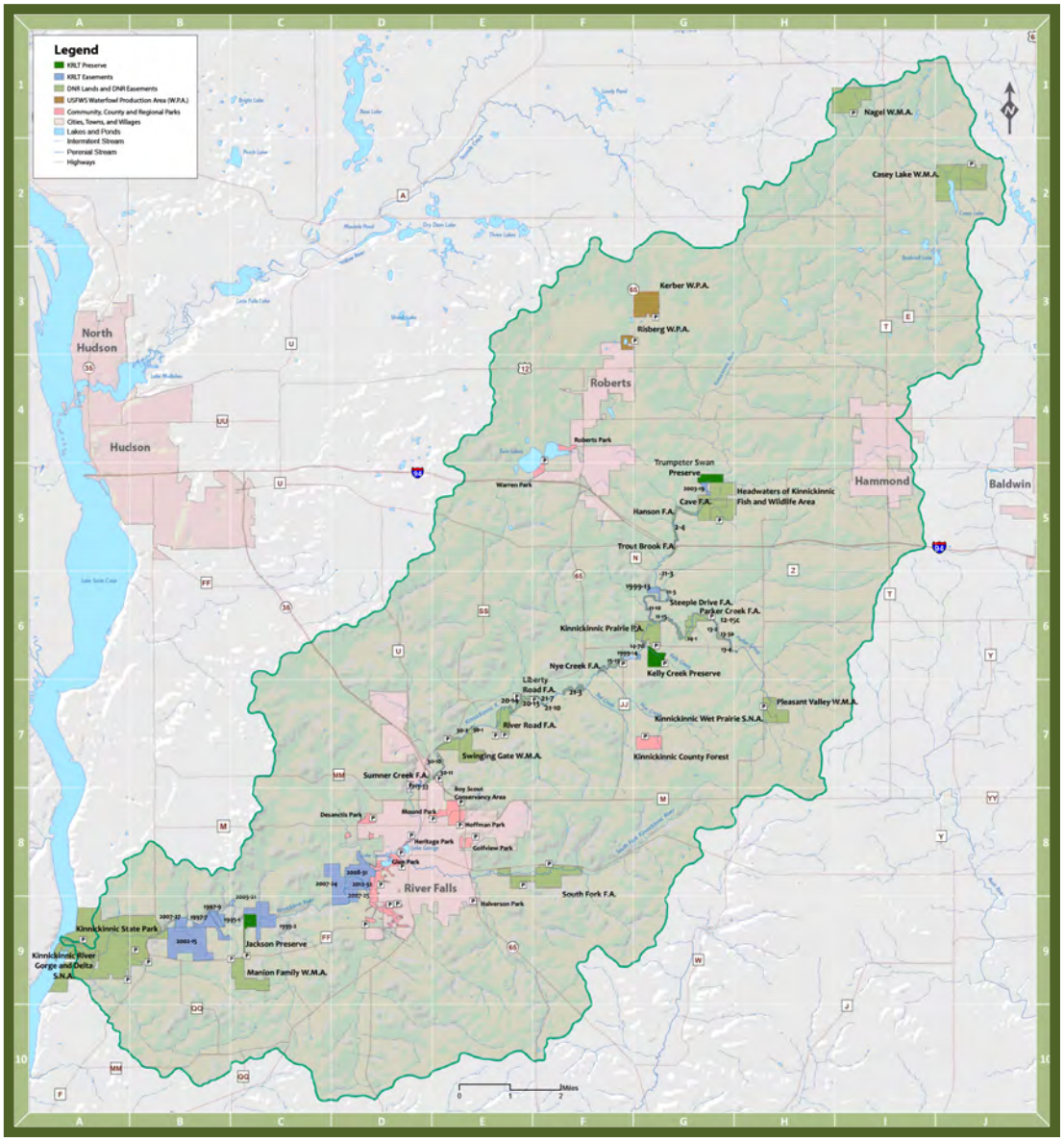
KINNICKINNIC RIVER WATERSHED PROJECT 1999-2010

Community Report



St. Croix County
Pierce County
City of River Falls

Project Managed by:
The Kinnickinnic River Land Trust

With Funds from:
Wisconsin Department of Natural Resources
The McKnight Foundation

Report Prepared by:
Harmony Environmental

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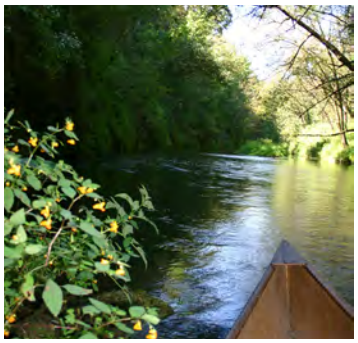

ROBERT CHAMBERS

DAN WILKENING

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Photos provided by Kinnickinnic River Land Trust unless otherwise noted.

RAY ZEMKE

INTRODUCTION

This *Kinnickinnic River Priority Watershed Project Community Report* documents and communicates priority watershed project results. The watershed project ran from 1999 through 2010. The project supported staffing and installation of best management practices to meet watershed goals in the rural areas of Pierce and St. Croix County. A few practices were also installed with watershed funding within the city of River Falls.

In addition to priority watershed activities, cities and villages developed plans and ordinances which protect the river. Extensive progress in stormwater management and resulting protection of the Kinnickinnic River was accomplished by the City of River Falls prior to and during the time the priority watershed project was being implemented. These activities are also summarized here in the community report.

Since the time of the watershed project, a Total Maximum Daily Load Report and Implementation Plan were developed for Lake St. Croix, an impaired waterbody. The Kinnickinnic River watershed is a part of the larger Lake St. Croix watershed. A phosphorus reduction goal for the St. Croix Basin is 20 percent by 2020. The TMDL Implementation Plan also sets individual phosphorus reduction goals for the Kinnickinnic River watershed to be implemented by St. Croix and Pierce counties, the City of River Falls, and UW-River Falls. The baseline for these reduction goals is the mid-1990s, so progress for the TMDL will be reported from the beginning of the watershed project through the present.

This community report will provide input for the development of the new Kinnickinnic River Strategic Action Plan. During the action plan planning process, a multi-stakeholder partnership will identify shared conservation and watershed management goals and develop a strategic action plan to achieve those goals. Goals will focus on reducing nutrient and sediment loading from both agricultural and urban sources and/or implementing land and water conservation in the Kinnickinnic River and its watershed.

