamarack	2,740	807	1,622	262	16	30	3	217
Wolf	209	133	10	66	0.0	0.0	0.1	71
Wood	22,230	12,643	4,974	4,023	277	231	83	6,318
Yellow	19,405	8,600	8,655	1,624	138	263	124	4,599

NOTES:

*Land use areas derived from GIS based 1992 NLCD dataset.

**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.

***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Burnett County tributary, land cover and phosphorus loading.

Where we stand today

Transect survey results

The Burnett County Transect Survey finds continued low rates of soil erosion on fields. In 2001 the county-wide average soil loss was 2.5 tons per year. In 2011, the average soil loss rate was 2.1 tons per acre.

Average Annual Soil Loss by Watershed (2001)

Watershed	Average Annual Soil Loss (tons/acre)
Clam River	0.1
Lower Namekagon River	2.7
Lower Yellow River	1.1
North Fork Clam River	2
St. Croix/Eau Clair Rivers	Na
Trade River	4.9
Upper Tamarack River	Na
Upper Yellow River	Na
Wolf Creek	Na
Wood River	2
Yellow River	1.1
County Rate	2.5

Average Annual Soil Loss by Watershed (2011)

Watershed	Average Annual Soil Loss (tons/acre)
Clam River	NA
Lower Namekagon	0.7
Lower Yellow	0.2
North Fork Clam River	2.5
Upper Yellow River	0.9
Trade River	2.8
Wood River	1.7
St. Croix/Eau Claire, Upper Tamarack, Wolf Creek	NA
County Rate	2.1

U.S. Census of Agriculture Livestock Data

The number of cattle and calves decreased from 13,550 in 1992 to 12,048 in 2007. The percentage of dairy cows decreased from 37% (of cattle and calves) in 1992 to 28% in 2007. The percentage of beef cows increased from 11% (of cattle and calves) in 1992 to 21% in 2007. Fewer cattle may result in less manure runoff to surface water and reduced streambank erosion. However, a decline in dairy cows also results in fewer hay crops and more row crops such as corn and soybeans.

Major phosphorus-reducing activities completed since 1992

- Big Wood Lake watershed project (1300 lbs. P reduced):
  - Reductions from barnyards (424 lbs.)
  - Sediment reduction from cropland (828 tons or 828 lbs. P[1])
  - Sediment reduction from streambank and shoreline erosion (17 tons or 17 lbs. P)
  - Sediment reduction from gully erosion (31 tons or 31 lbs. P)
- Clam Lake watershed – (1,000 acres – nutrient management planning)
- Cattle Streambank Exclusion – This project removed hundreds of beef cattle from two direct tributary streams to the St. Croix River in the St. Croix and Upper Tamarack subwatersheds. Stream length totaled about 4,500 feet. The project also established a significant buffer (100 ft. – 1000 ft.) between the stream and grazing and loafing areas with cattle excluded from 240 acres. Streambank vertical recession ranged from 1 to 5 feet prior to removing cattle.
- Burnett County's Shoreline Incentive Program used covenants to preserve a minimum of 35 foot shoreline buffers on 659 parcels covering 46 miles of lake and river shoreline (2000-2011).
- The Natural Resources Conservation Services installed many conservation practices over the years. The table below is a partial list of projects installed from 1997 through 2011.

Burnett County NRCS-Installed Projects 1997-2011[2]		
Practice	Number	Units
Nutrient Management Planning	6,334.7	Acres
Streambank and Shoreline Protection	2,484.5	Feet
Heavy Use Area Protection	2.05	Acres
Prescribed Grazing	1,211.1	Acres
Grade Stabilization Structure	6	?

[1] Assumed 1 lb. P per ton of sediment.
[2] From NRCS Progress Report generated 4/04/12

Phosphorus Reduction Plans

The following table presents a general listing of planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Wood River/Memory Lake Project includes NR 151 farm survey, inventory of bank erosion and stormwater runoff sites within the Wood River Watershed	2012-2013	Unknown	Funded through a WDNR lake planning grant.	County work provides grant match. Some funds provided to the county.
Encourage participation, develop conservation plans, design BMPs, supervise installation of agricultural practices	2013-2020	Unknown	2 FTE	BMPS listed below cannot be implemented without additional staff.
Nutrient Management Planning (4,400 acres)	2012-2020	Unknown	$123,200 (plus FTE above)	Very limited DATCP funding available. ($4 - $12,000/year ?)
Install Agricultural BMPs Conservation Tillage Barnyard Improvement Grade Stabilization Streambank Stabilization Manure Storage Facility Closure Rotational Grazing Etc.	2012-2020	Unknown	$240,000 additional (plus FTE above)	Approximately $30,000 currently available annually through DATCP funding. Additional staff needed to spend beyond current allocation.
Outreach to urban and lakeshore owners	2013-2020	Unknown	1 FTE	Contract $ could be substituted to carry out this task.
Install Urban BMPs	2013-2020	Unknown	$ for engineering $ for installation	

Methods of prioritization

Wood River/Memory Lake implementation projects will be prioritized based upon reduction of sediment loads to Memory Lake. Projects which reduce cropland and streambank erosion on the Wood River and tributary streams have a higher priority than reduction of nutrient loads.

From the Burnett County Land and Water Plan (2009):

The Agricultural Performance Standards implementation strategy considers cropland erosion, but as a lower priority than runoff from livestock facilities.

NR 151 activities are prioritized in the Burnett County Land and Water Plan as follows:

Livestock Facilities

The LWCD conducted a preliminary roadside survey of 140 livestock facilities in 2003. Results will be used to select priority farms for on-site visits in the implementation of the Agricultural Performance Standards. On-site visits began with two visits in 2008. Visits will continue as funds from the DATCP allocation allow. One livestock facility permit was issued in 2008.

Targeting Soil Loss from Cropland

Areas will be targeted for conservation practices using the following criteria:

- § the total amount of erosion occurring;
- § the extent to which current estimated erosion rates for cropland fields exceed the soil erosion standards;
- § the off-site damages, including water degradation caused by soil erosion;
- § the extent to which the soil erosion is preventable;
- § the cost of preventing erosion;
- § the feasibility of implementing the erosion control strategy; and
- § other factors to be identified by the Natural Resources Committee.

The transect survey indicates that there are crop fields present which may be disproportionally loading P to St. Croix River Watersheds. For example, the North Fork of the Clam River watershed had 1.6% of fields, the Trade River watershed had 0.5% of fields, and the Wood River watershed had 1.3% of fields where erosion was greater than 3T. These fields could be targeted for reduction in soil erosion. While overall erosions rates averaged well below T, at 2.1 tons per acre, about 11 % of fields had erosion rates above T.

Key players in implementation

- · Burnett County Land and Water Conservation Department
- · Village of Grantsburg (Memory Lake Project)
- · Burnett County Lakes and Rivers Association
- · University of Wisconsin Extension
- · Natural Resources Conservation Service
- · Department of Agriculture, Trade, and Consumer Protection
- · Department of Natural Resources

Activities to inform, educate, engage, motivate and enable citizens

- · LWCD one-on-one contacts
- · Workshops such as for farmer-written nutrient management plans
- · Lakelines newsletter - published by Burnett County Lakes and Rivers Association in the spring and fall of each year.

- Earth Day activities such as storm drain stenciling
- University of Wisconsin Extension publications and workshops
- Farm Bureau and other newsletters

CARLTON COUNTY

County Goals

The TMDL allows for 23,000 lbs/yr of phosphorus to be loaded to the St. Croix River from Carlton County. This requires 4,000 lbs/yr of reduction from the estimated TMDL baseline load of 27,000 lbs/yr in the early 1990s. Carlton County's required reduction ranks 10th largest among the 19 counties in the basin.

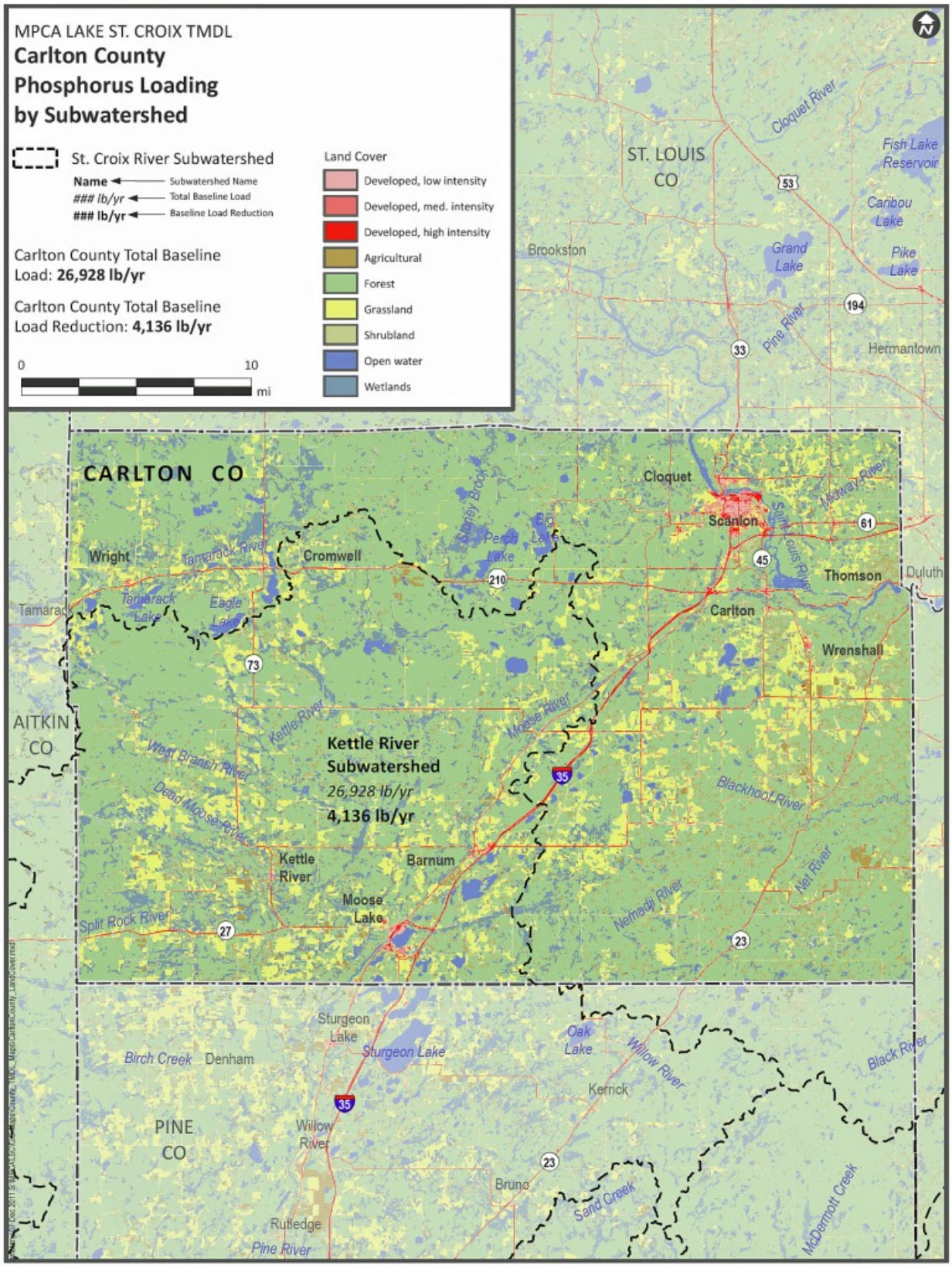
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Carlton County needs to reduce loadings by 3,100 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 100 lbs/yr over 30 yrs, or 310 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Carlton County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Carlton County contributing area and baseline phosphorus loading by subwatershed

Area in St. Croix Basin (ac)		By land use (1992 NLCD)*						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Carlton	229,671	6,423	168,714	36,515	1,580	1,950	14,489	
Subwatersheds	100%	3%	73%	16%	1%	1%	6%	
Kettle River	229,671	6,423	168,714	36,515	1,580	1,950	14,489	
Baseline Loading (lb/yr) ***		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Carlton	26,928	3,601	14,814	7,191	139	1,093	90	4,136
Subwatershed	100%	13%	55%	27%	1%	4%	0%	15%
Kettle River	26,928	3,601	14,814	7,191	139	1,093	90	4,136

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Carlton County tributary, land cover and phosphorus loading

Where we stand today

Dairy and livestock operations have declined in this area since the early 1990's, which have likely contributed to the reduction in phosphorous loading from agricultural sources. Additionally, some of those dairy operations have converted to beef cow/calf operations while the landowner pursues work off the farm. Consequently, reductions in total confined livestock areas may have led to decreased runoff of phosphorous.

Cost share programs implemented through the NRCS and the USDA have greatly contributed to the conservation efforts since the early 1990's. Due to FOIA restrictions, detailed information on the specific parties that implement conservation practices and the associated water quality impact is difficult to ascertain. However, Carlton SWCD is working with the conservation partnership on efforts to quantify the load reduction from the past 20 years of implementation.

While phosphorus loading from agricultural sources may have decreased, other sources may have increased. One source of increased phosphorus loading may be attributable to development in the watershed. In late 2011, the Carlton SWCD applied for a Clean Water Partnership through MPCA to collect data on lakes and streams in the Kettle River Watershed. That effort was unsuccessful but the need remains in order to identify high phosphorus loading areas.

Phosphorus reduction plans

In December 2011, the Carlton SWCD received funding for an accelerated implementation grant from the Clean Water Funds through BWSR. Pine, Kanabec, and Aitkin SWCDs are cooperating on this project to form a Kettle River watershed approach. The goal of the project is to accumulate GIS data, implementation records and analyze the load reduction targets for HUC 12 subwatersheds. Using a BWSR developed tool called Environmental Benefits Index (EBI), outreach efforts to HUC 12 subwatersheds will be prioritized in order to assess load reductions. Communication with private landowners in the prioritized subwatersheds will identify land use practices. Lastly, the design and cost of additional implementation projects will be evaluated in preparation for future funding opportunities. The time line for this project is 2012 -2014.

Conservation implementation will continue though NRCS EQIP program sign-ups, the Carlton County By-Products program, and the SWCD state Cost Share program. The Carlton SWCD is working to document the impacts from this ongoing implementation. The same FOIA hurdles exist when working with the USDA programs.

The following table presents a general listing of the planned activities, including a timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Timeframe for Planned Activities

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Continued conservation implementation through SWCD, Carlton County and USDA programs	Ongoing	???	More technical staff for implementation and documentation is needed. Cost share resources are available.	
Priority identification through CWF Grant	2012-2014	No projects are planned through this grant project so no direct reductions will be realized. Past reductions may be identified.	Grant funds of $99,000 will be utilized	Just beginning

Methods of prioritization

Through the CWF project, an EBI tool will be used to identify target areas. See previous information.

Key players in implementation

The Carlton SWCD will be the lead with assistance from the local conservation partnership including: Carlton County, USDA NRCS, local industry, and private landowners.

Activities to inform, educate, engage, motivate and enable citizens

This is a broad subject that has received much discussion in the St. Croix TMDL process. At this time, the Carlton SWCD will continue to utilize outreach methods including town meetings, mailings and direct phone calls. As other tools are developed, the SWCD will likely incorporate them into the outreach program.

CHISAGO COUNTY

County Goals

The TMDL allows for 46,400 lbs/yr of phosphorus to be loaded to the St. Croix River from Chisago County. This requires 21,800 lbs/yr of reduction from the estimated TMDL baseline load of 68,200 lbs/yr in the early 1990s. Chisago County's required reduction ranks 3rd largest among the 19 counties in the basin.

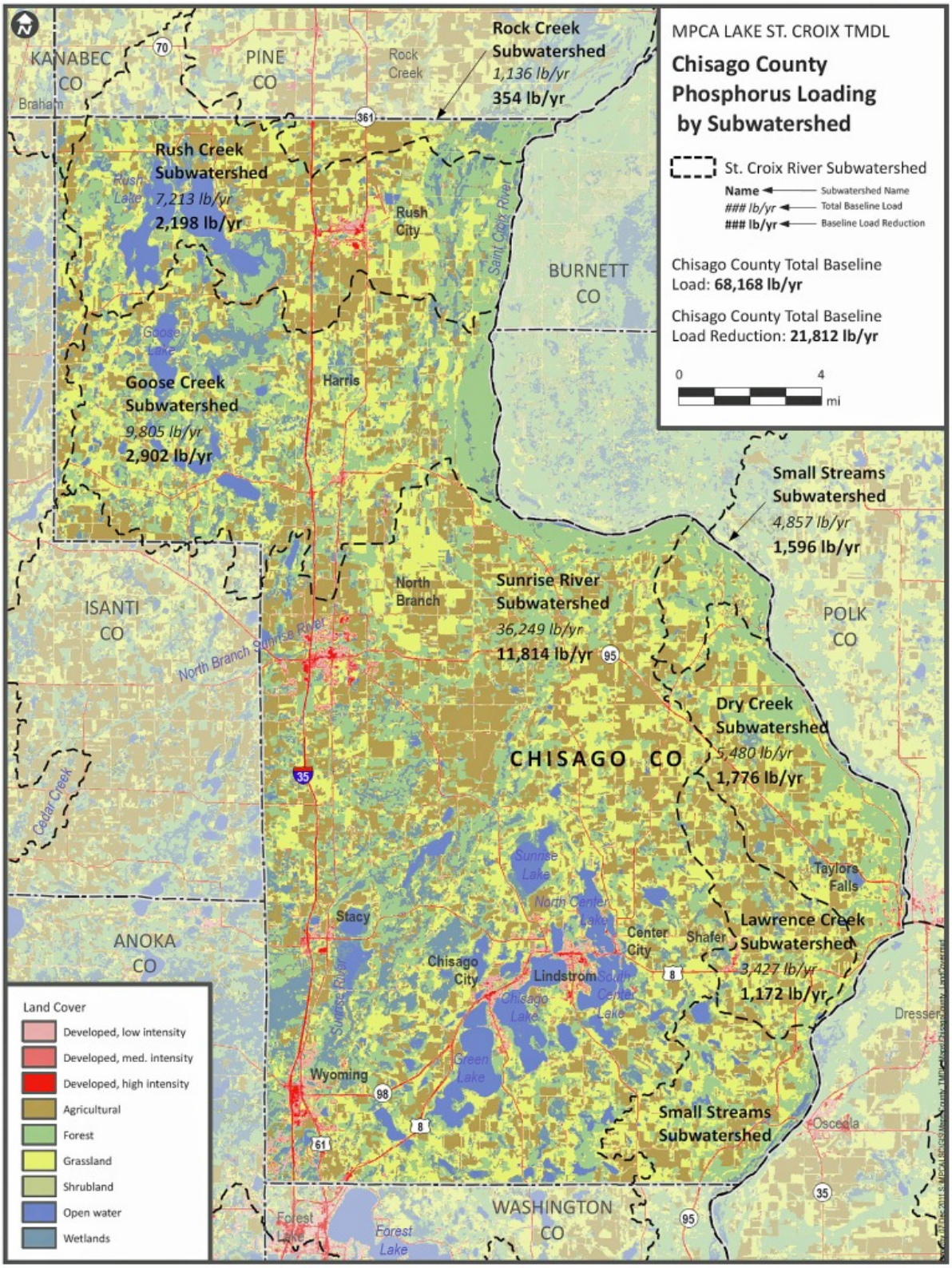
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Chisago County needs to reduce loadings by 16,200 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 500 lbs/yr over 30 yrs, or 1,600 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Chisago County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus

Chisago County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Chisago	279,247	73,713	76,146	90,681	28	3,704	34,974	
Subwatersheds	100%	26%	27%	32%	0%	1%	13%	
Dry Creek	20,537	6,157	5,827	7,476	1	67	1,008	
Goose Creek	48,638	9,684	19,388	12,365	5	348	6,847	
Lawrence Creek	11,180	4,014	1,594	5,147	0.0	36	388	
Rock Creek	5,156	1,106	1,789	1,713	2	33	513	
Rush Creek	35,940	6,422	10,883	11,025	7	790	6,814	
small streams	17,586	5,706	4,356	6,405	2	12	1,104	
Sunrise River	140,210	40,624	32,308	46,550	12	2,416	18,300	
Baseline Loading (lb/yr) ***		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Chisago	68,168	41,328	6,686	17,857	2	2,076	218	21,812
Subwatershed	100%	61%	10%	26%	0%	3%	0%	32%
Dry Creek	5,480	3,452	512	1,472	0.1	38	6	1,776
Goose Creek	9,805	5,429	1,702	2,435	0.4	195	43	2,902
Lawrence Creek	3,427	2,250	140	1,014	0.0	20	2	1,172
Rock Creek	1,136	620	157	337	0.1	19	3	354
Rush Creek	7,213	3,601	956	2,171	1	443	42	2,198
small streams	4,857	3,199	383	1,261	0.2	7	7	1,596
Sunrise River	36,249	22,776	2,837	9,167	1	1,355	114	11,814

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Chisago County tributary, land cover and phosphorus loading.