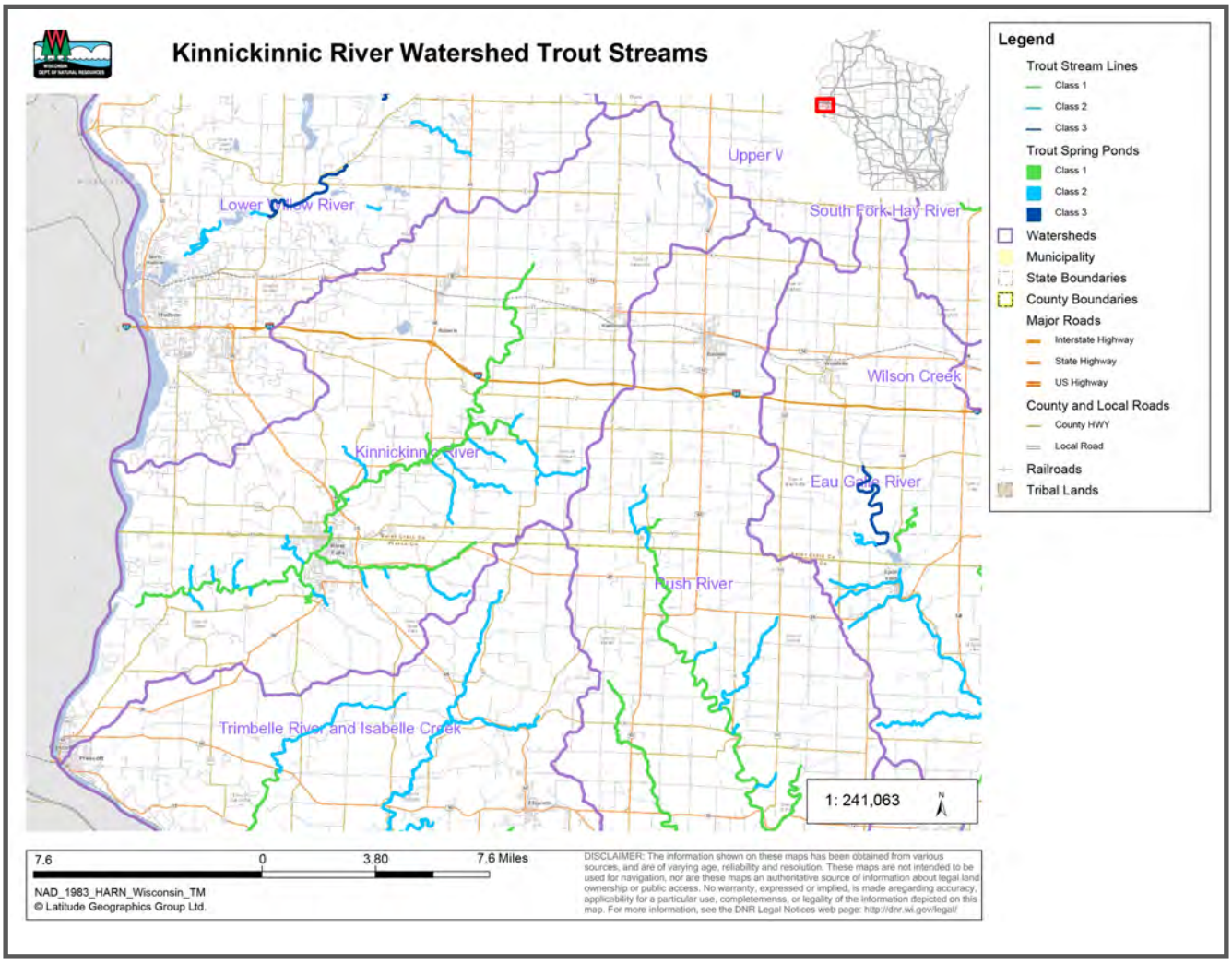


Figure 1. Kinnickinnic River Watershed Map with Trout Stream Segments.

KINNICKINNIC RIVER AND ITS WATERSHED

The River

The Kinnickinnic River is a high quality, cold Class I trout fishery which originates in agricultural lands in St. Croix County, flows through City of River Falls, and eventually drains through Pierce County to the St. Croix River. Figure 1 shows trout stream classifications for the river and its tributaries. In rural areas of the City of River Falls watershed, the river is impacted by agricultural runoff, flashy stream flow, and sedimentation. As the stream flows through River Falls, it is also thermally impacted by urban stormwater runoff and two shallow impoundments (known locally as Lake George and Lake Louise). The Kinnickinnic River, except the reach within the City of River Falls, has been designated as an "Outstanding Resource Water" by the State of Wisconsin.

The Watershed

The 174 square mile Kinnickinnic River watershed is located in St. Croix and Pierce counties. The watershed is within the St. Croix River Basin. Within St. Croix County, the watershed spans portions of the towns of Hammond, Warren, Kinnickinnic, Troy, Baldwin, Erin Prairie, Emerald, and Hudson. Watershed towns in Pierce County include River Falls and Clifton. Incorporated areas in the watershed include the cities of Prescott and River Falls and the villages of Hammond and Roberts.

The Watershed in the mid-1990s

Gently rolling agricultural land comprised most (78 percent) of the watershed when the watershed inventory was completed in the mid-1900s. Dairy farming and cash cropping were the primary enterprises, with an average farm size of 205 acres. Woodlands, wetlands and natural areas covered 17 percent of the watershed, and urban land uses covered 5 percent of the watershed. About 25,300 people lived in the watershed, with approximately 70 percent in cities and villages. Towns, villages, and cities had a growth rate from 1980 to 1990 of about 20 percent. Continued rapid expansion of the watershed population was anticipated.

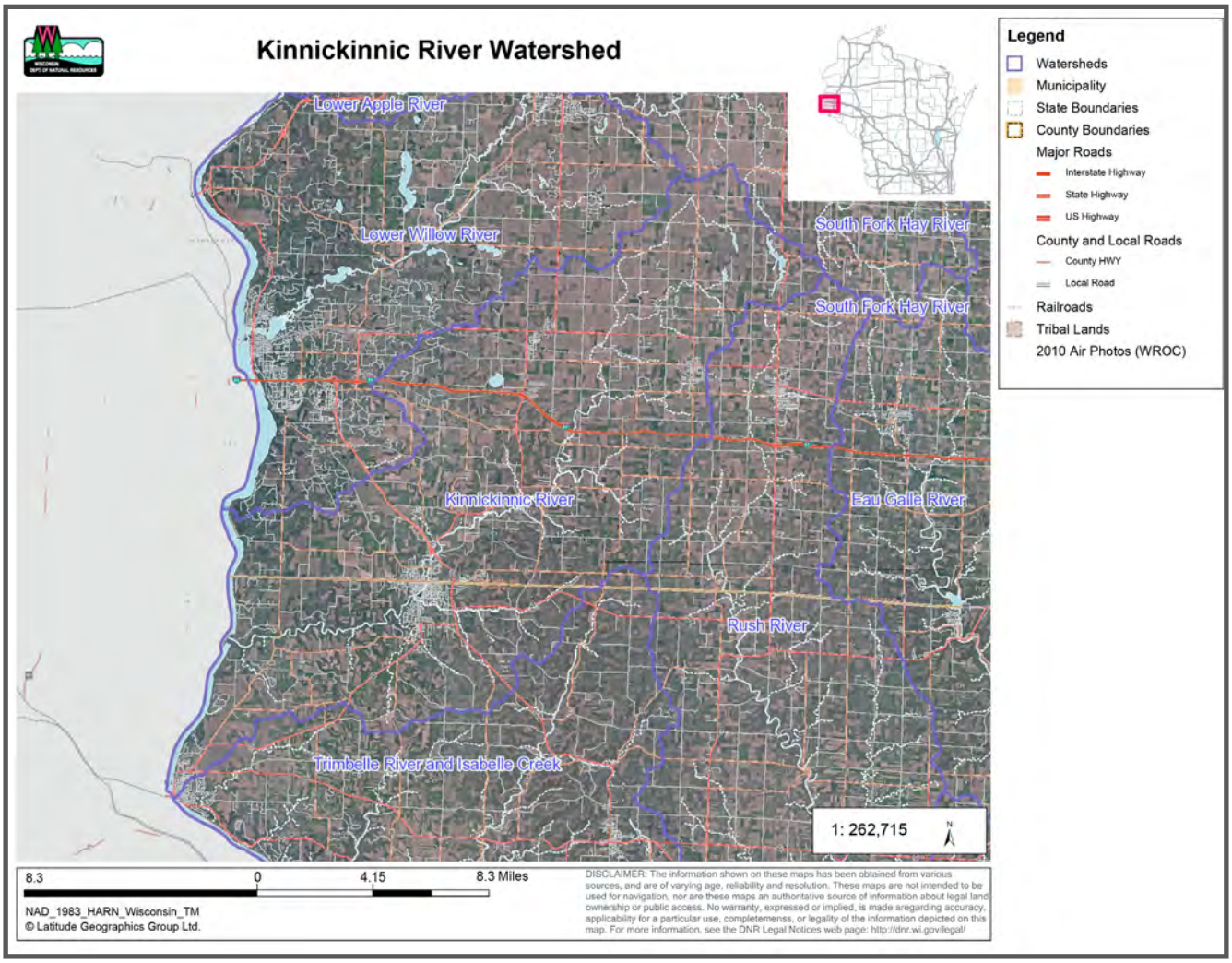


Figure 2. Kinnickinnic River Watershed Map with 2013 Aerial Photo

The Watershed Today

A watershed assessment completed for the Lake St. Croix Total Maximum Daily Load assessment used land cover information from the same time period as the priority watershed appraisal, so updated land cover data is not available.

Population

Population growth continued as expected with rates of 25 percent from 1990 to 2000 and 26 percent from 2000 to 2010.[1] Growth rates nearly came to a halt, however, from 2010 to 2015 when there was only an estimated 1 percent increase.

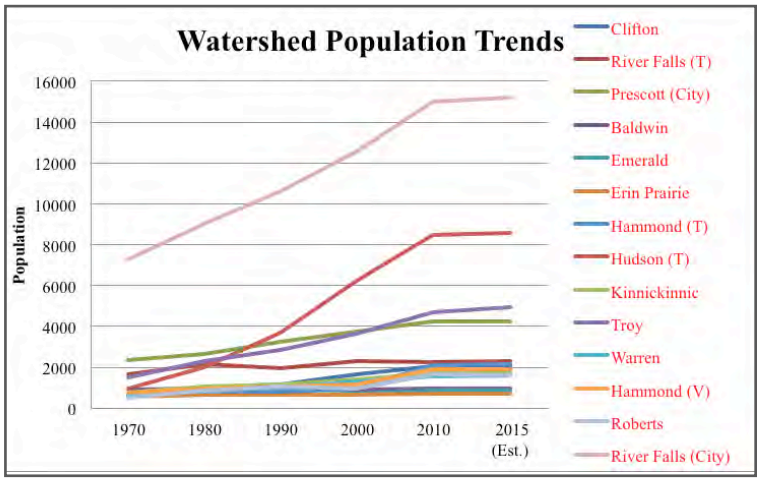


Figure 3. Watershed Population Trends

1 Demographic Services Center. Wisconsin Department of Administration. Time Series of the Final Official Population Estimates and Census Counts for Wisconsin Minor Civil Divisions. http://doa.wi.gov/Divisions/Intergovernmental-Relations/Demographic-Services-Center/Wisconsin-Population-Housing-Estimates/

Soil Erosion

Erosion from crop fields was identified in the watershed inventory as the major source of sediment to the river: An estimated 73,000 acres of cropland delivered 16,800 tons per year of soil to lakes, wetlands and streams in the watershed. An additional 1,650 tons per year are delivered from farmsteads, pastures and woodlots. Uplands were the source of 85 percent of the sediment delivered to surface waters.

Since the time of the watershed inventory, land in crop fields has remained about the same, but the crops planted have changed. While crop field information isn't available by watershed, it is collected in USDA Census of Agriculture studies by county every five years.[2] Data from the census of agriculture shows that farm numbers in St. Croix and Pierce counties have decreased while land in crops has increased slightly following declines from 1997-2002. Trends are toward increasing acres planted to row crops such as corn and soybeans and decreasing acres planted to hay and silage. Land in row crops tends to have higher erosion rates than land planted to hay and other grasses planted for grain because of reduced soil cover.

There have also been significant declines in acres in the Conservation Reserve Program in St. Croix and Pierce counties beginning around 2007. The Conservation Reserve Program requires conservation cover for contract terms of 10-15 years. By reducing water runoff and sedimentation, CRP protects groundwater and helps improve the condition of lakes, rivers, ponds, and streams.[3]

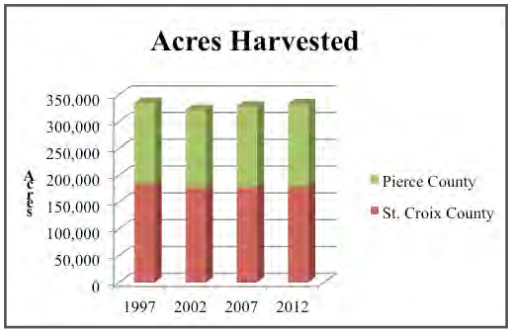


Figure 4. Acres Harvested in Pierce and St. Croix Counties

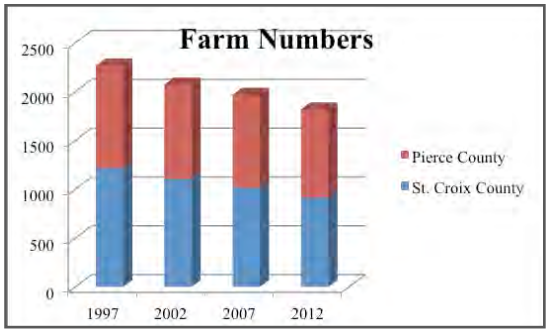


Figure 5. Number of Farms Harvesting Crops in Pierce and St. Croix Counties

2 https://www.agcensus.usda.gov
3 http://www.fsa.usda.gov/Internet/FSA_File/crpfactsheet0213.pdf

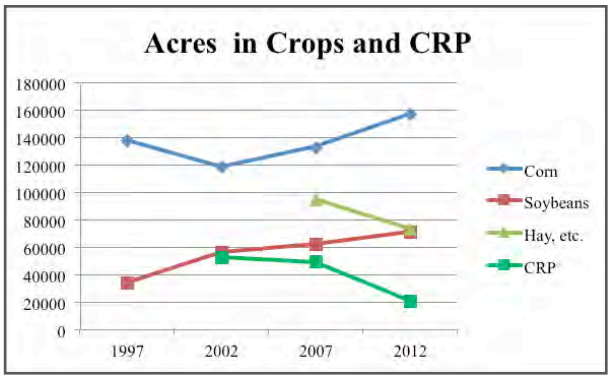


Figure 6. Acres of Corn, Soybeans, and Hay Harvested and CRP Acres in St. Croix and Pierce Counties (hay reported differently in 1997 and 2002)