Where we stand today

Quantifying changes in phosphorus loadings to the St. Croix River since the TMDL baseline conditions of the early 1990s is difficult. With respect to agricultural practices, there have been several in Chisago County that have had a significant impact on phosphorus loadings: The amount of animal agriculture has decreased dramatically. A review of the county's feedlot inventory shows a 70% reduction in number of dairy operations since 1997 (1997 = 73 vs. currently = 22). This has resulted in a decrease in the amount of livestock on sensitive pasture lands and the amount of manure. It has also resulted in a decrease in the percentage of cropland in alfalfa and an increase in the percentage of land in corn and soybeans. According to the USDA Farm Service Agency:

Total Reported Acres	1998	2009
Alfalfa	8,010	4,350
Corn	33,469	29,813
Soybean	21,430	24,612

There are numerous other crops that are reported such as small grains, vegetables and fruits in addition to fallow land. This is only a snapshot of the main agriculture crops grown in Chisago County.

There has been a 45% reduction in Alfalfa acreage – an important crop grown by dairy farmers.

Development of agricultural land between 1998 and 2009 may have contributed to the slight reduction in corn and soybean acreage.

Farming practices have changed. In the 1990s it was common to see tillage practices that retained minimal (near 0%) residue on the field after harvest. Since then, there have been significant improvements to tillage equipment, herbicides, and seed genetics that have resulted in an increase in residue retained on fields post-harvest, typically in excess of 30%. Also in the 1990's, farmers generally did not have comprehensive nutrient management plans. Since then, nutrient management plans have been more widely developed and implemented. The rising cost of fertilizer has also contributed to reductions in its application. Available data from tillage transect surveys compare conditions in the mid 1990's to more recent conditions:

Percentage of All Crop Land	1995	2007
Total Conservation Tillage >30% Residue	*31.3%	*68.2%
Other Conservation Practices 15-30% Residue	22.5%	14.5%
Other Conservation Practices <15% Residue	**46.2%	**17.3%

*Represents a 118% increase since 1995
**Represents a 63% decrease since 1995

Chisago County has also implemented a program to eliminate nearly 100% of septic systems characterized as "Imminent Threat to Public Health Septic Systems." However, many failing systems still exist throughout the county.

In a majority of the urban areas of Chisago County there have been minimal efforts to increase the amount of treatment that stormwater receives. The one exception is in the communities of Center City and Lindstrom, who in 2011, with assistance from the Chisago SWCD and the Chisago Lakes Lake Improvement District, began implementing numerous urban BMPs to capture and treat previously untreated stormwater runoff. The estimated phosphorus reduction total for urban BMPs installed in 2011 is 47.5 pounds/year.

Phosphorus reduction plans

The Chisago County Local Water Management Plan (2010-2013) specifies the St. Croix Basin Partner's 20% reduction by 2020 goal as Priority Concern #1. The plan identifies the following tasks related to this concern:

Priority Concern #1: Reduce phosphorus loading from Chisago County to the St. Croix River to help meet 20% basin wide goal.

> Task 1.3: Implement recommendations of Lake St. Croix TMDL Implementation Plan.
>
> Task 1.4: Coordinate and improve water quality monitoring and assessment capabilities to track progress on achievement of the recommended 20% phosphorus loading reduction goal for Lake St. Croix.

Additional details on the types of planned activities are explained in the county water plan, housed and updated by Chisago County. At this time, a current version of the county's water plan is available electronically at: www.co.chisago.mn.us/FileUpload/Library/2010-2013%20County%20Water%20Mgmt%20Plan%207-27-2010.pdf

Other plans with activities leading to phosphorus load reductions include:

- TMDL Restoration and Protection Plans
- Chisago Lakes Chain of Lakes Watershed (scheduled to be completed in 2012)
- Sunrise River Watershed (scheduled to be completed in 2013)
- Goose, Rush, Rock Creek Watersheds (scheduled to be completed in 2014)
- Comfort Lake / Forest Lake Watershed (completed)
- Subwatershed Assessments
- Urban assessments completed for the communities of Center City, Lindstrom and Chisago City
- Rural assessments scheduled for 2012/2013: Rush Lake Watershed, Chisago Lakes Chain of Lakes Watershed, portions of the lower Sunrise River Watershed.
- Inventory and assessment of the active gully erosion sites along the St. Croix River Escarpment (will be completed in early 2012).

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status. The county water plan is currently being updated and will help identify projects to be completed over the next ten years.

Implementation Timeframe

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Urban BMPs: Rain gardens Vegetative Swales Iron/Sand Filters Bioretention Tree pits/trench	2012-2013	100 pounds	$500,000 Received: State CWF: $320,000 Local: $80,000 Needed: $100,000	Projects have been identified through the completion of urban stormwater assessments
Rural/Ag. BMPs: Conservation Tillage Water & Sediment Control Basins Grassed Waterways Nutrient Management Plans Grassed Filter Strips	2012-2013	200 pounds	$750,000 USDA NRCS Funds: $400,000 (estimated) Landowner: $200,000 State CWF: $150,000	

Methods of prioritization

The SWCD workload is prioritized through:

- Development of a strong comprehensive plan (historically the SWCD has adopted the County Local Water Resource Management Plan as our comprehensive plan)
- Development of an Annual Plan – details the workload for the upcoming year.
- The completion of assessments and inventories. Projects that are currently completed or planned for 2012:
  - Chisago Lakes Chain of Lakes Urban Stormwater Retrofit Assessment
  - St. Croix River Escarpment Inventory and Assessment
  - Total Maximum Daily Load Restoration and Protection Plans
  - North Branch of the Sunrise River Watershed
  - Chisago Lakes Chain of Lakes Watershed
  - Sunrise River Watershed
  - Rock, Rush, Goose Creek Watersheds
  - Rush Lake Watershed rural assessment
  - Sunrise River SWAT study
  - Lower Sunrise Priority Management Zone study

Key players in implementation

- Chisago County (www.co.chisago.mn.us)
- Chisago Soil and Water Conservation District (www.chisagoswcd.org)
- Comfort Lake / Forest Lake Watershed District (www.clflwd.org)
- Chisago Lakes Lake Improvement District (www.co.chisago.mn.us/government/environmental-services/environmental-services-news/lake-improvement-district-news)
- USDA Natural Resources Conservation Service (www.mn.nrcs.usda.gov)
- Cities within Chisago County

- Local stream and lake organizations
- Friends of the Sunrise
- MN Department of Natural Resources

Activities to inform, educate, engage, motivate and enable citizens

- Local Nonpoint Education for Municipal Officials (NEMO) training
- Local Farmer Focus Group Meetings (A locally lead effort by the Chisago SWCD and NRCS office. Meetings held to inform local farmers on current and upcoming Local, State, and Federal programs and priorities.)
- Weekly Conservation Notes articles highlighting current SWCD/NRCS programs in our local newspapers
- Chisago County Children's Water Festival
- Chisago County Master Gardeners Spring Bonanza Adult Education Classes
- SWCD 4th-6th grade poster contest
- Countywide newsletters focusing on current SWCD/NRCS programs
- Numerous Staff presentations to local lake and river associations, schools, local community groups, local boards and educational workshops

DOUGLAS COUNTY

County Goals

The TMDL allows for 32,000lbs/yr of phosphorus to be loaded to the St. Croix River from Douglas County. This requires 1,900lbs/yr of reduction from the estimated TMDL baseline load of 34,000lbs/yr in the early 1990s. Douglas County's required reduction ranks 14th largest among the 19 counties in the basin.

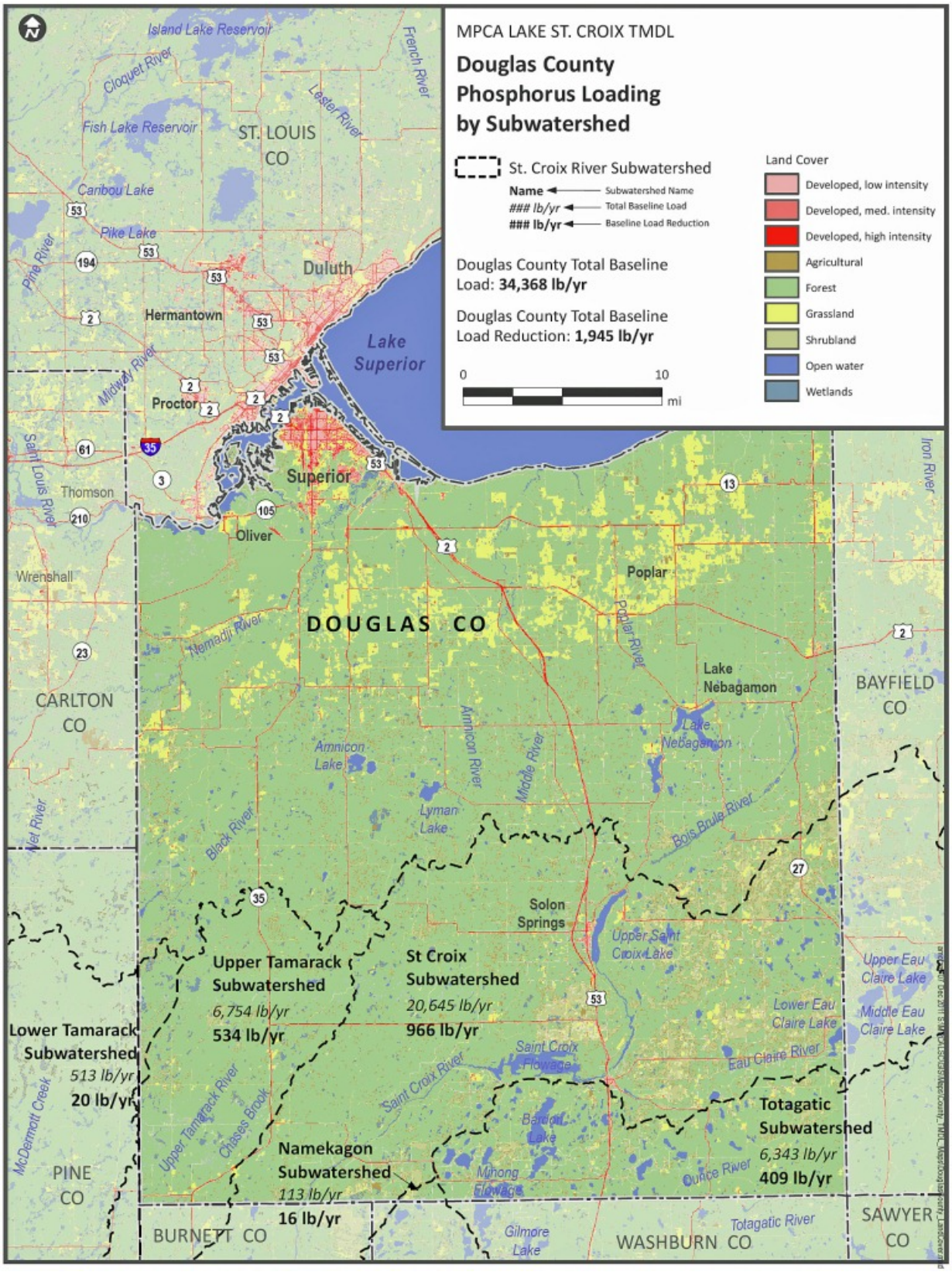
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Douglas County needs to reduce loadings by 1,400lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 50lbs/yr over 30 yrs, or 140lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Douglas County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Douglas County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Douglas	365,876	6,144	314,870	6,793	13,757	1,043	23,269	
Subwatersheds	100%	2%	86%	2%	4%	0%	6%	
Lower Tamarack	5,530	85	5,122	71	5	0.0	247	
Namekagon	1,128	0	1,059	24	9	25	11	
St Croix	221,612	3,050	188,971	3,785	12,470	754	12,581	
Totagatic	66,316	1,664	54,531	1,806	1,239	205	6,871	
Upper Tamarack	71,291	1,344	65,187	1,107	34	59	3,560	
Baseline Loading (lb/yr) ***		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Douglas	34,368	3,445	27,648	1,338	1,208	585	145	1,945
Subwatershed	100%	10%	80%	4%	4%	2%	0%	6%
Lower Tamarack	513	48	450	14	0.5	0.0	2	20
Namekagon	113	0.0	93	5	1	14	0.1	16
St Croix	20,645	1,710	16,593	745	1,095	423	78	966
Totagatic	6,343	933	4,788	356	109	115	43	409
Upper Tamarack	6,754	754	5,724	218	3	33	22	534

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Douglas County tributary, land cover and phosphorus loading.

Where we stand today

The St. Croix River originates in the county at Upper St. Croix Lake near Solon Springs. Land in the basin is mostly forested, with small tracts of agricultural land interspersed. Agricultural land in this area tends to be managed for raising beef through grazing. Phosphorus loading, in general, comes from development around lakes with some additional sources from industrial forest management. As the demand for recreational opportunities and shoreland property increases, a decline in water quality and increased phosphorus loading can be expected. The Upper St. Croix & Eau Claire Rivers Priority Watershed Project (1997-2007) provided for installation of shoreline conservation practices and urban best management practices that reduced phosphorus loading to the basin.

There are four main subwatersheds that make up the St. Croix Basin in the county. The Upper Tamarack subwatershed is located in the very southwestern corner of the county, extending into a small part of Burnett County. Little water quality data is available on the watershed within this area because lakes are small and public access is generally not allowed. The St. Croix & Eau Claire Rivers subwatershed includes all of the St. Croix River drainage below the Gordon Dam to Riverside in Burnett County. Much of the watershed contains poorly drained uplands with many wetlands. The Upper St. Croix & Eau Claire Rivers subwatershed are the headwaters of the St. Croix Basin. Intensive development threatens water quality in the lakes within this subwatershed. Several lakes have been designated by the state under NR102 as Outstanding Resource Waters. However, phosphorus concentration in the lakes has increased resulting in increased aquatic vegetation growth and a decrease in water clarity. The installation of the municipal waste collection system on Upper St. Croix Lake will help to reduce these levels over time. The Totogatic River subwatershed is relatively large and extends over four counties; the landscape is dotted with lakes and wetlands. Intensive development on lakes in this subwatershed is causing increased phosphorus loading resulting in increased turbidity and aquatic vegetation growth.

The County has an existing Shoreland Zoning Ordinance authorized by NR115 that regulates activities within shoreland areas. Counties may impose standards more restrictive than the state standards. In 1998, the Douglas County Board of Supervisors approved a Lake Classification System increasing minimum setbacks on the majority of Douglas County lakes and streams. In 2004, the Douglas County Board amended the Shoreland Zoning Ordinance to change the way legal pre-existing structures may be enlarged or structurally altered. Restoring shoreland vegetation buffers is an important component of this amendment.

Much conservation has been accomplished in the basin mostly through voluntary cost share programs and through zoning enforcement working with private shoreland owners to restore shorelands to native vegetation. Forestry practices have also changed so that public and industrial land in the basin is managed through certified forestry programs following forest best management practices. Quantifying changes in phosphorus loadings to the St. Croix River from private shoreland and large-scale forest management land uses is difficult.

Phosphorus reduction plans

Conservation implementation will continue through the county's cost share program and through federal cost share programs. Zoning enforcement will continue to require shoreland restoration. Forest management will continue to follow certification standards and best management

practices. Education will continue through government and citizen groups to discuss the importance of conservation development. The Douglas County Board is currently reviewing a conservation development ordinance that will favor planned developments that include conservation design principles. Conservation activities are further outlined in the Douglas County Land and Water Resource Management Plan (2010 -2020).

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Shorelands are managed to limit impacts of residential development. Shoreland buffers that meet county standards are in place; septic systems are maintained appropriately; zoning development standards to protect waterways are met or exceeded; stormwater runoff and erosion are minimized in shoreland areas.	2010 - 2020	unknown	$40,000 annually for staff and operations; cost share funding from state; unknown amount of private funding for individual projects	On-going
Impacts from road construction, maintenance, and other activities on public lands are minimized.	2010 – 2020	unknown	$12,500 annually for staff and operations; cost share funding from state	On-going
NR151 Non-agricultural standards are supported.	2010 – 2020	unknown	Unknown funding for staff, operations, private projects	Plans and designs currently reviewed as requested
Agricultural owners meet the NR151 Performance Standards.	2010 – 2020	unknown	$35,200 annually for staff and operations; unknown variable cost sharing from state and private sources	On-site visits, BMPs designed and installed as requested
Private and public landowners follow forestry best management practices for water quality protection, including managing for invasive forest pests that impact water quality through the destruction of land cover.	2010 - 2020	unknown	Unknown funding for outreach and programming	Assistance and technical review provided as requested

Methods of prioritization

Efforts are currently prioritized in the Douglas County Land & Water Resource Management Plan which is formulated through citizen and stakeholder input, and approved by the Douglas County Board and state agencies. Individual cost share projects are prioritized and approved by the Douglas County Land Conservation Committee through a priority checklist process. The county's surface water education strategy prioritizes education and outreach about protecting surface water quality and is contained in the county's Land & Water Resource Management Plan.

Key players in implementation

- Douglas County Land & Water Conservation Department
- Douglas County Forestry Department
- Douglas County Planning & Zoning Department
- Village and Towns in the St. Croix River basin
- Department of Agriculture, Trade, & Consumer Protection
- Department of Natural Resources
- Natural Resources Conservation Service
- University of Wisconsin Extension
- Douglas County Association of Lakes and Streams
- Upper St. Croix Lake Association
- St. Croix Flowage Association
- Friends of the St. Croix Headwaters
- Shoreland property owners
- Elected officials

Activities to inform, educate, engage, motivate and enable citizens

- Land and Water Conservation Department contacts
- Workshops focusing on the following topics: shoreland restoration and lawn care; forest BMPs for private landowners; roadside erosion control; culvert replacement; rural land ownership
- Newsletter articles and press releases
- Informational brochures and other handouts distributed at local outlets and events
- Presentations for outreach to landowners
- Annual orientation for local officials about zoning and conservation practices
- Further development of website to include directory of regulatory, technical and financial assistance experts and water quality links

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ISANTI COUNTY

County Goals

The TMDL allows for 8,400 lbs/yr of phosphorus to be loaded to the St. Croix River from Isanti County. This requires 3,700 lbs/yr of reduction from the estimated TMDL baseline load of 12,100 lbs/yr in the early 1990s. Isanti County's required reduction ranks 11th largest among the 19 counties in the basin.

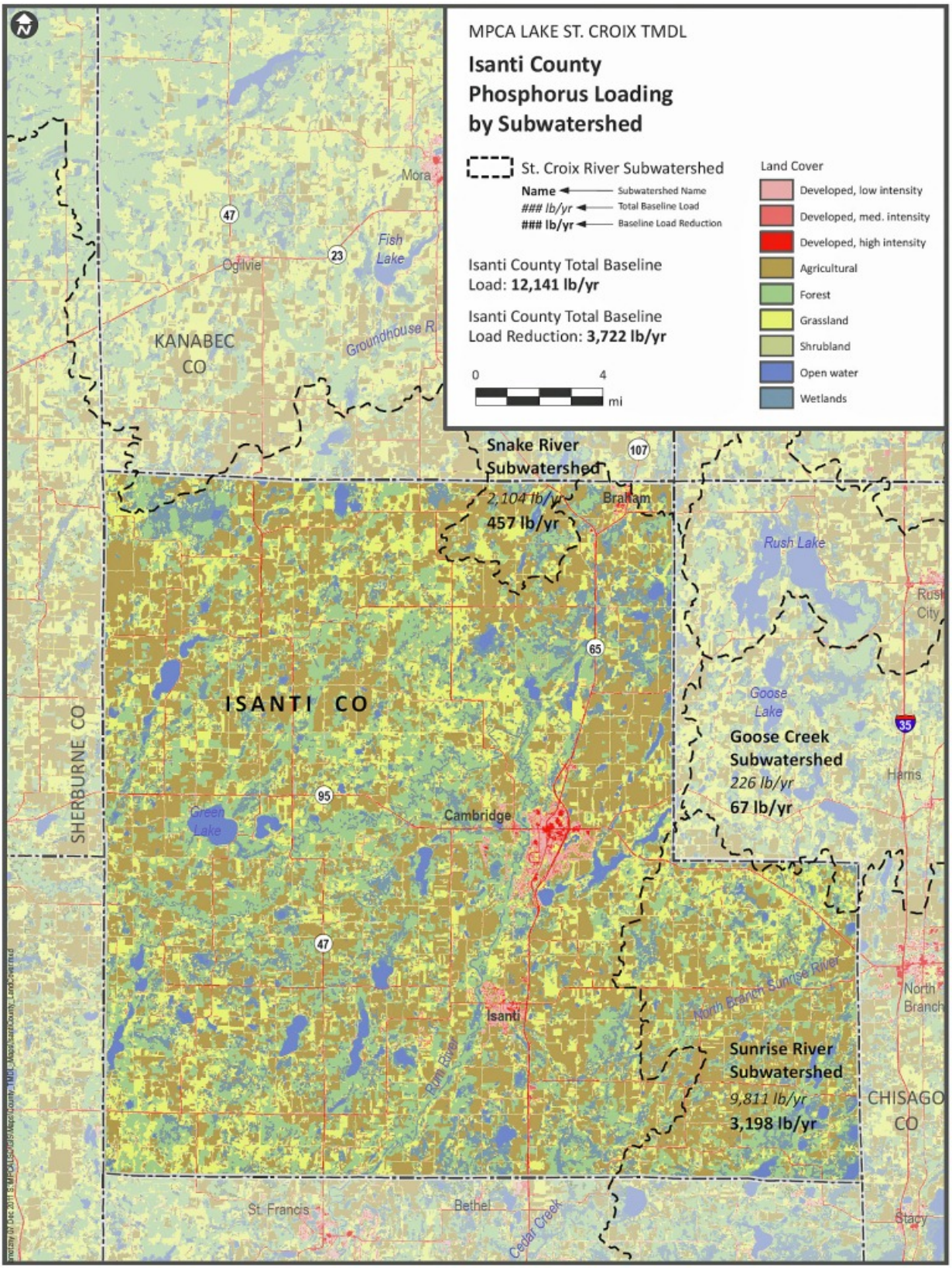
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Isanti County needs to reduce loadings by 2,800 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 90 lbs/yr over 30 yrs, or 280 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Isanti County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Isanti County contributing area and baseline phosphorus loading by subwatershed

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Isanti	51,492	14,768	16,861	11,212	10	214	8,426	
Subwatersheds	100%	29%	33%	22%	0%	0%	16%	
Goose Creek	1,027	228	322	345	0.2	2	130	
Snake River	8,679	2,670	2,367	1,678	2	103	1,860	
Sunrise River	41,785	11,870	14,172	9,190	8	109	6,435	
Baseline Loading (lb/yr) * **		By Landuse (1992 NLCD)						TMDL Load
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	Reduction**
Isanti	12,142	8,280	1,481	2,208	1	120	52	3,721
Subwatershed	100%	68%	12%	18%	0%	1%	0%	31%
Goose Creek	226	128	28	68	0.0	1	1	67
Snake River	2,104	1,497	208	330	0.2	57	12	457
Sunrise River	9,811	6,655	1,244	1,810	1	61	40	3,198

NOTES:
*Landuse areas derived from GIS based 1992 NLCD dataset
**TMDL load reduction= sum of landuse area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load= sum of landuse area * baseline TMDL phosphorus export coefficient



Isanti County tributary, land cover and phosphorus loading.

KANABEC COUNTY

County Goals

The TMDL allows for 39,500 lbs/yr of phosphorus to be loaded to the St. Croix River from Kanabec County. This requires 10,800 lbs/yr of reduction from the estimated TMDL baseline load of 50,300 lbs/yr in the early 1990s. Kanabec County's required reduction ranks 7th largest among the 19 counties in the basin.

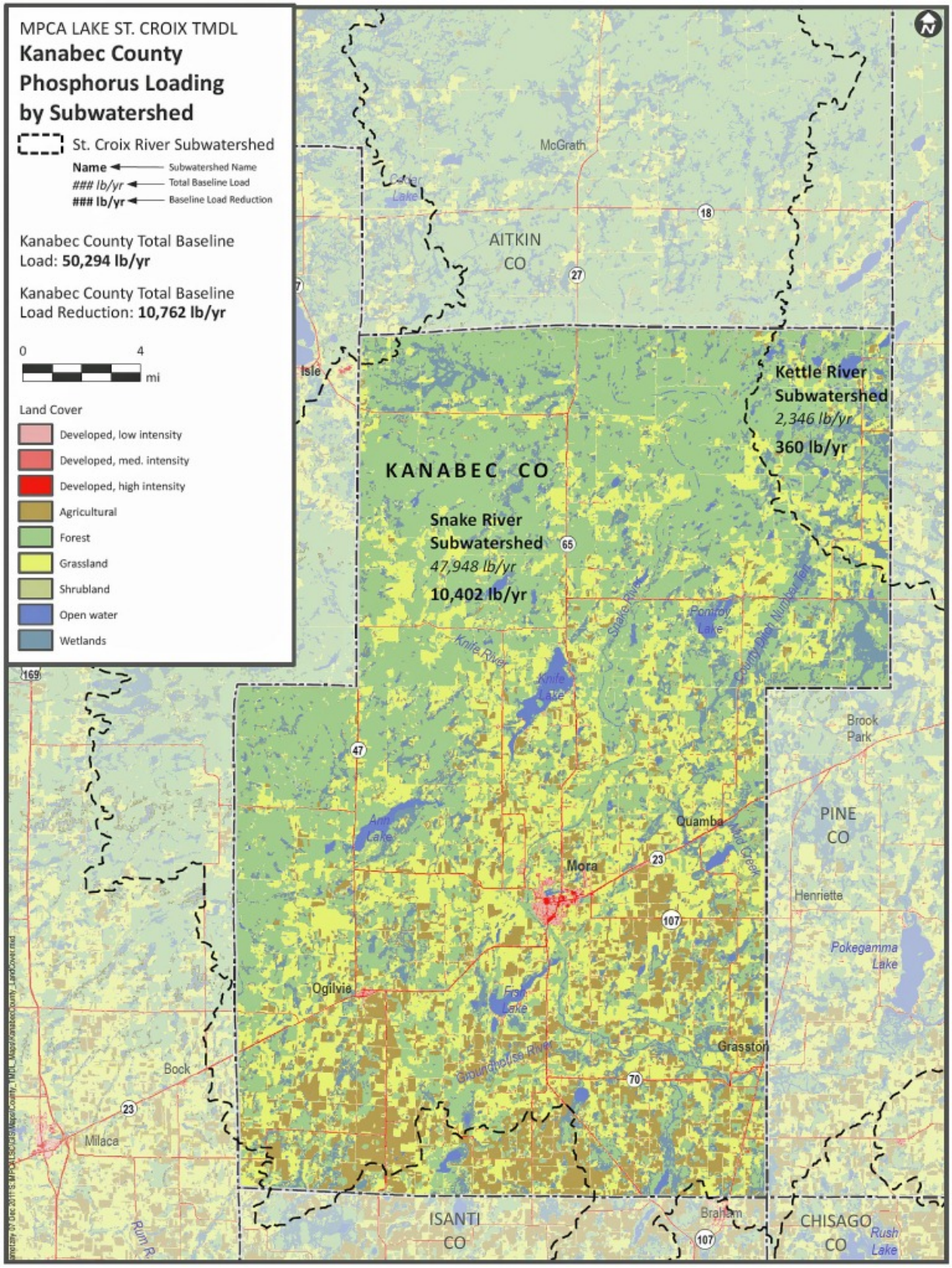
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Kanabec County needs to reduce loadings by 8,000 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 270 lbs/yr over 30 yrs, or 800 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Kanabec County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Kanabec County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Kanabec	329,189	32,027	166,736	81,050	165	2,552	46,658	
Subwatersheds	100%	10%	51%	25%	0%	1%	14%	
Kettle River	20,515	899	11,551	4,018	36	15	3,996	
Snake River	308,674	31,128	155,186	77,033	128	2,538	42,662	
Baseline Loading (lb/yr) ***		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Kanabec	50,293	17,956	14,641	15,961	14	1,431	291	10,763
Subwatershed	100%	36%	29%	32%	0%	3%	1%	21%
Kettle River	2,346	504	1,014	791	3	8	25	360
Snake River	47,948	17,452	13,627	15,169	11	1,423	266	10,402

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Kanabec County tributary, land cover and phosphorus loading.

Where we stand today

Based on Kanabec SWCD's - BMP project records (including the Snake River Watershed Management Board projects) back to the year 2000, when we started recording pollution reduction estimates, we had 873 lbs/year of phosphorus reductions and 828 tons/year of sediment reductions.

If we project these reductions back to 1990, we estimate that we had 1,667 lbs/year of phosphorus reductions and 1,580 tons/year of sediment reductions. If we consider the BMP contributions (on similar erosion control projects) from our federal partners (NRCS), we would double the figures to total 3,334 lbs/year of phosphorus reductions and 3,160 tons/year of sediment reductions back to 1990.

If we took in to consideration the phosphorus reductions from only nutrient management plans completed with NRCS in Kanabec County back to the year 2002, we estimate that there was approx. 2,529 acres planned. If we used an average reduction of 15 lbs. of P/acre X 2,529 acres, this would add an additional 37,935 lbs/acre of phosphorus reductions back to 2002. However, we don't have much for documentation on phosphorus reductions from nutrient management planning, which makes it difficult to estimate.

Our reduction estimates for the erosion type BMP's, are based on the Board of Water and Soil Resources estimators and calculators.

A growing concern in Kanabec County, as well as other areas within the Snake River Watershed, has been erosion and runoff issues. Of particular concern are areas where Township and County gravel roads transect tributaries and wetlands. These roads require continual maintenance, including culvert replacements, grading, shaping, filling and plowing. Paved County and State roadways also contribute a substantial amount of sediment runoff to tributaries and ditch systems that connect to streams and water bodies. In recent years, we have been working more and more with these various units of government on road side erosion and runoff projects, but do not have enough financial resources to make the needed water quality improvements.

In 2009, a road side erosion project within shorelands was completed in cooperation with a local Township and an adjoining landowner. Implementation of BMP's resulted in reductions of sediment by 27 tons/year and phosphorous by 27lbs/year.

Phosphorus reduction plans

Our current planning, monitoring and implementation efforts to reduce phosphorus loading in the county include the following projects and activities:

- Ann River subwatershed - TMDL phase II project (through MPCA) is in the process of finalizing the TMDL Draft Report, being prepared by the consultant. The pollutant stressors include nutrients, fish, macro-invertebrates and *E. coli* bacteria.
- 319 - Groundhouse River Implementation Plan and grant through the MPCA, to reduce sediment deposition by 210 tons/year and reduce fecal coliform and *E. coli* bacteria to standard levels. The pollutant stressors include fish, macro-invertebrates (through sediment) and fecal coliform.
- Clean Water Partnership - Protection Grant beginning in 2012 (through MPCA), to implement BMP's for water quality, forest management planning, nutrient management

planning, monitor the un-assessed lakes and tributaries and provide citizen outreach and education.

- SWCD - State Cost Share Program, to assist landowners with planning and implementation of BMP's in priority areas.
- Ag. BMP Loan Program for upgrading on-site sewage treatment systems, agricultural water quality improvements and erosion control structures.

Other current activities and plans coordinated by our local partners include:

- The Snake River TMDL - Restoration and Protection Project (through MPCA), administered by the Snake River Watershed Management Board.
- The consultant has been reviewing the monitoring and land use data and will begin work on the Draft Report this year. Technical meetings and Stakeholder meetings have been held to get input on the priority issues and areas of concern.
- Snake River Watershed Management Plan (administered by the SRWMB) for the planning, protection and implementation of BMP's for water quality. The organization consists of a joint powers agreement between the Counties of Kanabec, Pine, Mille Lacs and Aitkin.
- Kanabec County – Comprehensive Local Water Management Plan (administered by Kanabec County), provides for the planning and protection of the water resources.

Water Plan - Priority Concern #1 Goal Objectives includes the following summary of page 5:

- Reduce phosphorus loading, sediment and soil loss to the surface waters of Kanabec County through the implementation of BMP's, education, presentations and TMDL implementation plans.
- Ag. BMP Loan Program for upgrading on-site sewage treatment systems (administered by the SRWMB).
- The Environmental Quality Incentive Program (EQIP) and the Conservation Stewardship Program (CSP) for soil and water quality improvements (administered by NRCS).
- Recent proposed development of a Geologic Atlas for Kanabec County, in cooperation with the University of Minnesota and the U.S. Geological Survey.

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Ann River - TMDL study. Rural BMP's needed: · Agricultural, shoreline and streambank restorations · Specific Lake Management BMP's needed for internal loading reductions	2012 - 2015	3,408 lbs. for Ann and Fish Lakes	$400,000 (estimate) for future BMP implementation, technical assistance, education, and citizen outreach.	Draft TMDL Report and Implementation planning in progress
319 – Groundhouse River Implementation Plan. Rural BMP's needed: · Agricultural and streambank restorations	2010 – 2014	Phos. reductions undetermined. Sediment is the main stressor. Goal is 210 tons/year of sediment reductions. Bacteria reductions to meet standards.	$109,750 current grant amount. Future additional $300,000 (estimate) needed for BMP implementation, technical assistance and citizen outreach. $201,892 current grant amount.	Implementation grant (current)
· Clean Water Partnership Protection Grant	2012 - 2015	P Reduction goal is 27,079 lbs./year	BMP implementation, tech. assistance, monitoring, citizen outreach and education	Protection grant approved - 2012

Methods of prioritization

Our current and future efforts will be prioritized through the following local plans, grants and contracts:

- Comprehensive Local Water Management Plan for Kanabec County
- The Ann River - TMDL phase II study, Draft TMDL Report and future implementation funds
- The 319 - Groundhouse River Implementation Plan and grant to 2014
- The Clean Water Partnership - Protection Grant- 2012 - 2014
- The Snake River TMDL - Restoration and Protection Project study - 2012

Key players in implementation

The key players in the county in cooperation with the Kanabec SWCD will include the following partners and agencies:

- Snake River Watershed Management Board and the Citizens Advisory Committee
- Kanabec County Environmental Services
- The Technical Service Area - III serving the SWCD's in N.E. Minnesota
- The Natural Resources Conservation Service (NRCS)

- Local landowners
- Townships
- Minnesota Pollutions Control Agency (MPCA)
- Dept. of Natural Resources (DNR)
- U.S. Fish and Wildlife Service (USFWS)

Activities to inform, educate, engage, motivate and enable citizens

These activities will include the following:

- Periodic news releases, radio interviews, reports and updates to local agencies and groups
- Workshops, field trips and tours for the public, local agencies and groups
- Site visits with landowners to assess water quality problems for potential BMP implementation projects in priority areas

MILLE LACS COUNTY

County Goals

The TMDL allows for 4,700 lbs/yr of phosphorus to be loaded to the St. Croix River from Mille Lacs County. This requires 1,300 lbs/yr of reduction from the estimated TMDL baseline load of 6,000 lbs/yr in the early 1990s. Mille Lacs County's required reduction ranks 18th largest among the 19 counties in the basin.