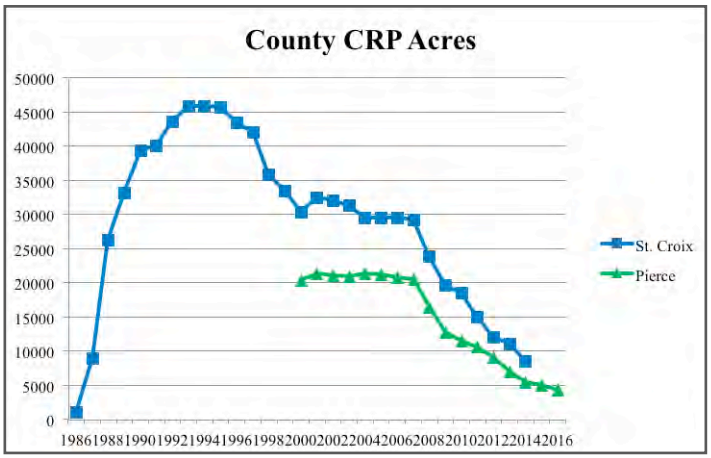


Figure 7. Conservation Reserve Program Acres in St. Croix and Pierce Counties by Year

Cropland Erosion Rates in the Watershed

Wisconsin counties conduct a transect survey of cropland cover and practices according to standard methods each year. This inventory, begun in 1999, provides information about erosion rates from cropland and assists in targeting areas for conservation practices. Average soil erosion rates for the Kinnickinnic River watershed in both St. Croix and Pierce counties are presented by county in Figure 8.

This figure illustrates that average soil loss within the watershed has generally decreased even while acres of cropland in row crops have increased and acres of cropland in hay have decreased. This is potentially because of increases in crop residues left on row-cropped fields with minimum and no till management practices and use of cover crops. Conversion of land use from cropland to residential can also lead to lower estimated soil loss from specific inventory points. Even changes in staff who conduct the transect survey and make judgments about crop residues could affect the results.[4]

The weighted average tolerable soil loss for St. Croix County is 4.4 tons per acre. The tolerable soil loss rate, commonly referred to as "T," is defined as the maximum average annual rate of soil erosion for each soil type that will permit a high level of crop productivity to be sustained economically and indefinitely (ATCP 50.01(16)). The soil and water conservation standard for the St. Croix and Pierce County Farmland Preservation Programs is for each crop field to achieve a soil loss at or below the tolerable soil loss rate.[5, 6]

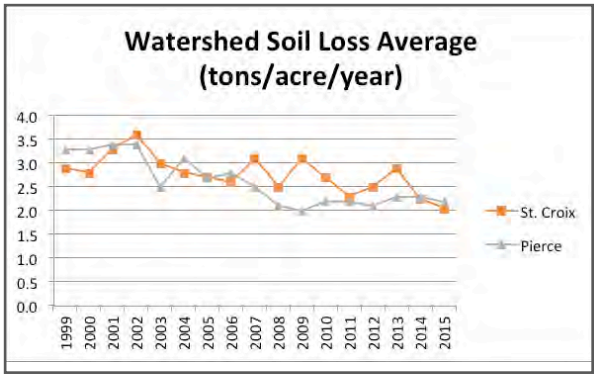


Figure 8. Kinnickinnic River Watershed Cropland Average Soil Loss by County (Transect Survey Results)[7]

4 Personal Communications. Kyle Kulow, St. Croix County, June 2016 and Rod Webb, Pierce County, June 2016.
5 St. Croix County Resource Management Plan. 2009.
6 Pierce County Land and Water Resource Management Plan. 2006.
7 Provided by St. Croix County Resource Management Division and Pierce County Land and Water Conservation Department. March 2016.

Priority Watershed Planning Process[8]

The State Legislature created the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1978. The goal of the program was to improve and protect the water quality of streams, lakes, wetlands, and groundwater by reducing pollutants from urban and rural nonpoint sources.

Pollutants from nonpoint sources are carried to surface water or groundwater through rainfall runoff or seepage, and snowmelt. Sources of nonpoint pollution include runoff and erosion from urban and developing areas, eroding agricultural lands, eroding stream banks, runoff from livestock wastes, and other agricultural practices.

The priority watershed plan was prepared from 1997-98 and approved in 1999. Implementation ran from 1999-2010 (with a few Pierce County projects installed in 2011). The plan assessed nonpoint sources of water pollution and identified best management practices (BMPs) to control pollutants. It also guided implementation of BMPs. State local assistance grants supported county staff, and cost sharing for best management practices was made available to landowners.[9]

Watershed project goals:

- Protect and enhance the water quality in the streams and lakes in the Kinnickinnic River Watershed;
- Protect, enhance and restore wetlands within the watershed;
- Protect and enhance the groundwater resources from nonpoint source pollutants, especially through protection of sinkholes and wellhead protection planning; and
- Protect and enhance the thermal regimes in the Kinnickinnic River and its tributaries, to protect and enhance the coldwater ecosystems.

8 Wisconsin Department of Natural Resources, et. al. Nonpoint Source Control Plan for the Kinnickinnic River Priority Watershed Project. April 1999.

9 Voss, Karen. Priority Watershed and Priority Lake Program Final Report. St. Croix County. Kinnickinnic River Priority Watershed. (Draft). January 2011.

RURAL PROJECT ACCOMPLISHMENTS

Landowner Participation

In 1997, approximately 25,300 people were estimated to live within the watershed.

St. Croix County

Of the estimated 9,400 people living within the St. Croix County watershed boundaries, approximately 2,500 were eligible for cost sharing. Approximately 75% of eligible landowners were contacted annually by Land and Water Conservation Department staff. They accomplished this through one-on-one meetings and participation in conservation group meetings, presentations at schools, and Farm City Days.

- Number of landowners/operators eligible for cost-sharing and easements: 2,500
- Number of landowner contacts during the project: 2,500
- Number of eligible landowners participating during the project: 63

Pierce County

Of the estimated 14,900 people living within the Pierce County watershed boundaries, approximately 200 were eligible for cost sharing.

- Number of landowners/ operators eligible for cost-sharing and easements: 200
- Number of landowner contacts during the project: 1,470
- Number of eligible landowners participating during the project: 70

BMP's Installed and Cost Sharing

St. Croix County

The original grant award to St. Croix County was $1.8 million, of which about $1.3 million was spent. The cost-share grant amount spent was $962,000.

Figure 9. Best Management Practices include Roof Runoff Facilities. When installed, clean roof runoff water is diverted away from areas with manure, which prevents the manure from flowing downhill toward the nearest stream.