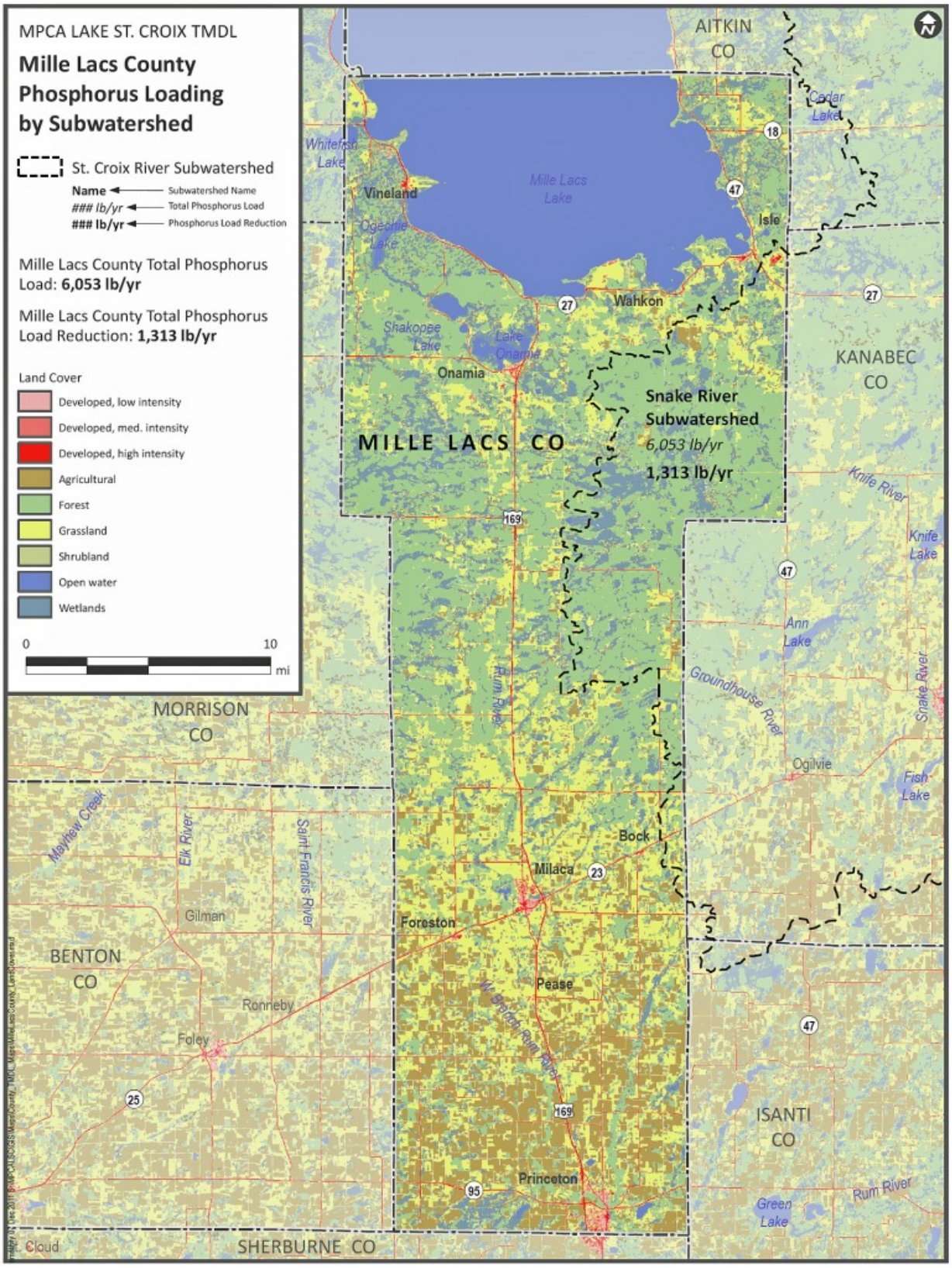
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Mille Lacs County needs to reduce loadings by 1,000 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 30 lbs/yr over 30 yrs, or 100 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Mille Lacs County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Mille Lacs County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Mille Lacs	64,781	1,413	43,879	6,364	87	118	12,919	
Subwatersheds	100%	2%	68%	10%	0%	0%	20%	
Snake River	64,781	1,413	43,879	6,364	87	118	12,919	
Baseline Loading (lb/yr) ***		By Landuse (1992 NLCD)						TMDL Load
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	Reduction**
Mille Lacs	6,053	792	3,853	1,253	8	66	80	1,313
Subwatershed	100%	13%	64%	21%	0%	1%	1%	22%
Snake River	6,053	792	3,853	1,253	8	66	80	1,313

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Mille Lacs County tributary, land cover and phosphorus loading.

Where we stand today

There have not been significant changes in this part of the watershed as a significant portion is forested and was not impacted heavily by the development boom of the 1990s. In approximately 2003, the Isle municipal waste water discharge was redirected to flow into the Knife River subwatershed instead of the Mille Lacs Lake subwatershed. Several managed grazing practices have recently been installed within the watershed. Excerpts from the 2006-2016 Mille Lacs County Local Water Management Plan Assessments chapters:

Snake River Watershed

The headwaters for three major tributaries of the Snake River Watershed are found in Mille Lacs County. They are the Knife, Little Ann, and Groundhouse Rivers.

The Snake River Watershed Management Board (SRWMB) is a four county non-regulatory joint powers organization working to develop and implement plans for the Snake River Watershed. The goals of the SRWMB are to:

- Protect property, streams and lakes from sedimentation and pollution
- Maintain and improve the quality of water in streams, lakes, and ground water
- Protect property from flood damages
- Control erosion of land
- Improve recreational and wildlife opportunities

Knife River

There are no cities completely within the boundaries of the Snake River Watershed in Mille Lacs County; however, Isle and Wahkon are close to the watershed border. Wahkon has sewage treatment ponds located within the Knife River Watershed that previously did not discharge into the watershed, but underwent a major system upgrade and discharge has now been redirected toward the Knife River Watershed. The watershed line between the Knife River and Mille Lacs Lake watersheds runs roughly down the middle of the Isle sewage ponds. Discharge from the Isle sewage ponds drains into an unnamed wetland of the Knife River Watershed.

Little Ann

The Little Ann River has its origin at the Dewitt Pool located within the boundaries of the Mille Lacs WMA. The minor watersheds of the Little Ann River are entirely forest and swamp areas in Mille Lacs County. There is very little human disturbance which would be considered a pollution source in this watershed.

Groundhouse

The Groundhouse and South Fork of the Groundhouse Rivers have their origin in the Mille Lacs WMA and the Rum River State Forest. Agricultural activities along the rivers consist of crops and livestock. The entire Groundhouse watershed is approximately 85% forest and swamp land cover with the remaining 15% land cover as agricultural. The crop rotation is mainly corn and hay with each being approximately 50% of the agricultural land cover. The number and location of animal agricultural uses in this watershed may have been most recently identified in a land use inventory for the Groundhouse TMDL.

Phosphorus reduction plans

The Mille Lacs County Local Water Management Plan (2006-2016) identifies action steps to reduce nutrient loading to the Snake River Watershed within its Priority Concern #2: The Development of TMDLs for impaired waters to determine if various water resources can support their designated uses, and where needed, improve those that do not.

To achieve this goal the following objective and action steps have been identified.

Objective B: Work with land managers, land owners and operators in Mille Lacs County, regardless of land use to encourage best management practices.

Action steps to implement Objective B include:

- Continue farm planning followed by implementation of recommended best management practices.
- Assist with the registration and inspection of all feedlot sites in Mille Lacs County.
- Educate feedlot owners about the importance of protecting surface waters from animal waste runoff.
- Provide information and technical assistant to operators regarding the appropriate management of animal waste.
- Provide technical and financial assistance to feedlot owners wishing/desiring to comply with local and state requirements.
- Educate forest owners and loggers about the impacts of harvest damage and provide information on best management practices (BMP), and industry BMP certifications.
- Educate landowners about proper forest management and sustainable forestry opportunities, and available programs.
- Support the efforts of the Snake River Watershed Management Board in encouraging best management practices to improve water quality and wise stewardship during forestry, grazing and agricultural crop activities.
- Work with local government and/or state agencies to improve riverside recreation areas that will meet both water quality and community recreation needs.

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Ag/Grassland BMPs: Managed grazing Nutrient management plans	2012-2016	100 lbs	Funding Assistance $10,000 Landowner: $2,000	Projects need to be identified and voluntary landowner interest secured.
Private Forestry BMPs	2012-2016	50 lbs	$4,000 Landowner: $1,000	Projects need to be identified and voluntary landowner interest secured.

Methods of prioritization

The SWCD workload is prioritized through:

- Development of a strong comprehensive plan (historically the SWCD has adopted the County Local Water Resource Management Plan as our comprehensive plan)
- Development of an Annual Plan – details the workload for the upcoming year.
- The completion of assessments and inventories. Projects that are currently completed or underway in 2012:
  - Groundhouse River TMDL Implementation Plan
  - Snake River TMDL
  - Anne River TMDL

Key players in implementation

- Mille Lacs Soil & Water Conservation District (www.millelacsSWCD.org)
- Mille Lacs County (www.co.mille-lacs.mn.us)
- USDA Natural Resources Conservation Service (www.mn.nrcs.usda.gov)
- Snake River Watershed Management Board(www.kanabeccounty.org)
- DNR Forestry

Activities to inform, educate, engage, motivate and enable citizens

- Articles highlighting current SWCD/NRCS programs in our local newspapers.
- Staff presentations to local community groups, agricultural and cattleman's groups and educational workshops.
- Private Forest Stewardship Planning.
- The DNR BMP audit group provides random audits of private land activities, mainly timber sales.
- The DNR logger education program provides BMP training for loggers working on State land.
- Most loggers cut for both State and private sales and the goal would be that water quality protection BMPs guidelines would be applied on private land as they do on State land.

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PIERCE COUNTY

County Goals

The TMDL allows for 9,100 lbs/yr of phosphorus to be loaded to the St. Croix River from Pierce County. This requires 5,500 lbs/yr of reduction from the estimated TMDL baseline load of 14,600 lbs/yr in the early 1990s. Pierce County's required reduction ranks 9th largest among the 19 counties in the basin.

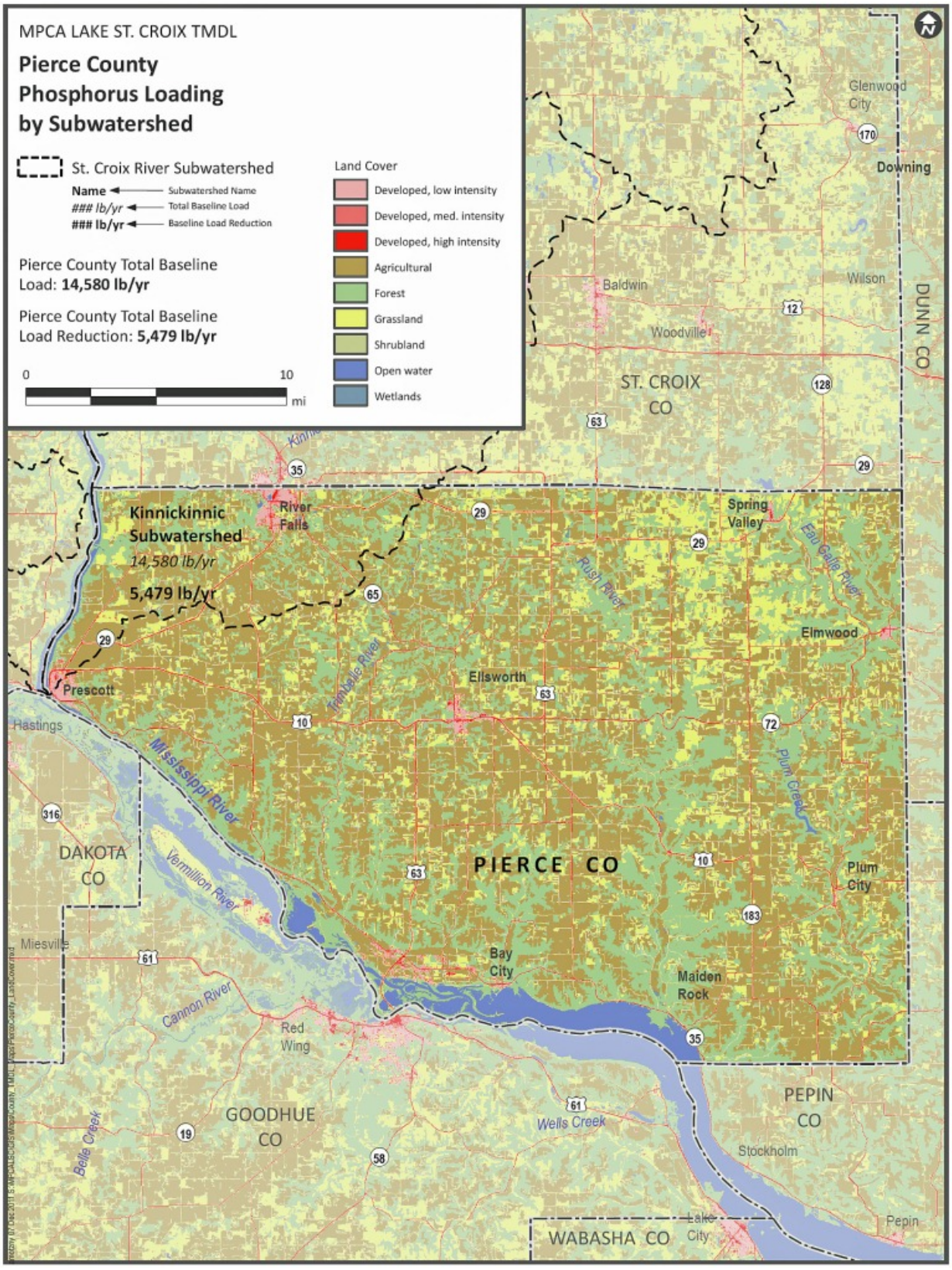
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Pierce County needs to reduce loadings by 4,100 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 140 lbs/yr over 30 yrs, or 410 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Pierce County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Pierce County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Pierce	38,448	20,591	5,691	10,371	0	870	925	
Subwatersheds	100%	54%	15%	27%	0%	2%	2%	
Kinnickinnic	38,448	20,591	5,691	10,371	0.4	870	925	
Baseline Loading (lb/yr) * **		By Landuse (1992 NLCD)						TMDL Load
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	Reduction**
Pierce	14,580	11,544	500	2,042	0	488	6	5,479
Subwatershed	100%	79%	3%	14%	0%	3%	0%	38%
Kinnickinnic	14,580	11,544	500	2,042	0.0	488	6	5,479

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



Pierce County tributary, land cover and phosphorus loading.

Where we stand today

The Pierce County transect survey showed that soil loss decreased from 3.3 tons per acre in 1999 to 2.2 tons per acre in 2010. Priority Watershed program was implemented from 1999 to 2009. The final project report for this Priority Watershed showed sediment reductions totaled 23,200 tons and phosphorus reductions totaled 2111 tons.

What plans are being made to reduce phosphorus loads in the county?

Pierce County conservation efforts include one on one work with farmers to develop nutrient management plans and reduce sheet and rill erosion on cropland. We also assist livestock producers with waste storage facility designs. Clean water diversions around feedlots are used when the feedlots are close to surface water management areas.

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Implement a targeted watershed approach based on potential to deliver sediment and nutrients to surface water	2013-2016	0	$80,000.00 (annual staff costs)	On-going effort
Install conservation BMP's such as grassed waterways, field borders, contour buffer strips, clean water diversions and no-till planting	2013-2016	750 lbs	$80,000.00 (annual staff costs) $250,000.00 (annual cost share and incentives funds, multiple funding sources will be needed)	Practices and installation progress will be limited by available funds

Methods of prioritization

Pierce County's land and water resource management plan details our priority farm effort (http://www.co.pierce.wi.us/Land%20Conservation/index.html). We plan to use GIS to inventory critical areas within surface water quality management areas (SWQMA). Efforts will be focused on the farms that, with conservation BMP installations, provide the most environmental benefit.

Key players in implementation

Pierce County Land Conservation staff, USDA_NRCS staff, UWEX staff, Kinnickinnic River Land Trust (KRLT) and Wisconsin DNR.

Activities to inform, educate, engage, motivate and enable citizens

- Small group workshops
- e-newsletters
- newspaper articles
- one on one visits with key producer's in sub-watershed areas.
- KRLT events
- Pierce County Fair information booth

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PINE COUNTY

County Goals

The TMDL allows for 96,400 lbs/yr of phosphorus to be loaded to the St. Croix River from Pine County. This requires 20,900 lbs/yr of reduction from the estimated TMDL baseline load of 117,300 lbs/yr in the early 1990s. Pine County's required reduction ranks 5th largest among the 19 counties in the basin.

To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Pine County needs to reduce loadings by 16,200 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 500 lbs/yr over 30 yrs, or 1,550 lbs/yr over 10 yrs.

Pine SWCD has reduced the amount of phosphorus entering the St. Croix by 3,600 pounds over the last 20 years. The Pine NRCS has reduced the amount of phosphorus by 7,200 pounds over the last 20 years for a total of 10,800 pounds. We are a little over half way of reaching our goal.

The table and figure below provide a breakdown of the major subwatersheds in Pine County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Pine County contributing area and baseline phosphorus loading by subwatershed.