Table 1. St. Croix County BMP Summary

BMP	Name	Unit	Amount	State Cost[7]	Average Cost Share/Unit
MR	Streambank Rip-rapping	FEET	9029	$170,051	$18.83
M2	Grade Stabilization Structure	NUMBER	4	$49,158	$12,290
UR	Urban Best Management Practices	NUMBER	1	$123,900	$123,900
C5	Grassed Waterways	ACRES	28.82	$82,698	$2,869
M5	Nutrient Management Planning	ACRES	26,108	$136,424	$5.23
M1	Critical Area Stabilization	ACRES	35.2	$36,521	$1,038
L2	Manure Storage Facility	NUMBER	3	$79,690	$26,563
MC	Stream Crossing	NUMBER	2	$2,976	$1,488
L5	Rotational Grazing	ACRES	0	$0	
M4	Agricultural Sediment Basin	NUMBER	2	$34,021	$17,011
M9	Well Abandonment	NUMBER	1	$459	$459
L3	Livestock Fencing	FEET	3030	$4,069	$1.34
C2	Contour & Field Stripcropping	ACRES	0	$0	
C3	Field Diversions	FEET	200	$63	$0.32
L1	Barnyard Runoff Management	NUMBER	7	$85,974	$12,282
M6	Pesticide Management	ACRES	8108	$28,372	$3.50
C10	Green Manure Crop	ACRES	3018	$74,184	$24.58
E18	DNR Easement	NUMBER	1	$39,900	$39,900
MS	Streambank Shaping and Seeding	FEET	6187	$6,894	$1.11
MO	Other Shoreline Protection	NUMBER	1	$4,618	$4,618
MF	Streambank Fencing	FEET	2720	$2,246	$0.83
				$962,218.00	

DNR Conservation Easement

A 17-acre conservation easement was acquired using watershed project funding through collaborative arrangements with the Kinnickinnic River Land Trust (KRLT) and St. Croix County. This land, known as the DorWes Farms Easement, is in the headwaters area of the Kinnickinnic River. It contains wetlands and springs that contribute to the high water quality of the river. The land is also in close proximity to the Kinnickinnic River State Fishery Area. Upland best management practices, CREP buffers, and a purchased KRLT easement on an adjoining 23 acres assure perpetual protection to the area.

Installation of best management practices continued in the watershed since the closure of the priority watershed project. Installed practices from 2011-2015 in St. Croix County:

Well abandonment (5)
Critical area stabilization (1, 0.5 acres)
Nutrient management plans (2,475 acres)
Grassed waterways (4, 3.9 acres)

[7] The state generally provided 50-70% of the cost of a practice. Remaining costs were usually paid by the landowner or operator.

Pierce County

The original grant award for this project to Pierce County was $917,000 with about $1 million actually spent over the course of the project implementation.

Table 2. Pierce County BMP Summary

BMP	Name	Unit	Amount	State Cost[8]	Average Cost Share/Unit
MR	Streambank Rip-rapping	FEET	8254	$254,705	$31
M2	Grade Stabilization Structure	NUMBER	48	$217,643	$4,534
UR	Urban Best Management Practices	NUMBER	14	$131,769	$9,412
C5	Grassed Waterways	ACRES	57	$65,326	$1,146
M5	Nutrient Management Planning	ACRES	9778	$48,384	$5
M1	Critical Area Stabilization	ACRES	35	$48,262	$1,342
L2	Manure Storage Facility	NUMBER	2	$53,411	$26,705
MC	Stream Crossing	NUMBER	4	$7,974	$1,994
L5	Rotational Grazing	ACRES	88	$6,156	$70
M4	Agricultural Sediment Basin	NUMBER	1	$4,200	$4,200
M9	Well Abandonment	NUMBER	9	$3,676	$408
L3	Livestock Fencing	FEET	1000	$3,350	$3.35
C2	Contour & Field Stripcropping	ACRES	400	$388	$0.97
C3	Field Diversions	FEET	1600	$2,532	$1.58
L1	Barnyard Runoff Management[2]	NUMBER	1	$2,372	$2,372
M6	Pesticide Management	ACRES	0		
				$850,148.00	$24.58

Installation of best management practices continued in the watershed since the closure of the priority watershed project. Installed practices from 2011-2015 in Pierce County:

Grassed waterways: 14.7 acres
Critical area treatment: 6.9 acres
Roof runoff system: 1 facility
Nutrient management plans developed: 1629.1 acres

8 The state generally provided 50-70% of the cost of a practice. Remaining costs were usually paid by the landowner or operator.

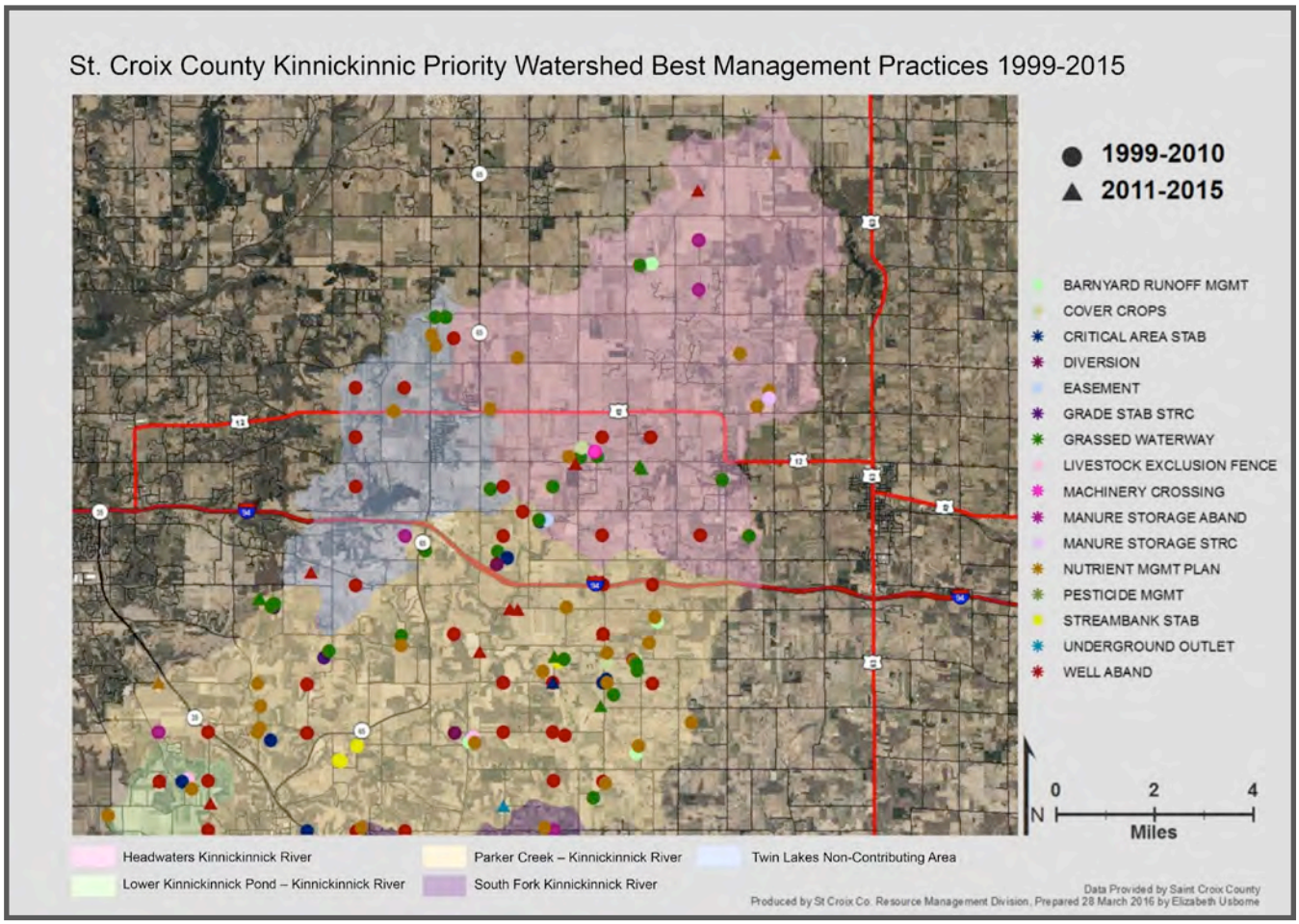


Figure 10. St. Croix County Map of Installed Best Management Practices (1999-2015)