Areas (ac) (Within St. Croix Basin)

County	Total	By land use (1992 NLCD) Ag	Forest	Grassland	Shrubland	Urban	Water
Pine	884,545	59,344	558,833	156,161	3,007	5,960	101,239
Subwatersheds	100%	7%	63%	18%	0%	1%	11%
Bear Creek	43,381	1,952	26,927	8,530	96	173	5,703
Crooked Creek	72,574	7,400	57,747	3,824	217	164	3,221
Kettle River	354,737	14,619	224,205	69,249	1,637	2,973	42,055
Lower Tamarack River	125,739	5,198	113,105	1,444	90	248	5,652
Redhorse Creek	12,012	24	7,879	138	68	3	3,901
Rock Creek	44,264	9,249	11,078	18,669	30	423	4,816
Rush Creek	3,756	688	915	1,641	1	20	490
Sand Creek	89,483	7,518	64,242	9,206	828	48	7,643
Snake River	131,810	12,157	46,952	43,204	39	1,864	27,595
Upper Tamarack River	6,787	539	5,782	255	2	45	164

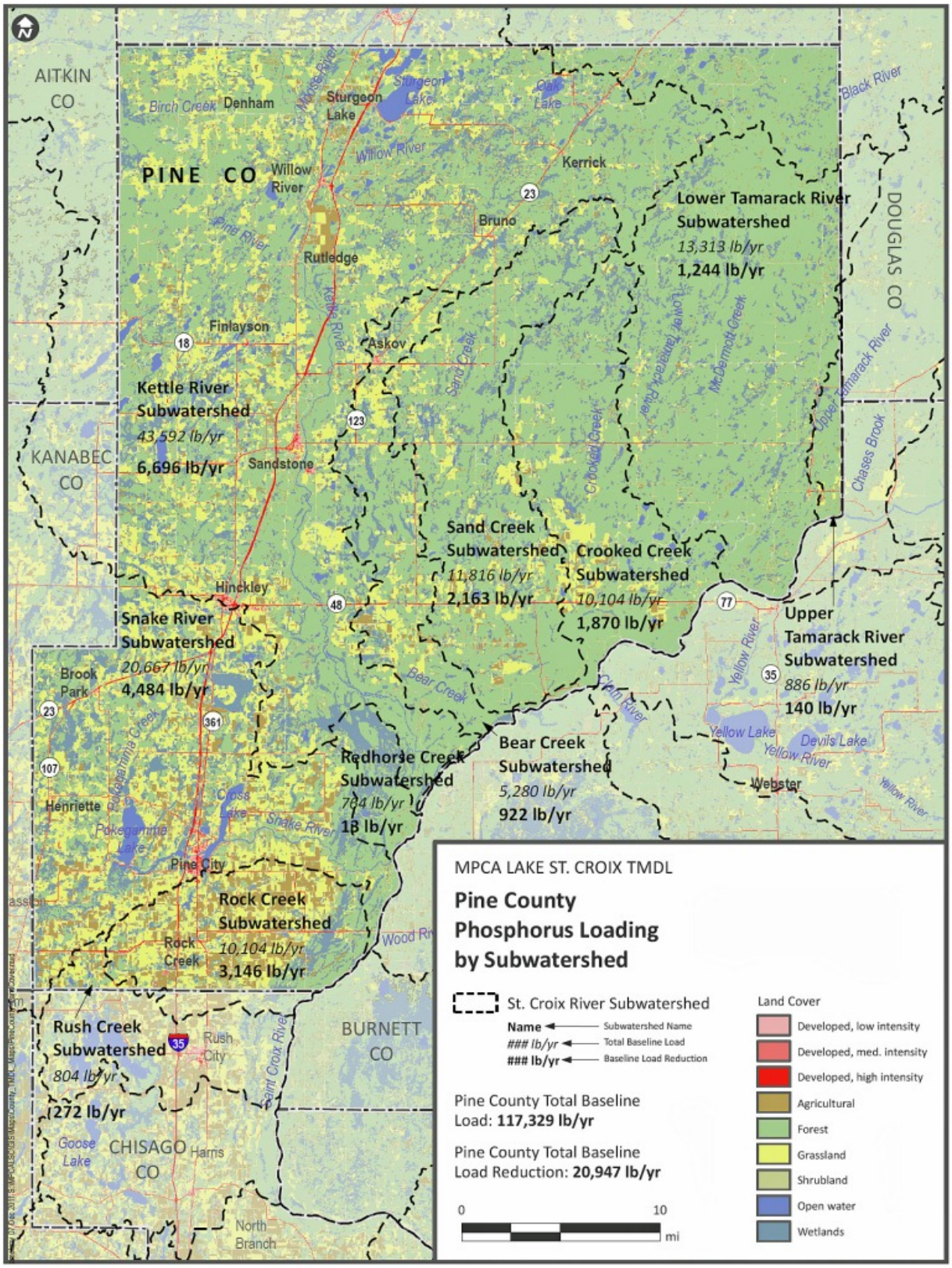
Loading (lb/yr)

County	Total	By Land use (1992 NLCD) Ag	Forest	Grassland	Shrubland	Urban	Water	TMDL Load Reduction
Pine	117,329	33,272	49,070	30,751	264	3,341	630	20,947
Subwatershed	100%	28%	42%	26%	0%	3%	1%	18%
Bear Creek	5,280	1,095	2,364	1,680	8	97	36	922
Crooked Creek	10,104	4,149	5,071	753	19	92	20	1,870
Kettle River	43,592	8,196	19,687	13,637	144	1,667	262	6,696
Lower Tamarack River	13,313	2,914	9,932	284	8	139	35	1,244
Redhorse Creek	764	13	692	27	6	2	24	13
Rock Creek	10,104	5,186	973	3,676	3	237	30	3,146
Rush Creek	804	386	80	323	0	11	3	272
Sand Creek	11,816	4,215	5,641	1,813	73	27	48	2,163
Snake River	20,667	6,816	4,123	8,508	3	1,045	172	4,484
Upper Tamarack River	886	302	508	50	0	25	1	140

NOTES:

*Land use areas derived from GIS based 1992 NLCD dataset.

*TMDL load reduction = [(land use area*P export coefficient)/total subwatershed load]*(total subwatershed reduction) ---> i.e., required reduction is proportional to load contribution per unit area.
*Load = land use area * given TMDL phosphorus export coefficient.



Pine County tributary, land cover and phosphorus loading.

Where we stand today

The amount of animal agriculture has decreased. In 1996, there were 125 dairy farms in Pine County. In 2012, there are 69 dairy farms still operating in Pine County. There about 8,400 less cattle in the county in 2009 compared to 1994. In 2009, there were fewer than 50% of the dairy cows in the county compared to 1994. The number of beef animals increased by 900 from 1994 to 2009. The amount of hay ground has increased by over 20%. Development has played a role in the decrease of number of acres of land in farms cropland. There is less than 62% of the land total land in farms in 2007 compared to 1994. There has been a 28% decrease in acres of corn from 1994 to 2009. Due to high commodity prices, the amount of acres in corn has increased since 2009. The amount of soybeans raised increased 2.5 times from 1992 to 2004.

Total Reported Acres	1994	2009
Corn	30,900	22,500
Soybeans	5,200	12,900
Hay	48,500	61,800

Total Animals	1994	2009
Beef	7,500	8,400
Milk cows	10,900	5,200
All cattle	38,400	30,000

Total Land in Farms-Cropland	1994	2007
	335,000 acres	207,679 acres

A number of changes have occurred in agriculture and more conservation practices are being utilized since the early 1990's. Conservation and reduced tillage are being practiced more now. In the 1990's, nutrient management plans were not very common. Now, more people have them and use them. Rising cost of fertilizer and implementation of nutrient management plans has has reduced the amount of fertilizer used.

Between 1992 and 2004, there was a 315% increase in the amount of conservation tillage. In 2004, there were only 29% of the acres in reduced-till compared to 1992. There were only 42% of the acres in intensive-till in 2004 compared to 1992. The total planted acres went from 72,989 in 1992 to 30,914 in 2004, representing a 58% decrease. These numbers have changed in the last couple years as commodity prices have been high. Between 1992 and 2004, the percentage of intensive-till for these two years has stayed about the same. Since 2004, about 1,616 acres of no-till land have been added and 3,631 acres of mulch-till have been added. Approximately 2,850 acres have been put in conservation crop rotations, 7,133 acres have nutrient management plans and 8,406 acres have prescribed grazing plans.

.	1992	2004
Total Conservation Tillage >30% Residue acres	1,100	3,475
Reduced Till 15-30% Residue acres	18,000	5,225
Intensive Till <15% Residue acres	53,889	22,214

	1992	2004
Total Conservation Tillage >30% Residue	1.5%	11.2%
Reduced Till 15-30% Residue	24.7%	16.9%
Intensive Till 0-15% Residue	73.8%	71.9%

Pine City has installed pervious piping and rain gardens and continues to do so as part of their street reconstruction projects. The City of Sandstone has installed two commercial rain gardens at a new grocery store and car wash. Most of the rest of the cities have not done a lot to treat storm water.

Phosphorus reduction plans

The Pine County Local Water Management Plan (2012-2020) goals are consistent with the St. Croix Basin Partner's 20% reduction by 2020 goal. Except for about 40 square miles in the Nemadji Watershed in the northeast part of the county, almost all of Pine County is in the St. Croix Basin. All activities in the water plan contribute to reducing the amount of phosphorus reaching the St. Croix.

Priority Concern #1: Water Quality:

A. Improving Impaired Waters

B. Maintaining Unimpaired Waters

Goal 2.2: Participate in Lake St. Croix TMDL Process – serve on technical committee, conduct monitoring and host stakeholder meetings

Goal 2.7: Participate in TMDL Implementation Plans

More specific details on the types of activities planned are explained in the county water plan. The Pine SWCD administers and updates the water plan. The current version of the county's water plan is available electronically at: www.pineswcd.com. Click on "Programs and Services". Click on "Local Water Management". Click on "Pine County Local Water Management Plan".

Other plans that include activities contributing to phosphorus load reductions include:

- TMDL Restoration and Protection Plans
- Lake St. Croix Watershed
- Snake River Watershed
- Rock Creek Watershed (scheduled to be completed in 2014)
- Kettle River Watershed (scheduled to start in 2015)
- Nemadji Watershed

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Planned Activities

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Urban BMP's				
Rain Gardens	2012-2013			
Shoreland Buffers	2012-2013			
Rural/Ag. BMPs				
Conservation Tillage	2012-2013	*600 lbs*		
Nutrient Management Plans				
Grassed Waterways				
Grassed Filter Strips				
Livestock Exclusion				
Rotational Grazing		*100 lbs*		
Field Buffers				
Riparian Buffers				
Ag Waste Systems				
Upland Wildlife Habitat		*150 lbs*		
Shoreland Stabilization	2012-2013	*80 lbs*		

Methods of prioritization

The Pine County Local Water Management Plan (2012-2020) goals are consistent with the St. Croix Basin Partner's 20% reduction by 2020 goal.

- Development of a strong comprehensive plan (historically the SWCD has adopted the County Local Water Management Plan as our comprehensive plan)
- Development of an Annual Plan – details the workload for the upcoming year
- TMDL Restoration and Protection Plans
- Lake St. Croix Watershed
- Snake River Watershed
- Rock Creek Watershed (scheduled to be completed in 2014)
- Kettle River Watershed (scheduled to start in 2015)
- Nemadji Watershed

Effort should be placed on getting more agricultural based conservation projects installed as they tend to reduce more phosphorus per activity. More outreach and education is needed as buy in is difficult. More staff could be used to do nutrient management plans and to individually contact each producer and see what practices they might consider installing or implementing.

Key players in implementation

- Pine Soil and Water Conservation District (www.pineswcd.com)
- Snake River Watershed Management Board
- USDA Natural Resources Conservation Service (www.mn.nrcs.usda.gov)
- Cities within Pine County

- Local lake and stream associations
- MN Department of Natural Resources

Activities to inform, educate, engage, motivate and enable citizens

- Grazing workshops – dairy and small ruminant
- Local Producer Input Meetings
- PLA Freshwater Festival for 5th graders
- Pine County Waters Newsletter
- Staff presentations to local lake and river associations, schools, local community groups, local boards, and educational workshops
- Rain Garden Design and Planting Workshops

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POLK COUNTY

County Goals

The TMDL allows for 108,000 lbs/yr of phosphorus to be loaded to the St. Croix River from Polk County. This requires 53,000 lbs/yr of reduction from the estimated TMDL baseline load of 161,000 lbs/yr in the early 1990s. Polk County's required reduction ranks 1st largest among the 19 counties in the basin.

To achieve the St. Croix Basin Partners' goal of 20% reduction by 2020, Polk County needs to reduce loadings by 39,000 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 1,300 lbs/yr over 30 yrs, or 3,900 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Polk County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Polk County contributing area and baseline phosphorus loading by subwatershed.

Areas (ac) (Within St. Croix Basin)

County	Total	By land use (1992 NLCD) Ag	Forest	Grassland	Shrubland	Urban	Water
Polk	605,513	194,993	225,145	152,661	1,746	2,660	28,308
Subwatersheds	100%	32%	37%	25%	0%	0%	5%
Apple	303,398	106,151	98,470	77,284	22	1,031	20,439
Clam	74,533	13,217	42,262	16,432	19	32	2,571
Trade	60,563	10,572	34,631	11,628	1,690	339	1,702
Trout	46,172	19,102	13,132	12,344	1	533	1,059
Willow	26,821	11,538	3,909	11,005	0	133	236
Wolf	69,725	27,972	21,663	18,141	8	304	1,636
Wood	24,301	6,441	11,077	5,826	5	288	664

Loading (lb/yr)

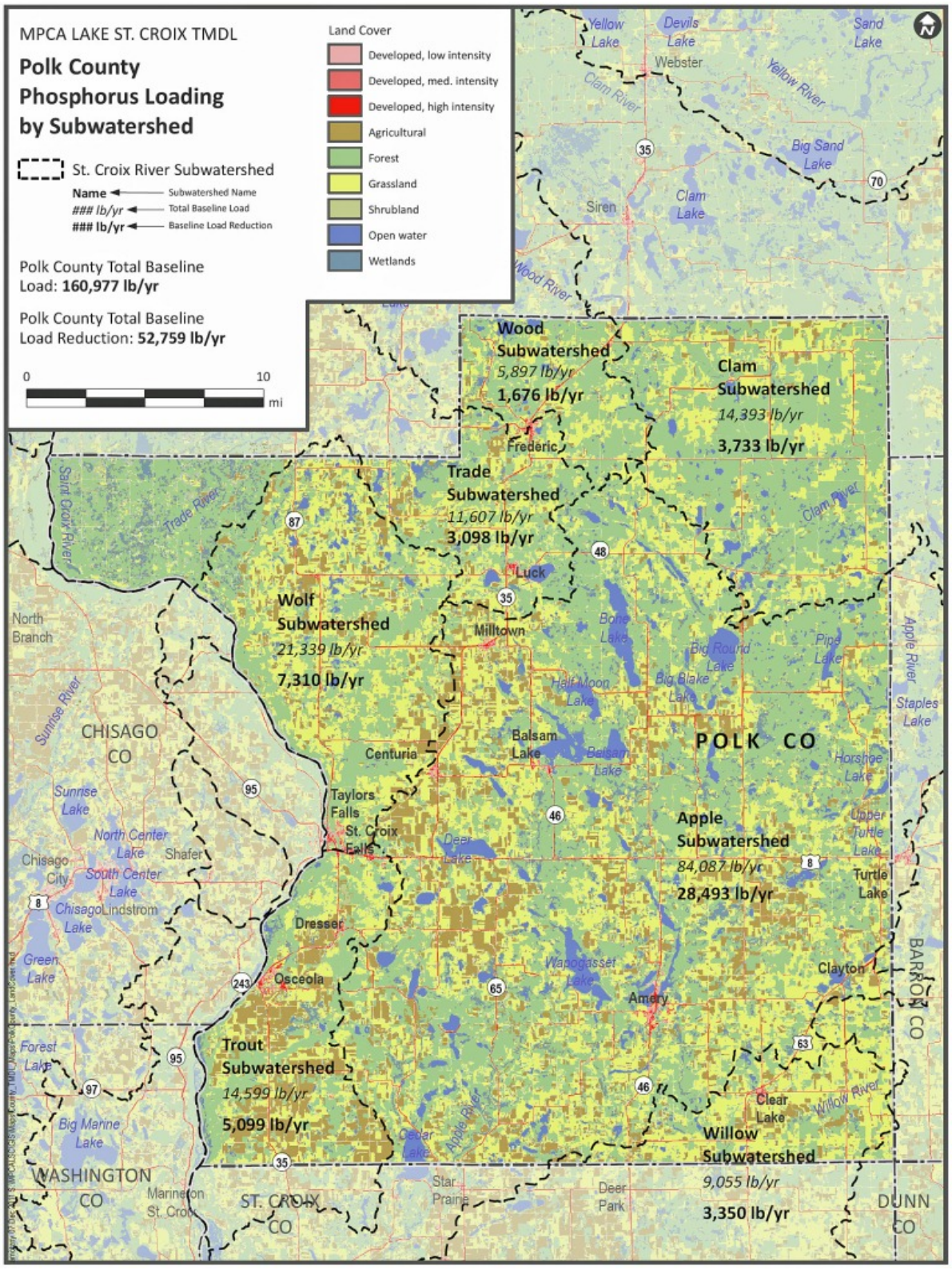
County	Total	By Land use (1992 NLCD) Ag	Forest	Grassland	Shrubland	Urban	Water	TMDL Load Reduction
Polk	160,976	109,323	19,770	30,062	153	1,491	176	52,759
Subwatershed	100%	68%	12%	19%	0%	1%	0%	33%
Apple	84,087	59,514	8,646	15,219	2	578	127	28,493
Clam	14,393	7,410	3,711	3,236	2	18	16	3,733
Trade	11,607	5,927	3,041	2,290	148	190	11	3,098
Trout	14,599	10,710	1,153	2,431	0	299	7	5,099
Willow	9,055	6,469	343	2,167	0	74	1	3,350
Wolf	21,339	15,683	1,902	3,572	1	170	10	7,310
Wood	5,897	3,611	973	1,147	0	161	4	1,676

NOTES:

*Land use areas derived from GIS based 1992 NLCD dataset.

*TMDL load reduction = [(lanuse area*P export coefficient)/total subwatershed load]*(total subwatershed reduction) ---> i.e., required reduction is proportional to load contribution per unit area.

*Load = land use area * given TMDL phosphorus export coefficient.



Polk County tributary, land cover and phosphorus loading.

Where we stand today

The Polk County Transect Survey finds that the average rate of soil erosion has increased in all but two watersheds.

Watershed	1999	2001	2003	2005	2007	2009	2011
Lower Apple River	1.6	1.5	1.8	2	2	2	2.0
Upper Apple River	1.3	1.2	1	1.3	1.3	1.6	1.6
Wolf Creek	.8	.6	.7	.7	.6	1.6	2.3
Horse Creek	1.7	1.7	1.7	2.4	2.3	2.5	2.2
Squaw Lake	2.8	2.7	2.8	2.7	1.7	2.4	2.1
North Fork Clam River	1.4	1.2	1.1	.6	.6	.4	1.5
Clam River	1	.9	1.2	1.1	1.6	3.1	1.8
South Fork Hay River	.6	.5	.4	.3	.8	2	1.4
Trade River	1.6	.8	1.1	2.1	1	1.3	.9
Trout Brook	1.6	1.7	1.7	2.3	1.8	2.7	2.3
Beaver Brook	1.5	2	1.3	2	2.5	2.6	2.9
Balsam Branch	1.6	1.9	1.7	2.3	2	2.2	2.5
Upper Willow River	1.6	1.7	1.6	2.3	2.2	2.3	2.8
Wood River	2.2	1.8	1.8	2.7	3.9	2.2	2.3
County Average	1.5	1.6	1.5	2.0	1.9	2.2	2.2

Polk County currently has 2 nested impaired waters at various stages in the TMDL process (see table below). Activities to attain nested TMDLs may be applicable to the Lake St. Croix TMDL.