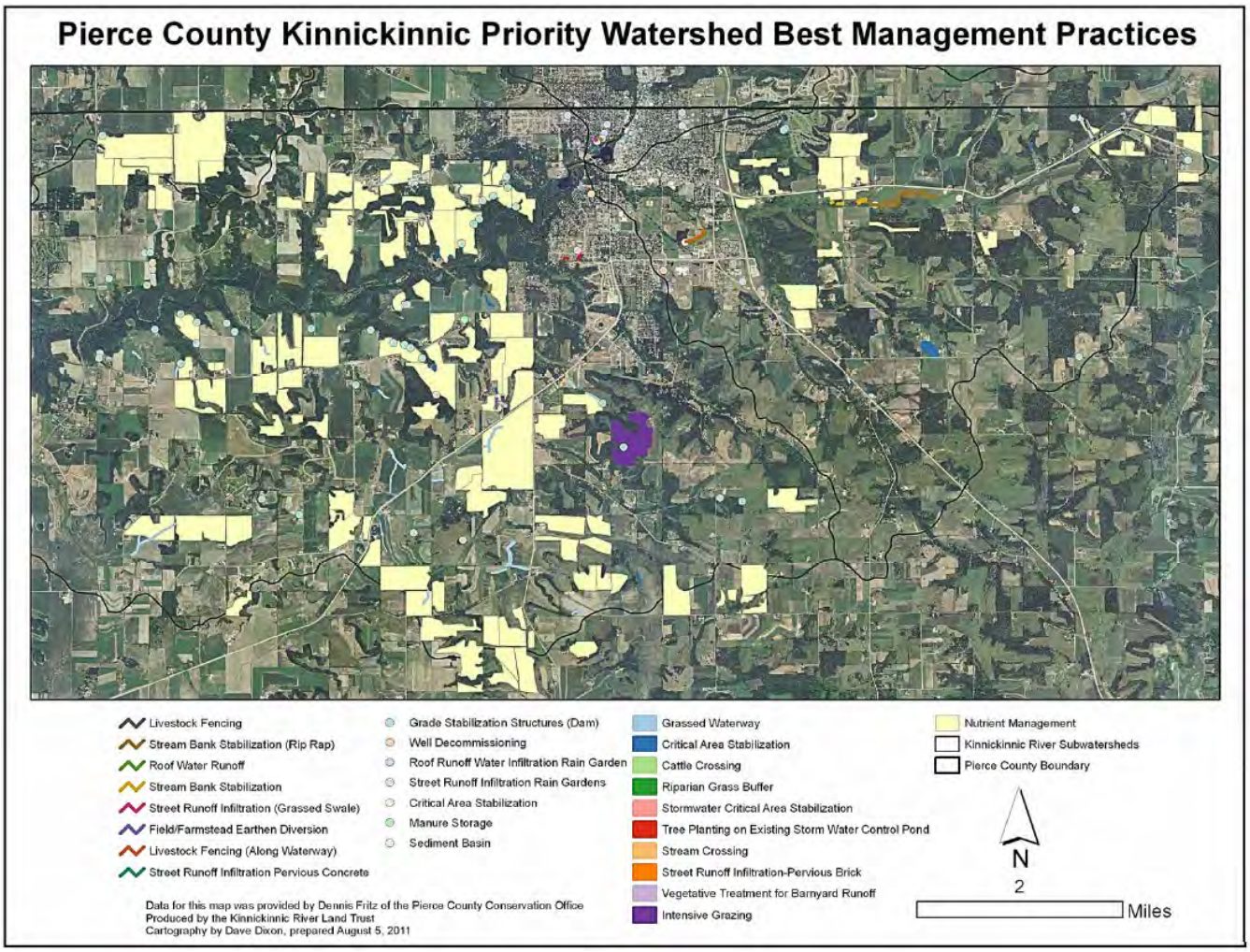


Figure 11. Pierce County Map of Installed Best Management Practices (1999-2011)

Critical Sites Addressed

DEFINITION: CRITICAL MANAGEMENT CATEGORY[9]

When a site is designated as "critical", it is an indication that controlling the source of pollution is essential for meeting water quality objectives for the project. Critical nonpoint sources contribute a significant amount of the pollutants impacting surface waters. These sources were eligible for funding and technical assistance through the priority watershed project. Landowners with critical sites were required, by law, to address those sites by reducing the nonpoint source pollutant load to an acceptable level.

Critical site information below is applicable to both St. Croix and Pierce counties.

Barnyard Runoff

Critical Site Criteria: > 20,000 pounds of COD (Chemical Oxygen Demand) annually
Number Meeting Criteria: 2
Controlled: 2 (not funded from priority watershed program)

Cropland Sediment

Criteria: Sediment delivery ≥ 0.9 Tons/acre/year and sediment loss exceeding "T".
Acres Meeting Criteria: 997 (WINHUSLE modeling)
Acres Controlled: 997 (RUSLE2 modeling – due to changes in modeling method)

Cropped or Pastured Dry Runs

Criteria: Cropped or pastured and 1,700 feet or more in length
Number Meeting Criteria: 4
Controlled: 4 (all removed from list because no delivery to surface water with re-evaluation)

Streambank Erosion

Criteria: Erosion rate > 10 Tons/year, caused by animal access or landowner management practices
Number Meeting Criteria: 10
Controlled: 10

Table 3. Critical Sites Summary

Category	Inventoried	Controlled	Remaining
Barnyards	2	2	0
Cropland Sediment (Acres)	997	997	0
Cropped or Pastured Dry Runs	4	4	0
Streambank Erosion Sites	10	10	0

Source: County Annual Accomplishment Reports

9 Wisconsin Department of Natural Resources, et. al. Nonpoint Source Control Plan for the Kinnickinnic River Priority Watershed Project. April 1999.

Local Assistance Grant Expenditures for Staffing and Planning

The Wisconsin DNR nonpoint program provided $639,213 of Local Assistance Grant (LAG) funds for the planning and implementation of the Kinnickinnic River project. St. Croix County, which covered 70.3% of the watershed area, received about 55% of these funds.

Pierce County maintained at least one staff person dedicated to implementing the watershed project and Natural Resource Conservation Service (NRCS) EQIP contracts for the Kinnickinnic River watershed during watershed project implementation. Prior to 2001, local assistance grant (LAG) expenditures for the watershed project in Pierce County totaled approximately $192,000 (30% of the LAG funds for the entire watershed). These grants supported one staff position, which provided the necessary technical support and information and educational programming. In 2001, DNR LAG grants were incorporated into a Department of Agriculture, Trade, and Consumer Protection (DATCP) local assistance program that used a formula to provide staffing grants to counties. On paper, Pierce County did not allot these assistance dollars to the watershed technical staff member, but by offsetting costs of other office staff, grant dollars helped to maintain the watershed technical position.

The City of River Falls received about 15% of the early LAG funds. River Falls conducted sediment loading and thermal warming studies. These studies provided the technical basis for the storm water management and erosion control ordinances developed using LAG funds.