Nested Impaired Waters within County

Waterbody	Pollutant/ Stressor	Status	P- goals
Cedar Lake	Nutrient/ Eutrophication	TMDL Approved	40% TP load reduction
Magnor Lake	Nutrient/ Eutrophication	303(d) listed	

Major phosphorus reducing activities since 1992:

Balsam Branch Non-Point Source Priority Watershed Project 1995 - 2007

Field Diversion	*686 feet*
High Residue Management	280 acres
Conservation Easement	48 acres
Barnyard Runoff Management	4 yards
Manure Storage Facility	1 pit
Milk House Waste Control	1 unit
Manure Storage Abandonment	4 pits
Critical Area Stabilization	37.7 acres
Grade Stabilization Structures	11 structures
Nutrient Management	28,603 acres
Pest Management	28,502 acres
Wetland Restorations	21 acres
Well Abandonment	7 wells
Shoreline Habitat Restorations for Developed Areas	91,411 sq. feet
Other Shoreline Protection	526 sq. feet
Special Shoreline Habitat Restoration	75,195 sq. feet
48 barnyards ceased operation	2320 lbs P reduction

Osceola Creek Non-Point Source Priority Watershed Project 1996 - 2007

High Residue Management	*653 acres*
Barnyard Runoff Management	1 yard
Manure Storage Abandonment	4 structures
Critical Area Stabilization	10 acres
Grade Stabilization Structures	1 structure
Nutrient Management	249 acres
Pest Management	150 acres
Well Abandonment	2 wells
Urban Best Mgmt. Practices	4 rain gardens
1 barnyard ceased operation	64 lbs P reduction

Horse Creek Non-Point Source Priority Watershed Project 1999 - 2009

Critical Area Stabilization	*132,731 sq. feet*
Shoreline Habitat Restoration	295,216 sq. feet
Well Abandonment	2 wells
Shoreline & Streambank Protection	5,192 sq. feet
Urban Best Management Practices	59 practices
Other Shoreline Protection	2 acres
Nutrient Management	5302.9 acres
Animal Waste Storage System Abandonment	2 structures
High Residue Management	1302.6 acres

Pesticide Management	3758.9 acres
Grade Stabilization Structure	1 structure
18 barnyards ceased operation	932 lbs P reduction

Polk County LWRD Cost Share installed practices 2000 - 2011

Well Abandonment	*37 wells*
Barnyard Runoff Management	5 yards
Manure Storage Abandonment	10 structures
Shoreline Restoration	27 restorations
Critical Area Stabilization	21 areas
Abandon Feed Operation	1 operation
Livestock Fencing/Waterway	3 sites
Nutrient Management	6 farms
CREP Equivalent	1 site
Diversion	1 site
Rain Garden	8 sites
Animal Trail/Walkway	1 site
Manure Storage Facility	1 structure

Polk County Zoning/Board of Adjustment 2001 – 2011

Shoreline Restorations	*70 sites*
Rain Gardens	30 sites

Amery Lakes District Protection grant

Runoff Control Ponds	*2 ponds in sequence*
Rain Garden	3 sites
Shoreline Restoration	1 site
Rain Barrels	100

Bone Lake Protection grant

Rain Gardens	*5 sites*
Shoreline Restorations	3 sites
Grade Stabilization	2 sites

Pipe Lake Protection grant

Rain Gardens	*3 sites*
Shoreline Restorations	18 sites
Runoff Control Pond	1 pond
Streambank Stabilization	200 ft

Balsam Lake Protection grant

Rain Gardens	*15 sites*
Shoreline Restorations	12 sites
Runoff Control Pond	2 ponds in sequence

Shoreline Protection purchase	2 properties

Deer Lake Protection grant

Shoreline Restorations	*5 sites*
Rain Gardens	5 sites

Big Butternut Lake Protection grant

Runoff Control Pond	*1 pond*

Blake Lake Management grant

CLP Harvest	*2 semi loads/yr*

White Ash Lake Management grant

CLP Harvest	*2 semi loads/yr*

USDA-NRCS installed practices 2003 to 2011

Practice	*Number Units*
Comprehensive Nutr. Mgmt. Plan	15
Comprehensive Nutr. Mgmt. Plan – Written	4
Comprehensive Nutr. Mgmt. Plan – Applied	1
Conservation Plan Supporting Organic Transition – Written	2
Waste Storage Facility	3
Brush Management	1,671.9 acres
Conservation Cover	1,810.3 acres
Conservation Crop Rotation	18,682.4 acres

Residue & Tillage Mgmt.,

No- Till/Strip Till/Direct Seed	*238.4 acres*
Residue Management, No-Till/Strip Till	1,652.4 acres
Residue Management, Mulch Till	3,345.1 acres
Prescribed Burning	589.6 acres
Cover Crop	489 acres
Critical Area Planting	35.7 acres
Residue Management, Seasonal	22.3 acres
Residue & Tillage Mgmt., Mulch Till	679.7 acres
Dike	5,125.00 feet
Diversion	106 feet
Windbreak/Shelterbelt Establishment	13,012 feet
Fence	33,783 feet
Filter Strip	6 acres
Firebreak	36,828 feet
Grade Stabilization Structure	7
Grassed Waterway	26 acres

Access Control	43 acres
Tree/shrub site preparation	4 acres
Obstruction Removal	11.3 acres
Forage Harvest Management	16 acres
Forage and Biomass Planting	561.7 acres
Prescribed Grazing	2,828.9 acres
Roof Runoff Structure	1
Access Road	975 feet
Heavy Use Area Protection	14 acres
Animal Trails & Walkways	330 feet
Stream Crossing	2
Nutrient Management	14,476.9 acres
Integrated Pest Management	5,318.2 acres
Tree/Shrub Establishment	805.4 acres
Watering Facility	13
Underground Outlet	638 feet
Waste Transfer	2
Vegetated Treatment Area	1 acre
Water & Sediment Control Basin	1
Water Well	2
Wetland Wildlife Habitat Mgmt	196.7 acres
Upland Wildlife Habitat Mgmt	1,556.8 acres
Wetland Restoration	129.6 acres
Forest Stand Improvement	202.4 acres

Regulatory efforts to control non-point source pollution runoff since 1992 include:

- Polk County Manure and Water Quality Management Ordinance adopted 2000
- Polk County Non-metallic Mining Reclamation Ordinance adopted 2001
- Shoreland Protection Zoning Ordinance adopted 2002
- Land Use Subdivision Ordinance adopted 2005
- Stormwater Management and Erosion Control Ordinance adopted 2005

Polk County's current Land and Water Resource Management Plan will collaborate with state efforts to achieve the Basin Partner goal of 20% reduction in phosphorus loading to the St. Croix Basin. The plan specifically calls for the following activities which will contribute towards the attainment of this goal:

Goal 1, Follow Agriculture Performance Standards and Prohibitions and encourage Best Management Practices.

Goal 1, Conservation program implementation related to other state and federal programs.

Goal 1, Follow Non-Agricultural Performance Standards and encourage Best Management Practices.

Goal 1, Monitor water quality.

Goal 2, Preliminary assessment of rivers to moderate development on sensitive riparian areas.

Goal 3, Shoreland management.

Key players in implementation

- Polk County Land & Water Resources Department
- Farmers
- Agricultural organizations
- USDA-NRCS and FSA
- Wisconsin DATCP and DNR
- Polk County Land Conservation Committee and Polk County Board
- Lakeshore property owners
- Polk County Association of Lakes and Rivers
- Lake Associations and Lake Protection & Rehabilitation Districts
- Contractors
- Citizens

The bad news is that despite efforts to reduce phosphorus in runoff, six more Polk County lakes are proposed to be added to the WDNR Impaired Waters List:

- Wapogasset – total phosphorus
- Loveless – total phosphorus
- Apple River Flowage – total phosphorus
- White Ash – total phosphorus
- Long Trade – total phosphorus
- Big Butternut – total phosphorus

Requirements for attaining the TMDL within the county

Staffing: To accomplish the Lake St. Croix TMDL goal of reducing phosphorus by nearly 53,000 lbs/yr in Polk County, the Land and Water Resources Department will need a minimum of 15 FTE staff. At this time, the department has 7 FTE's, and significant staff time is spent generating revenue. Staff funding must be sufficient to allow all field staff, support staff and administrative staff to work exclusively on plan goals without the distraction of finding revenues to maintain staff levels.

Funding: To reduce 53,000 pounds of phosphorus using conventional methods will require roughly $53 million.

Civic Engagement: A robust strategy to engage farmers, lakeshore owners, and citizens will be essential to accomplish the goals of the TMDL Plan.

Tools: A better practice installation tracking tool is needed. Preferably one which is GIS based and easily updated with plans, performance standards, maintenance schedules, etc.

Policy Changes: Just as the world continues to increase carbon emissions far past the point of no return without more than passing comments from politicians, so too does the state continue to tolerate surface water and ground water degradation without serious change in policies or priorities. We need strong mandates that require all sectors of land users to reduce runoff to sustainable levels. We also need the agricultural industry itself to become sustainable, which would require major changes in federal farm policy and national economic policy.

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RAMSEY COUNTY

County Goals

The TMDL allows for 150 lbs/yr of phosphorus to be loaded to the St. Croix River from Ramsey County. This requires 60 lbs/yr of reduction from the estimated TMDL baseline load of 210 lbs/yr in the early 1990s. Ramsey County's required reduction ranks 19th largest among the 19 counties in the basin.

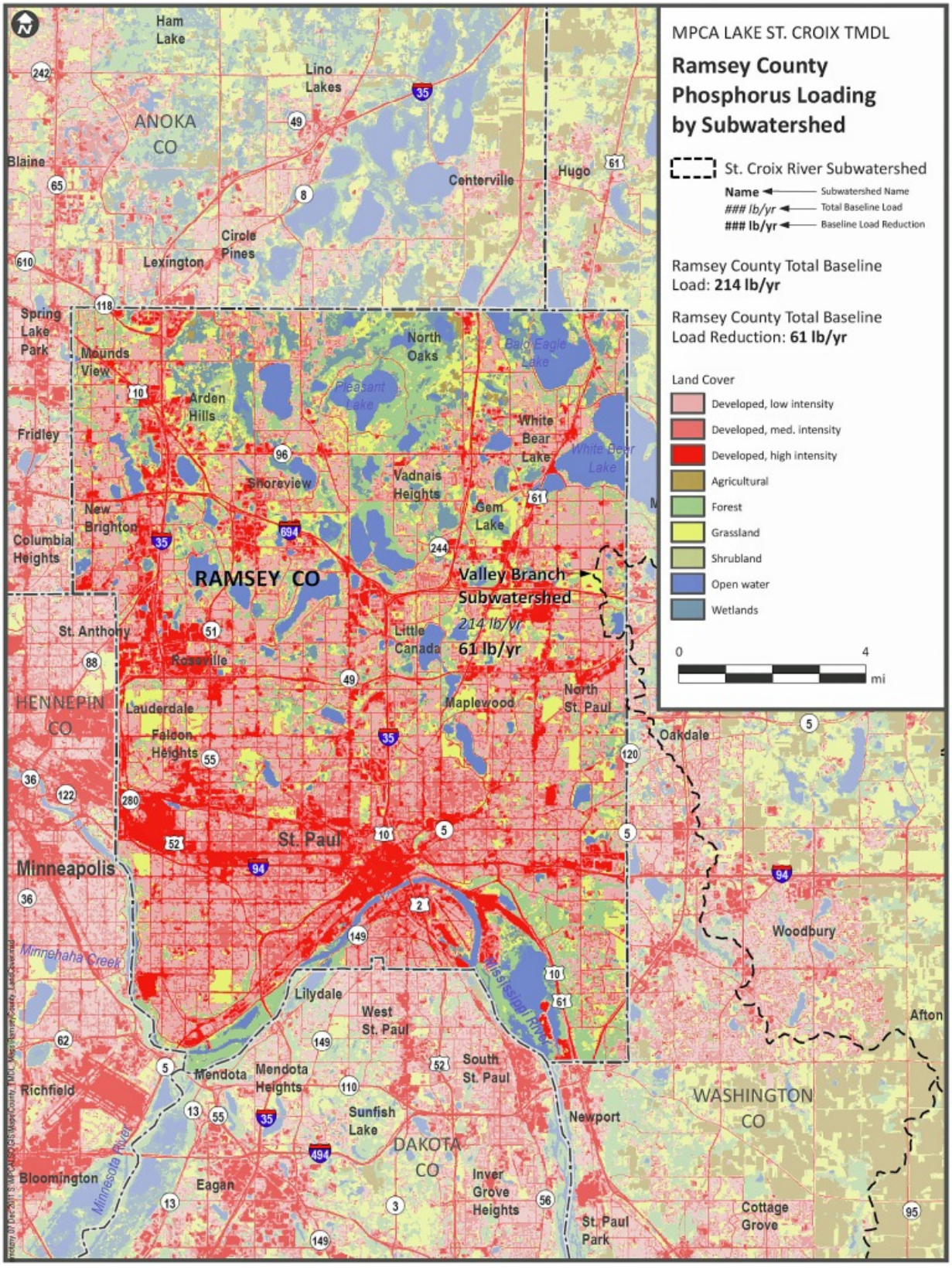
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Ramsey County needs to reduce loadings by 45 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 1.5 lbs/yr over 30 yrs, or 4.5 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Ramsey County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Ramsey County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Ramsey	636	11	71	165	0	301	87	
Subwatersheds	100%	2%	11%	26%	0%	47%	14%	
Valley Branch	636	11	71	165	0.0	301	87	
Baseline Loading (lb/yr) * **		By Landuse (1992 NLCD)						TMDL Load
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	Reduction**
Ramsey	214	6	6	33	0	169	1	61
Subwatershed	100%	3%	3%	15%	0%	79%	0%	28%
Valley Branch	214	6	6	33	0.0	169	1	61

NOTES:
*Landuse areas derived from GIS based 1992 NLCD dataset
**TMDL load reduction= sum of landuse area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load= sum of landuse area * baseline TMDL phosphorus export coefficient



Ramsey County tributary, land cover and phosphorus loading.

SAWYER COUNTY

County Goals

The TMDL allows for 10,300 lbs/yr of phosphorus to be loaded to the St. Croix River from Sawyer County. This requires 1,500 lbs/yr of reduction from the estimated TMDL baseline load of 11,800 lbs/yr in the early 1990s. Sawyer County's required reduction ranks 17th largest among the 19 counties in the basin.

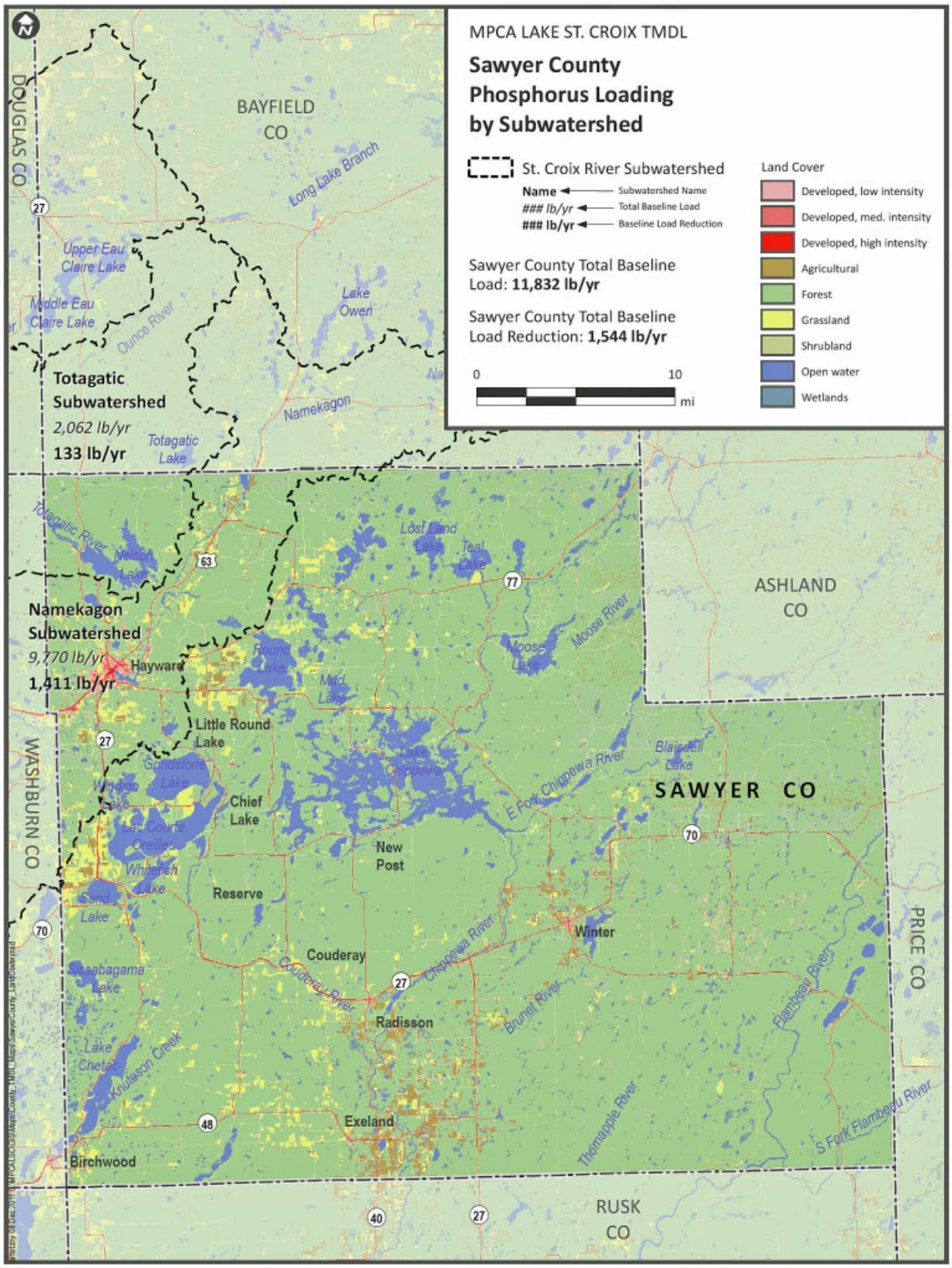
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Sawyer County needs to reduce loadings by 1,100 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 40 lbs/yr over 30 yrs, or 110 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Sawyer County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Sawyer County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Sawyer	96,119	6,196	77,759	4,878	59	937	6,290	
Subwatersheds	100%	6%	81%	5%	0%	1%	7%	
Namekagon	71,176	5,953	57,251	4,576	36	867	2,493	
Totagatic	24,943	243	20,508	302	23	70	3,797	
Baseline Loading (lb/yr) * **		By Landuse (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Sawyer	11,832	3,474	6,828	961	5	526	39	1,544
Subwatershed	100%	29%	58%	8%	0%	4%	0%	13%
Namekagon	9,770	3,337	5,027	901	3	486	16	1,411
Totagatic	2,062	136	1,801	59	2	40	24	133

NOTES:
*Landuse areas derived from GIS based 1992 NLCD dataset
**TMDL load reduction= sum of landuse area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load= sum of landuse area * baseline TMDL phosphorus export coefficient



Sawyer County tributary, land cover and phosphorus loading.

ST. CROIX COUNTY

County Goals

The TMDL allows for 84,000 lbs/yr of phosphorus to be loaded to the St. Croix River from St. Croix County. This requires 49,000 lbs/yr of reduction from the estimated TMDL baseline load of 133,000 lbs/yr in the early 1990s. St. Croix County's required reduction ranks 2nd largest among the 19 counties in the basin.