Pollutant Reduction: Objectives & Results

Pollutant inventories and reductions are reported for the entire rural area of the watershed in Table 6, 7 and 8 on the following page. These charts illustrate the difficulty of reporting sediment and phosphorus reduction in a watershed with the implementation of BMPs. The bulk of the sediment delivery was from cropland in the original inventory. However, the model used to calculate sediment delivery from cropland, WINHUSLE, was not Y2K compliant, and therefore not useable during the entire implementation period. The impact of cropland nutrient management planning, which was very successful in the watershed, was tracked by soil loss rather than sediment delivery to a water body. Resulting load reductions were not comparable to the original inventory as a result. Comparing inventoried loads from streambanks and dry runs also presents challenges. BMP tracking shows reductions greater than the original inventoried load because additional sites were identified during the implementation process.

Sediment

Table 4. Watershed Sediment Reduction Objectives and Accomplishments

Source	Inventoried Load (T/yr)	Planned Reduction (%)	Reduction Goal (T/yr)	St. Croix Reduction Tracked (T/yr)	Pierce Reduction Tracked	Remaining
Cropland[13]	16,824	25%	4,206	909	402	1,311
Streambank[14]	600	60%	360	1,096	3,383	4,479
Dry Runs[15]	988	30%	395	101	2,090	2,191
Urban Runoff	1,223	35%	428			
Construction Sites[16]	720	70%	504			
Overall	20,355	30%	5,893			

Table 5. Cropland Soil Loss Reduction Tracked (from Nutrient Management Planning)

Acres Planned St. Croix	St. Croix Soil Loss Reduction Tracked (T/yr)	Acres Planned Pierce	Pierce Soil Loss Reduction Tracked (T/yr)	TOTAL Reduction Tracked (T/yr)	Inventoried Ave. Ton Sediment delivery/Ton Soil Loss	Estimated Sediment Delivery Reduction
26,108	11,364	9,778	5,026	16,390	.08	1,311

13 In the planning process, cropland sediment delivery was calculated using USLE and hydrology data in the FOCS WINHU-SLE model. Tracked cropland soil loss reduction loads included all planned acres multiplied by a constant (See Table 7); measured waterway erosion volumes that were eliminated; and measured sediment loads from repaired critical area grading and seeding sites. The average sediment delivery from the original inventory was then used to estimate resulting reductions in sediment delivery for cropland.

14 Tracked stream bank loads were entirely in the South Fork. Loads were based on visible bank wasting. Additional eroding streambanks not identified in the original inventory were found and corrected during watershed project implementation. This resulted in reduction numbers that are higher than the original inventory. Bank height times length times an average of one foot of lateral movement was used for actual load reduction. The plan used an average of three pounds of soil loss per running foot of stream for developing the inventory load.

15 Additional dry runs not identified in the original inventory were found and corrected during watershed project implementation. Tracked reduction in dry runs is mostly attributed to the number of grade stabilization structures constructed in channels times a constant. Technical staff viewed dry run and gully erosion as similar in application in the field. Several intermittent channels were grassed and reported as meeting waterway goals. Most of the dry run work was on channelized flow of runoff water.

16 No mechanism was outlined in the plan for the tracking of urban runoff and construction site erosion goals. In the City of River Falls, all developments followed the new stormwater ordinance. River Falls tracks sediment reduction as part of their MS4 permit requirements. Construction sites within the city applied erosion controls on building sites. In the rural area, all conservation construction sites were seeded and mulched within 2 or 3 days of the construction start. One rural site required a written erosion control plan with sediment basins, silt fence, and erosion mats.

Phosphorus

Table 6. Phosphorus Reduction Objectives and Accomplishments

Source	Inventoried Load (lb/yr)	Planned Reduction (%)	Reduction Goal (lb/yr)	St. Croix Reduction Tracked (lb/yr)	Pierce Reduction Tracked (lb/yr)	TOTAL Tracked Reduction (lb/yr)
Barnyards[1]	3,885	35	1,360	1,865	246	2,111
Cropland[2]	16,400	25	4,100	NA[17]	NA	NA
Overall	20,285	NA	5,460	1,865	246	2,111

1 Barnyard changes account for some barnyards no longer present and others not originally included in the inventory.
2 Area inventoried is about 73,000 acres of cropland in the watershed. Acres planned included NRCS EQIP contracts in addition to those funded through the priority watershed program. A mechanism for tracking phosphorus application on crop fields was not defined before nutrient management planning (NMP) began, so phosphorus reduction from NMP is not tracked. Nutrient management plan soil test recommendations adjusted phosphorus rates to actual needs, and the phosphorus management strategies were tied to soil test values. Also, all nutrient management plans developed recommended using lime to adjust PH to optimum conditions.

Phosphorus and Sediment Reductions Tracked 2011-2015

Practices installed since 2011 have resulted in additional phosphorus and sediment reductions in the Kinnickinnic River watershed.

Table 7. Watershed Sediment Reduction (2011-2015)

Source	Inventoried Load (lb/yr)	Planned Reduction (%)	Reduction Goal (lb/yr)
Grassed Waterway	224.5	NA[18]	224.5
Nutrient Management	NA	NA	NA
Overall	224.5	NA	224.5

Table 8. Phosphorus Reduction (2011-2015)

Source	Inventoried Load (lb/yr)	Planned Reduction (%)	Reduction Goal (lb/yr)
Grassed Waterway	131.6	NA	131.6
Nutrient Management	350.3	NA	350.3
Overall	481.9	NA	481.9

17 NA = Not Available
18 NA = Not Available

Information & Education

St. Croix County

- Nutrient management planning one-on-one with agricultural producers and user group meetings
- Presentations to area grade school and high schools
- "Biology of Kinni" River Falls High School course
- Steering committee meetings
- Presentations to UW-River Falls Resource Management Club
- Kinni-Karetaker educational program
- Conservation Awards Banquet – Kinni Farmer of the Year
- Annual participation in county fair
- Annual participation in Farm City Day
- Annual St. Croix County native plants sale
- Watershed tours
- Well water testing

Pierce County

- Information mailings to watershed residents
- Steering committee meetings
- Reports to local newspapers and county newsletters
- Nutrient Management Planning one-on-one with agricultural producers and user group meetings
- Presentations to area grade school and high schools
- Presentations to UW-River Falls Resource Management Club
- Conservation Awards Banquet-Kinnickinnic Farmer of the Year
- Annual participation in county fair
- Watershed tours
- Annual letters to eligible landowners

Ordinance/Policy Development

Several county ordinances were developed and amended during the priority watershed project. State regulation NR 151 began in 2002. It included animal waste prohibitions for agriculture and stormwater permitting requirements.

St. Croix County

- Animal Waste – Adopted 1985, amended 2008
- Shoreland Zoning – Adopted 1985, amended 2009
- Non Metallic Mining – Adopted 1992, amended 2007
- Subdivision Ordinance – Adopted 2005

Pierce County

- Animal Waste Storage Ordinance(1990)
- Shoreland Zoning (1990)
- Non Metallic Mining (2001)
- Erosion & Stormwater Control (2005)


Whole Earth
GROCERY • COMMUNITY
WHOLE EARTH GROCERY
Grateful Bread
Bakery
Deli
Cafe
South Fork Cafe
Coca-Cola

URBAN PROJECT ACCOMPLISHMENTS

The cities of River Falls and Prescott, and the villages of Hammond and Roberts comprise about 7,000 urban acres. The City of River Falls straddles the Kinnickinnic River at the center of its watershed, and thermal impacts of development on the river are a major concern.