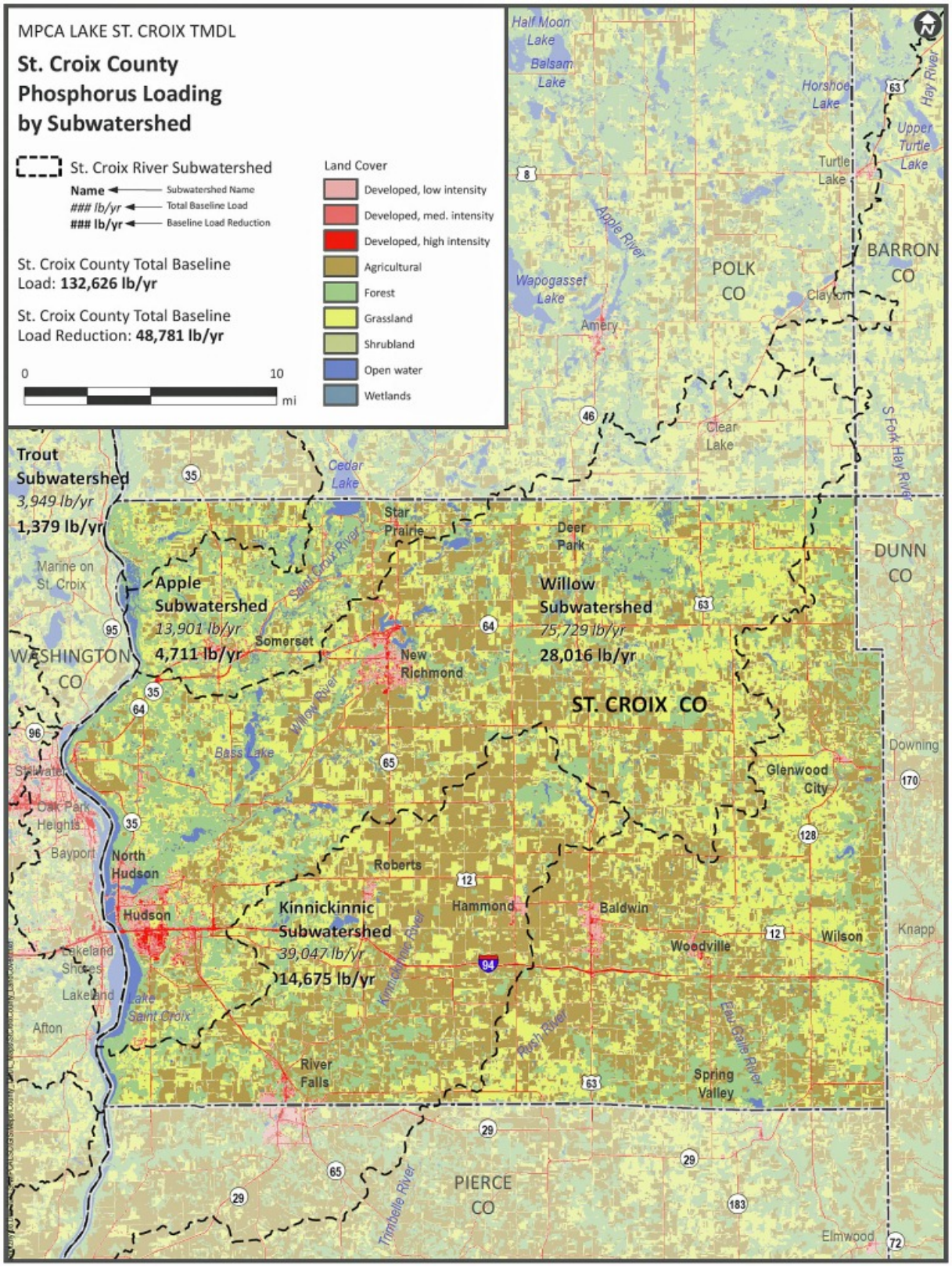
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, St. Croix County needs to reduce loadings by 36,000 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 1,200 lbs/yr over 30 yrs, or 3,600 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in St. Croix County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

St. Croix County contributing area and baseline phosphorus loading by subwatershed

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
St. Croix	335,485	197,282	43,109	84,189	7	2,861	8,036	
Subwatersheds	100%	59%	13%	25%	0%	1%	2%	
Apple	35,249	21,269	5,290	7,245	0.2	138	1,306	
Kinnickinnic	93,208	59,286	8,813	23,680	0.2	654	775	
Trout	11,728	5,718	2,986	2,420	0.4	0.0	602	
Willow	195,300	111,009	26,020	50,844	6	2,069	5,352	
Baseline Loading (lb/yr) ***		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
St. Croix	132,626	110,607	3,785	16,579	1	1,604	50	48,781
Subwatershed	100%	83%	3%	13%	0%	1%	0%	37%
Apple	13,901	11,924	464	1,427	0.0	78	8	4,711
Kinnickinnic	39,047	33,239	774	4,663	0.0	367	5	14,675
Trout	3,949	3,206	262	477	0.0	0.0	4	1,379
Willow	75,729	62,238	2,285	10,012	1	1,160	33	28,016

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.



St. Croix County tributary, land cover and phosphorus loading

Where we stand today

Unknown at this point.

Phosphorus reduction plans

Key steps of adaptive implementation include monitoring, prioritization, technical assistance, implementation, and performance assessment.

- UW Extension field monitoring
- Soil Sampling
- WAV Program implementation
- USGS Stream Gauging
- Producer Led / Performance based Watershed Management

The County Water Plan (LWRMP Date/County web link provided at prior meeting) specifies the following important goals and activities related to adaptive implementation of the Lake St. Croix TMDL:

Goal #1: Protect and enhance groundwater resources
Goal #2: Protect and enhance surface Water resources

Other efforts within the County related to achieving the Lake St. Croix TMDL:

- Farmland Preservation (Landowner participation and County Staff review)
- County Land and Water Resource Management Cost Share Program
- Lake Mallalieu/Willow River TMDL Implementation Plan
- Kinnickinnic River Land Trust Strategic Plan
- Squaw Lake Implementation Plan
- City of Hudson transition to MS4 designation

Desired/Expected strategies to implement:

- Lake Mallalieu/Willow River TMDL Implementation Plan
- Prioritizing EQIP cost share program as primary funding mechanism
- PI indexing in Willow Rivers' top "P" and "sediment" yielding subsheds
- Formulate a 5 county producer led/performance based watershed structure

Resource needs for implementing motivational/education

- One halftime position

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Planned Activities

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
"PI" Indexing	2012/ 2013	1000 lbs.	2 full time staff/ dollars	
County cost Share Program	2012/ 2013	750 lbs.	2 full time staff/ dollars	
Tillage Transect Survey	2012/ 2013	?	2 staff members/ dollars	
Leaf Pick-Up (Hudson/ N.R.)	2012/ 2013	?	1 staff/ volunteers	
Municipal Rain Garden Program	2012/ 2013	100 lbs.	1 staff member/ part time	
Squaw Lake Infiltration Project	2013	?	2 full time staff/ dollars	
Stormwater Review for Permitted Filling and Grading Activities	2012/ 2013	?	1 staff member/ dollars	
Nutrient Management/ Farmer Education	2012/ 2013	?	2 staff/ dollars	
City of Hudson MS4 Implementation	2013	?	Part time staff	
Animal Waste Ordinance Update	2012/ 2013	?	1 staff member	
Producer Led Work Group (Willow River)	2012/ 2013	?	2 staff members	
USDA EQUIP Program	2012/ 2013	?	2 staff members	

Key players in implementation

- St. Croix County Land and Water Conservation Department
- St. Croix County Planning and Zoning Department
- USDA – Natural Resource Conservation Service
- Willow River Rehabilitation District
- Squaw Lake Management District
- Cedar Lake "Lake Association"
- Lake Mallalieu "Lake Association"
- Kinnickinnic River Land Trust
- West Wisconsin Land Trust
- St. Croix County Sportsman's Alliance
- City of Hudson
- Village of North Hudson
- City of New Richmond
- Trout Unlimited
- Ducks Unlimited
- U.S. Fish and Wildlife
- Farm Bureau
- Wisconsin DNR
- Environmental Protection Agency
- University of Wisconsin Extension

Activities to inform, educate, engage, motivate and enable citizens

Existing County Civic Engagement Activities:

- Artful raingarden program
- Rain as a Resource program
- Tree sale program
- Lake St. Croix/Willow River Stakeholder meetings
- UW Extension Agronomic field days
- Annual Farm City Event
- St. Croix County Fair
- Lake Association Meetings
- Lake Mallaieu/Willow River Stakeholder Meetings
- Bi Annual Newsletter
- Town meetings
- Producer Led Engagement Strategy
- Technical Assistance
- County Information and Education Program

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WASHBURN COUNTY

County Goals

The TMDL allows for 51,300 lbs/yr of phosphorus to be loaded to the St. Croix River from Washburn County. This requires 10,700 lbs/yr of reduction from the estimated TMDL baseline load of 62,000 lbs/yr in the early 1990s. Washburn County's required reduction ranks 8th largest among the 19 counties in the basin.

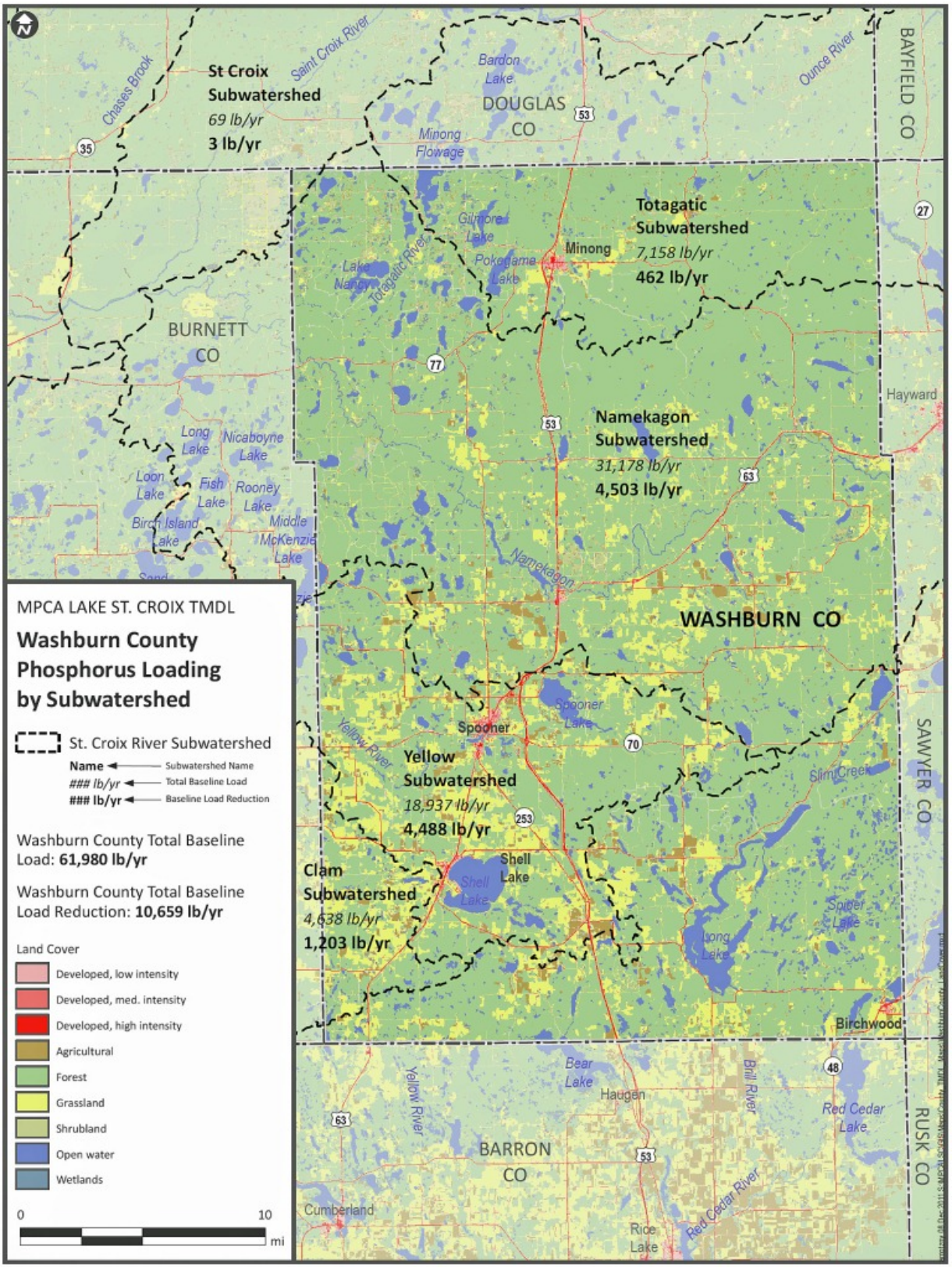
To achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Washburn County needs to reduce loadings by 7,900 lbs/yr by the year 2020. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 260 lbs/yr over 30 yrs, or 790 lbs/yr over 10 yrs.

The table and figure below provide a breakdown of the major subwatersheds in Washburn County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Washburn County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By landuse (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Washburn	434,610	43,347	318,316	40,093	2,502	2,565	27,787	
Subwatersheds	100%	10%	73%	9%	1%	1%	6%	
Clam	19,257	5,177	8,917	4,809	5	5	343	
Namekagon	248,473	18,469	196,077	14,878	2,348	659	16,041	
St Croix	765	0.0	742	13	10	0.0	0.0	
Totagatic	70,013	2,099	60,168	2,571	87	274	4,813	
Yellow	96,101	17,602	52,411	17,821	51	1,626	6,589	
Baseline Loading (lb/yr) * **		By Landuse (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Washburn	61,979	24,303	27,951	7,895	220	1,438	173	10,660
Subwatershed	100%	39%	45%	13%	0%	2%	0%	17%
Clam	4,638	2,902	783	947	0.5	3	2	1,203
Namekagon	31,178	10,355	17,217	2,930	206	370	100	4,503
St Croix	69	0.0	65	3	1	0.0	0.0	3
Totagatic	7,158	1,177	5,283	506	8	154	30	462
Yellow	18,937	9,869	4,602	3,509	4	912	41	4,488

NOTES:
*Landuse areas derived from GIS based 1992 NLCD dataset
**TMDL load reduction= sum of landuse area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load= sum of landuse area * baseline TMDL phosphorus export coefficient



Washburn County tributary, land cover and phosphorus loading.

Where we stand today

It is extremely difficult to estimate changes in phosphorus loading since the early 1990's. Complex factors contribute to the overall phosphorus load that enters the water bodies draining to the St. Croix. Without comprehensive modeling to examine phosphorus reduction over the last twenty years, it is simply not possible to quantify the progress. However, there are certain generalizations that can be made based on observed or documented changes since that time.

Cropland

The croplands in Washburn County are generally concentrated in southwestern and south central portion of the county, and primarily drain into the Clam and Yellow River subwatersheds. Concern regarding cropland is generally low in the county because of the limited amount of cropland and the low erosion rates. Transect surveys were conducted annually from 1999 until 2004. These surveys provided information about erosion rates from cropland. The Washburn County soil loss average is 1.4 tons per acre, well below the average annual tolerable soil loss rate for Washburn County of 4.4 tons per acre.

Changes in farming practices and crop prices have had an impact on soil loss from cropland since the early 1990's. Much more dairy farming existed at that time so many rotations included hay. With the loss of dairy cows there has been an increase in the percentage of rows crops which are more erosive. Additionally, the high commodity prices for corn and soybeans have led to an increase in the amount of cropland harvested. The amount of cropland harvested increased from about 35,484 acres in 2002 to 38,679 acres in 2007.

Livestock

The number of cattle and calves decreased from 14,058 in 1992 to 9,684 in 2007. The percentage of dairy cows remained the same from 1992 to 2007, about 28%. The percentage of beef cows, however, increased from 15% in 1992 to 26% in 2007. Generally speaking, fewer cattle out on the landscape may mitigate runoff containing manure to surface water and streambank erosion. However, reduction in dairy cattle also results in less cropland planted to hay crops and more planted to row crops such as corn and soybeans. This makes it very difficult to assess how these changes over time have impacted phosphorus loading to the St. Croix Basin.

Shoreland Development

Perhaps the single largest land use change since the early 1990s has been the increase in development around the lakes of Washburn County. There have been several periods of rapid development, even though the current economy has slowed and development is minimal. The 2010 Census showed there are 12,979 housing units in Washburn County, which is an increase of 1,725 resident households since 2,000. Such an increase has undoubtedly placed additional burdens on our lakes and rivers in terms of sediment and phosphorus runoff. It is difficult to determine how these changes have affected runoff and water quality though without a significant modeling effort.

Major phosphorus-reducing activities completed since 1992

Such accomplishments usually require staff and Best Management Practice (BMP) funding, so a historical look at department funding is appropriate. The Department of Agriculture, Trade and Consumer Protection (DATCP) has been providing staffing funds to Washburn County since 1992. Over this time period, DATCP provided $1,392,120.00 to Washburn County for staff. However, the yearly awards were minimal until 1999 when the amount received was significant enough to create a County Conservationist position. A number of counties in northern Wisconsin were able to create these positions for the first time with the funding from DATCP. The following year, Washburn County also created a Conservation Specialist position to provide additional support in practice design and installation. While having these two positions within the department made it possible to provide the technical services the public was demanding, the recent downturn in the economy and state government cuts are now jeopardizing these positions.

The cost-sharing funding from DATCP began in 2000, but the amounts available each year have been low. Washburn County has been allocated $455,426.00 in cost-share funding from DATCP over that 12-year period. While the department was eligible for $60,000 for several years, it has dropped to only $20,000 annually for the last 3 years. With such a limited amount of funding available, progress can be slow.

With minimal staff and BMP cost-sharing available, department focus has been placed on the priorities as shown in the *Washburn County Land & Water Resource Management Plan*. The first version of the plan was drafted in 1999 and has gone through 2 revisions since then. The major goals in the 10-year plan are listed as follows:

1. Protect and restore aquatic and near shore fish and wildlife habitats and encourage their appreciation.
2. Protect and enhance lakes, streams, and wetlands by managing nutrient and sediment inputs.
3. Balance outdoor water and shoreland experiences to minimize conflicts among users and impacts to the natural environment.
4. Protect groundwater quality to supply clean water for drinking and recharging lakes and streams.
5. Preserve and protect natural areas and agricultural lands from the negative impacts of development.

With 943 lakes, 18 impoundments, and 60 streams in the county, the focus of the limited staff and financial resources has been these water bodies. Recreation and tourism represents a significant portion of the counties' economy so it makes sense to focus on lake protection and enhancement. Generally in our department this means committing technical and financial resources to lakeshore or streambank projects, but it could also mean an agriculture practice if the NR 151 Ag Performance Standard rules were involved. Fortunately, Washburn County does not have a significant number of Ag Performance Standard issues. Nearly all of the agricultural practices installed in Washburn County in the last 8 – 10 years have been installed by NRCS staff through EQIP funding.

A second source of significant funding has been through the Department of Natural Resources Aquatic Invasive Species (AIS) program. Washburn County has benefitted greatly from this competitive grant program. Since 2006, the Land and Water Conservation Department has

secured AIS grants in excess of $350,000 primarily to fund an Aquatic Invasive Species Specialist position. The goals and activities of the Aquatic Invasive Species program generally do not lead to reduced phosphorus levels, however.

Phosphorus Reduction Plans

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Resources Needed	Status
Staff person to encourage participation, design BMP's, supervise installation of BMP's	2013-2020	NA	$480,000	Position needed to complete field work
Shoreland/Streambank BMP's Shoreline Protection Habitat Restoration Critical Area Stabilization Urban BMP's Rain Gardens Detention Basins Rural BPM's Manure Storage Facility Closure Rotational Grazing Other practices	2013-2020	???	$350,000	Currently only receiving $20,000/yr from DATCP

Methods of prioritization

The Washburn County Land and Water Resource Management Plan provides a strategy for achieving each of the goals listed above. Some of the goals can be achieved primarily through shoreline protection and shoreland habitat restoration. Generally this work is to be done wherever and whenever possible to restore lakeshore habitats.

The agricultural BMP's need to be completed using the Agricultural Performance Standards implementation strategy, which considers cropland erosion a lower priority than runoff from livestock facilities. NR 151 activities are prioritized in the Washburn County Land and Water Plan as follows:

Livestock Facilities

Priority Farms will be selected based on a combination of geographic and resource characteristics. A list of farms in the county will be narrowed down based upon geographic location. Then the highest priority farms will be selected using resource factors including evidence of performance standard violations, high potential for groundwater contamination, and nutrient management plan status. The Washburn County Land and Water Conservation Department will visit all livestock farms within the plan implementation period.

Targeting Soil Loss from Cropland

Areas will be targeted for conservation practices using the following criteria:

- the total amount of erosion occurring;
- the extent to which current estimated erosion rates for cropland fields exceed the soil erosion standards;
- the off-site damages, including water degradation caused by soil erosion;
- the extent to which the soil erosion is preventable;
  the cost of preventing erosion;
- the feasibility of implementing the erosion control strategy; and
- other factors to be identified by the Land Conservation Committee.

Key players in implementation

- Washburn County (www.co.washburn.wi.us)
- Washburn County Land and Water Conservation Department
  (www.co.washburn.wi.us/departments/landwatercons)
- USDA Natural Resources Conservation Service (www.wi.nrcs.usda.gov)
- WI Department of Natural Resources
- Department of Agriculture, Trade, and Consumer Protection
- University of Wisconsin Extension
- Washburn County Lakes and River's Association (www.wclra.org)

Activities to inform, educate, engage, motivate and enable citizens

- One-on-one contacts
- Staff presentations to local lake associations, schools, local town boards and educational workshops.
- On the Waterfront newsletter – published by Washburn Lakes and Rivers Association.
- Monthly Conservation Notes articles highlighting current LWCD/NRCS programs in our local newspapers.
- University of Wisconsin Extension publications and workshops

WASHINGTON COUNTY

County Goals

The TMDL allows for 31,300 lbs/yr of phosphorus to be loaded to the St. Croix River from Washington County. This requires 15,700 lbs/yr of reduction from the estimated TMDL baseline load of 47,000 lbs/yr in the early 1990s. Washington County's required reduction ranks 6th largest among the 19 counties in the basin.

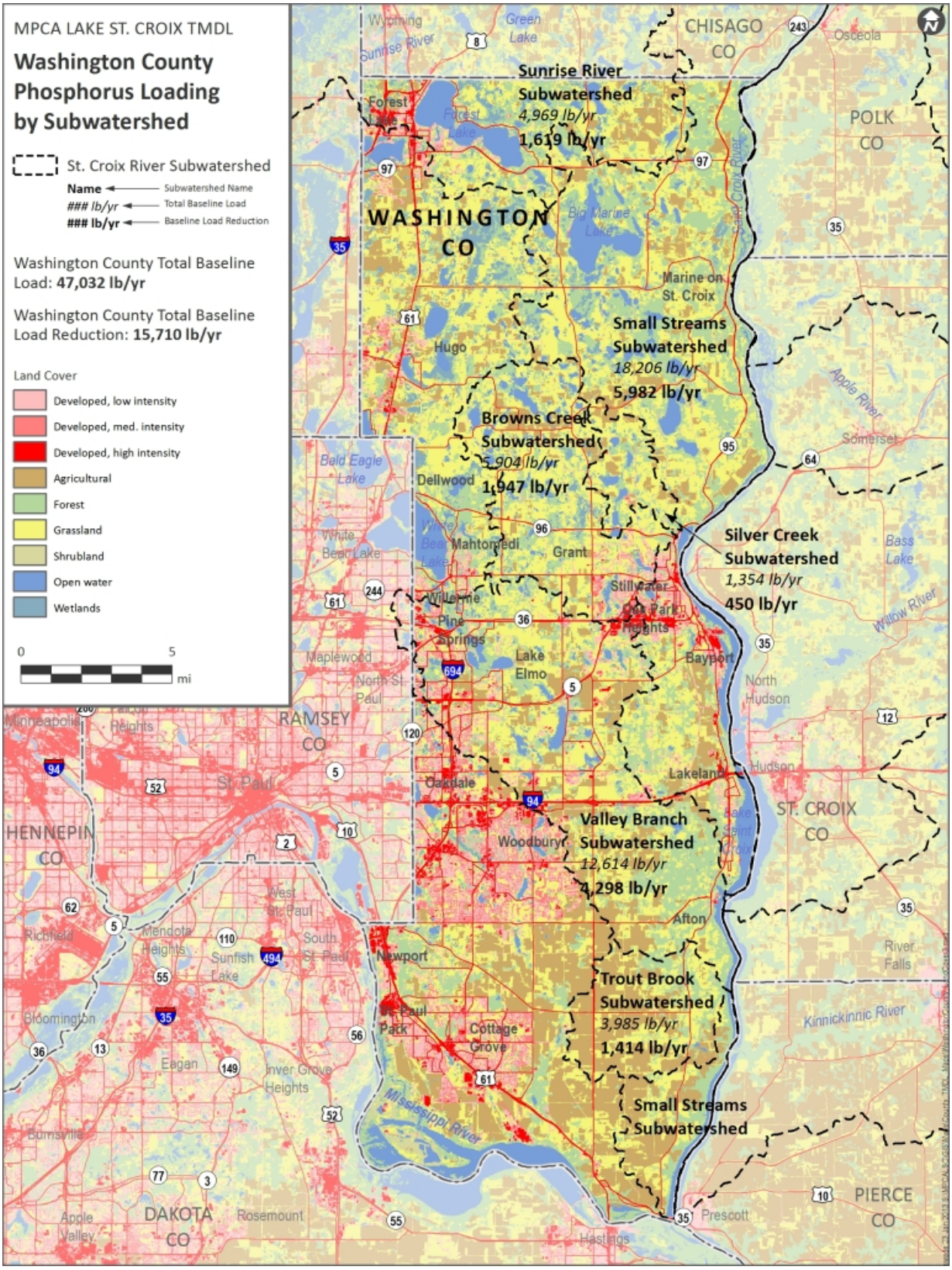
The table and figure below provide a breakdown of the major subwatersheds in Washington County contributing to the St. Croix River basin, land uses under TMDL baseline conditions, baseline phosphorus loadings, and needed reductions.

Washington County contributing area and baseline phosphorus loading by subwatershed.

Area in St. Croix Basin (ac)		By land use (1992 NLCD) *						
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Washington	173,093	48,093	31,843	69,329	4	6,262	17,562	
Subwatersheds	100%	28%	18%	40%	0%	4%	10%	
Browns Creek	21,827	5,647	3,297	10,704	0.0	590	1,588	
Silver Creek	4,876	1,441	641	2,451	0.0	10	334	
small streams	71,998	18,371	17,196	24,345	2	2,754	9,330	
Sunrise River	19,733	4,832	3,023	6,913	0.4	1,087	3,879	
Trout Brook	11,540	5,080	1,178	5,221	0.0	8	52	
Valley Branch	43,119	12,723	6,508	19,695	2	1,812	2,379	
Baseline Loading (lb/yr) * **		By Land use (1992 NLCD)						TMDL Load Reduction**
County	Total	Ag	Forest	Grassland	Shrubland	Urban	Water	
Washington	47,032	26,963	2,796	13,652	0	3,511	109	**15,710**
Subwatershed	100%	57%	6%	29%	0%	8%	0%	33%
Browns Creek	5,904	3,166	290	2,108	0.0	331	10	1,947
Silver Creek	1,354	808	56	483	0.0	5	2	450
small streams	18,206	10,300	1,510	4,794	0.2	1,544	58	5,982
Sunrise River	4,969	2,709	265	1,361	0.0	609	24	1,619
Trout Brook	3,985	2,848	103	1,028	0.0	5	0.3	1,414
Valley Branch	12,614	7,133	571	3,878	0	1,016	15	4,298

NOTES:
*Land use areas derived from GIS based 1992 NLCD dataset.
**TMDL load reduction = sum of land use area * difference between baseline and TMDL phosphorus export coefficient.
***Baseline load = sum of land use area * baseline TMDL phosphorus export coefficient.

According to the assumptions in Table 1, to achieve the St. Croix Basin Partners' goal of 20% Reduction by 2020, Washington County needs to reduce loadings by 9,400 lbs/yr. To attain this goal, activities must be implemented that achieve an average annual rate of phosphorus reduction of 310 lbs/yr over 30 yrs, or 940 lbs/yr over 10 yrs.



Washington County tributary, land cover and phosphorus loading.

Quantifying changes in phosphorus loadings to the St. Croix River since the TMDL baseline conditions of the early 1990s is difficult. Rapid urbanization occurred within the county, primarily converting agricultural land to suburban and commercial land uses. Most of these changes occurred in the central portion of the county (e.g. Brown's Creek Watershed and Valley Branch Watershed). Land use changes were less dramatic in the northern and southern portions of Washington County. During this period of time, stormwater management was being required by the cities and county – first with rate control ponds and later with more innovative practices. In the early 2000s the watershed districts began implementing stricter development standards (including volume control).

Because very limited data are available to assess these changes and the implementation of volume controls did not begin until the 2000s, a no net change in loading as a result of land use changes is assumed. However, during this same time frame there have been hundreds of best management practices (BMPs) implemented in Washington County.

According to the Washington County Soil and Water Conservation District's BMP database, 638 practices have been installed since the early 1990s. This database is not all inclusive and current condition of all of these practices (especially the older BMPs) has not been field verified. However, this is the best source of information available for estimating load reductions since the early 1990s. Total Estimated Retrofit Load Reduction: 1,068 lbs/yr.

To further refine the estimated progress for Washington County, annual loading data from multiple monitoring locations and adjustments based on non-contributing areas have been evaluated.

Baseline Loading (lb/yr)		TMDL Load Reduction	Adjusted Loading*	Revised TMDL Load Reduction***	Monitored Loading**	Revised TMDL Load Reduction***
County	Total					
Washington	49,642	15,728		11,598		6,830
Browns Creek	5,904	1,947	3,542	1165	2,652	848
Silver Creek	1,354	450		450	100	0
small streams	18,206	5,982		5982		5,982
Sunrise River	4,969	1,619		1,619	1,146	0
Trout Brook	3,985	1,414		1,414	915	0
Valley Branch	12,614	4,298	3,027	968	1630	0

* As noted in the TMDL Report, "for Valley Branch, Browns, [snip], actual P loads are estimated to be smaller than those shown here by 40%, 76%, [snip] respectively, based on non-contributing area percentages." Further, approximately 50% of the land area of Trout Brook is non-contributing.

**Silver Creek, Sunrise River, and Trout Brook based on 2011 monitoring (which appears to be a below average runoff year). Brown's Creek and Valley Branch based on 9 years of data.

*** 32% of actual loads. If the adjusted and monitored loads are comparable, the monitored load is used

Incorporating the non-contributing areas into the total load reduction reduces the total load reduction by 4,130 lbs. Further, the monitoring information in the table above demonstrates that many of the tributaries may already be achieving the targeted annual loads. These monitored values are listed for reference purposes and are used to justify extending the implementation timeline.

Revised Load Reduction Goal for Washington County: (11,598 lbs/yr – 1,068 lbs/yr) = 10,530 lbs/yr.

Revised Annual Load Reduction Targets:

10,530 lbs/yr / 8 yrs = 1,316.25 lbs/yr

10,530 / 15 yrs = 702 lbs/yr

10,530 / 20 yrs = 526.5 lbs/yr **Ç** === Target Retrofit Annual Load Reduction Goal!

Phosphorus reduction plans

Multiple efforts are underway to reduce P loads to the St. Croix, including collaborations between the tributary watershed organizations, municipalities, Washington Conservation District, Washington County, Natural Resource Conservation Service, and private landowners. Funding for implementing these activities come are derived local, state and federal sources.

Load reductions can come from a variety of activities, including: Regulation, New Development Standards, Redevelopment Standards, Retrofits, Municipal O&M, and Education/Source Reduction. Some of these activities are currently supported, others are not.

The portion of load reduction necessary from each of these broad categories of activities varies depending on the land use, land cover, landscape, ownership and a variety of other factors.

All of the watershed organizations in Washington County have active watershed plans that include BMP retrofit programs. These BMP retrofit programs are implemented as partnerships between the WDs, WCD, and landowners. Implementation has been increasing over the past few years:

WCD/Partner BMP Retrofits Installed by Year

2008	52
2009	58
2010	89
2011	111

The WCD currently has a collaborative target of 100-200 BMP retrofits per year with estimated annual load reductions between 200-300 pounds per year. To increase the load reduction to achieve the goals of the TMDL, additional resources are needed and are summarized in the table below.

The following table presents a general listing of the planned activities, including timeframe for implementation, approximate phosphorus reductions expected, resources needed, and status.

Activity	Timeframe	Estimated P Reduction	Additional Resources Needed to achieve 500#/yr	Status
Regulation	2012+	Unknown	Unknown	Ongoing
New Development Standards	Ongoing	Variable – at a minimum will work toward no net increase. Where opportunities arise additional treatment and load reductions may be achieved.	Unknown	Ongoing
Redevelopment Standards	Variable	Variable – Some watersheds have standards that apply to redevelopment, others do not	Unknown	Ongoing
Retrofits	2012+	200-300 pounds/yr	$1,000,000/yr	Ongoing
Municipal O&M	2012+	Variable – quantified by each municipality	Unknown	Ongoing
Education/Source Control	2012+	Unknown – Credit system not currently in place	Unknown	Ongoing

Methods of prioritization

Local BMP retrofits will be prioritized through the completion of subwatershed analysis and cost-benefit analysis. BMPs and other activities implemented by the WDs, County, and others will be prioritized on an annual basis as part of their CIP and budget process. It is unclear how the state will prioritize implementation of their regulatory programs.

Key players in implementation

Activity	Key Players
Regulation	MPCA, Washington County
New Development Standards	Watershed Organizations, MPCA
Redevelopment Standards	Watershed Organizations, MPCA
Retrofits	WCD, Watershed Organizations, Municipalities, NRCS
Municipal O&M	Municipalities, Watershed Organizations
Education/Source Control	WCD, Watershed Organizations, Municipalities

Activities to inform, educate, engage, motivate and enable citizens

The East Metro Water Resource Education Program (EMWREP) is a partnership that was formed in 2006 to develop and implement a comprehensive water resource education and outreach program for Washington County (and a small portion of Ramsey County), MN. The purpose of the EMWREP partnership is to educate the public and various other target audiences within the EMWREP region about the impacts of non-point source pollution on local lakes, rivers, streams, wetlands and groundwater resources and engage people in projects that will help to protect and improve water quality in the region. EMWREP is guided by a steering committee comprised of representatives from each of the 17 partner organizations. The committee generally meets twice a year to provide recommendations on the program budget and activities. The EMWREP educator sends a quarterly e-newsletter to all partners' staff, council members and board members, and communicates one-on-one with individual partners on projects throughout the year. The EMWREP education plan is revised every two to three years to accommodate

changing priorities and new target audiences. In addition, the EMWREP educator prepares an annual report on program activities and provides outreach data and statistics for partners' MS4 Permit reports. All EMWREP reports, plans, print materials and news articles are available on-line at www.mnwcd.org/emwrep. See attached EMWREP 2011 Annual Report for more details.

APPENDIX C
Implementation Tracking Forms

Project Tracking Form
Lake St. Croix Nutrient TMDL

Please complete the following information for each project.
Note that all items may not be applicable to every project.
Use the "Other" field to include important information not otherwise identified in the form.

General Information	
Project Lead Organization/Individual	
Contact Information (phone and email)	
Project Partners	
Date of Project Completion	
Project Description	
Other	
Location	
State	
County	
Subwatershed	
Parcel No.	
Tract No.	
Township No.	
Range	
Section	
GIS coordinates (UTM)	
Other	
Linkage to St. Croix Flow Network	
Direct/ Indirect?	
(Direct) Receiving Water	
(Indirect) Proximity to Flow Network	
Phosphorus Reduction Information	
Land Use Addressed	
Treated Area (acres)	
Estimated Phosphorus Reduction (lbs/yr)	
Method used for estimating reduction	
Other	
Financial Information	
Cost	
Funding Source(s)	
Other	
Maintenance Information	
Maintenance requirements	
Entity responsible for maintenance	
Date of most recent inspection	
Other	
Miscellaneous Information	
Other	

Annual Status Report
Lake St. Croix Nutrient TMDL

County	State	Phosphorus Reduction Goal from Baseline (lbs/yr)	Reductions Achieved (lb/yr)										Remaining Reduction Needed (lbs/yr)
			Accounted for since Baseline	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Aitkin	MN	3,700											3,700
Anoka	MN	1,607											1,607
Barron	WI	2,447											2,447
Bayfield	WI	1,615											1,615
Burnett	WI	21,419											21,419
Carlton	MN	4,136											4,136
Chisago	MN	21,812											21,812
Douglas	WI	1,945											1,945
Isanti	MN	3,721											3,721
Kanabec	MN	10,763											10,763
Mille Lacs	MN	1,313											1,313
Pierce	WI	5,479											5,479
Pine	MN	20,947											20,947
Polk	WI	52,759											52,759
Ramsey	MN	61											61
Sawyer	WI	1,544											1,544
St. Croix	WI	48,781											48,781
Washburn	WI	10,660											10,660
Washington	MN	15,710											15,710
Basin Totals	---	230,437											230,437