BMPs Installed with Priority Watershed Funding

Urban BMPs installed with priority watershed funding are listed along with other county-installed projects in Table 3 and Table 4. One BMP was installed in St. Croix County and 14 were installed in Pierce County.

Installed practices included:

- Grassed waterways
- Curb cuts
- Stormwater management systems
- Rain gardens
- Grade stabilization structures

Village of Roberts

The Village of Roberts used WDNR Urban Stormwater grants to develop stormwater management and wellhead protection plans and construction site erosion control and stormwater management ordinances during the time of the priority watershed project.

Plans

- Stormwater Management Plan (USP grant-2007)
- Wellhead Protection Plan (USP grant-2006)

Ordinances

- Construction Site Erosion Control Ordinance (USP grant-2006)
- Post Construction Stormwater Management Ordinances (USP grant- 2006)

Village of Hammond and City of Prescott

The WDNR reports that Hammond Waterworks and Prescott Waterworks have also completed Wellhead Protection Plans.[19]

19 http://dnr.wi.gov/topic/DrinkingWater/documents/WHP/Communities.pdf

PROJECT CHALLENGES/LESSONS LEARNED[20]

The priority watershed project was a collaboration of multiple partners including the citizens of the watershed, St. Croix and Pierce counties, local conservation groups, state and federal agencies, and others.

Landowner Participation

Participation in the initial inventory and installation of best management practices was strong from early to mid-way through the watershed project. This strong initial participation dropped off in later years. Staff changes also occurred during this time period. Consistent staff throughout a project is important to conservation practice participation, not only because of staff knowledge but also the importance of long-term relationships between farmers and staff.

Commodity prices also seem to influence interest in conservation practices. For example, when corn prices are high there may be less interest in installation of conservation practices.

Case Studies of Best Management Practice Installation

Parker Creek

Parker Creek is a tributary of the Kinnickinnic River east of River Falls. Native brook trout and stocked brown trout are present in the creek. The stream was degraded from sediment accumulation and cattle grazing resulting in a wide, shallow creek choked with tag alders. The trout stream restoration project involved purchasing fishing access easements from landowners, removing of brush and trees along the channel, placing rock and lunker structures to re-establish a deeper, narrower stream channel, and revegetating the streambank.

The project was funded by the priority watershed project and DNR Trout Stamp funds. Volunteers from Trout Unlimited assisted with project installation. The total project cost for 5,370 feet of stream was $190,000.

River Falls High School Demonstration Project

The priority watershed project supported a demonstration project at River Falls High School. The demonstration involved not only installation of a variety of best management practices, but also involvement of students and faculty from the Science Department and ongoing educational opportunities.

Best Management Practices Installed

- Irrigation/Pump Systems to irrigate athletic fields from detention basins
- Native Grass Planting
- Tree Planting
- Wetland Establishment
- Turf Management Plan

20 Personal Communications. Kyle Kulow, St. Croix County, June 2016 and Rod Webb, Pierce County, June 2016.
21 Wilcox, Dan. River Falls Journal. Exstream Makeover. May 2009.
22 River Falls High School Demonstration Project Proposal. Kinnickinnic River Priority Watershed Project. 2000.

Educational Components

- Monitoring/Stream Ecology Equipment
- Signage
- Field Days

Signage highlighted native plantings, roof design, detention basin and the irrigation system. Monitoring equipment allowed the students to track the effectiveness of various installed practices. The field day show-cased the project to community officials and school district residents.

Critical Sites

All identified critical sites were showcased in this project.

Sediment Reduction

The watershed project successfully addressed and even exceeded goals related to advancing head cuts, gullied waterways, and massive stream bank wasting. Nutrient management plan development addressed both sediment and nutrient reductions from crop fields. (Pierce Report)

Ongoing sediment loading with "tolerable" soil loss

The project failed to adequately address the sediment transport systems that consistently load the river system with an excessive sediment bed load. Sheet erosion in the watershed was addressed through farm crop field plans. Allowing an acceptable (or "tolerable") four tons of sheet erosion per acre to move about over 73,000 acres of cropland starts sediment transport problems. If only 5% of this mobile sheet erosion soil load reaches an active waterway or water course, the potential for 14,600 tons of soil to erode into the sediment transport system can occur. Once in the transport system, this soil moves toward the river with each successive runoff event, or each day in the case of channels with base flow. The South Fork of the Kinnickinnic River is a perfect example of a soil transport channel that is choked with many years of sediment from sheet erosion that results from erosion rates considered "tolerable" for conservation planning of cropland. (Pierce Report)

Better tools are needed to address sediment loading: buffers, treatment strips, reduced tillage

The watershed planning process was used to predict sediment loading to the river system. Goals were set for targeted fields. What was missing were the tools and expertise to implement effective treatments for these targeted fields. Buffers and treatment strips work well and a few were installed, but if used exclusively, they can become overloaded with sediment and become ineffective.
Gut feelings rather than specific standards were the design tool used to place buffers in riparian situations. Although there is a reasonable demand for hay or grass, long term hay rotations were not used often. Field reduced tillage options were utilized, but even this modified disturbance of the soil surface allows movement of soil. No till and zone till reduce the disturbance of the soil surface and this, in turn, reduces sheet erosion and sediment movement from the field. Any measurable improvements of reduced sediment loss were difficult to document lacking diligent observations and record keeping. (Pierce Report)

Several easements were driven by the Kinnickinnic River Land Trust. Easements can be complicated, expensive measures and have perpetual maintenance requirements. However, easements work well to protect the soil resource when retiring land where cropping results in high erosion rates and sediment delivery. Easements can also direct soil stewardship on land that has good crop production potential. For example, reduced tillage measures and/or conservation planning requirements can be

specified in an easement. Besides maintaining soil health, easements can also protect rural croplands from use changes such as residential or commercial developments. (Pierce Report)

Phosphorus Reduction

The challenge for phosphorus reduction was that tools were either not established or not practical to use for tracking pollutant load reductions. The lesson learned is that it is important to establish a means for tracking BMP installation and estimating pollutant load reductions at the outset of the project. Tracking BMP installation, estimating results, and reporting would be more effective with consistent methods and staff.

Information & Education

Significant information and education work was completed during the priority watershed project. However, resources for information and education tasks became increasingly limited in later years of the project.

Ordinance/Policy Development

While updates to county regulations during the priority watershed project resulted in strengthened resource protection, recent changes to state regulations stand to weaken this protection, especially in shoreland zoning.

Financial

Staffing: Pierce County

In conclusion, one of the biggest lessons learned is that a stable and adequate staff is essential for success. Over the length of this watershed project, Pierce County changed County Conservationists and Watershed Technicians eight times. For a 2-year period, the County Conservationist position was vacant. The learning curve for a watershed project could be 6 to 13 years. With such rapid turnover of staff, a lot of cohesion of the plan's elements was lost. Despite this, many needed land use practices were installed and continue to maintain good land use in the watershed. The problem now is that it is difficult to draw measureable conclusions in the fashion the plan envisioned. In the future, it is hoped that we can develop useable field inventories and successful measures to address fields and sites as the watershed plan outlined.

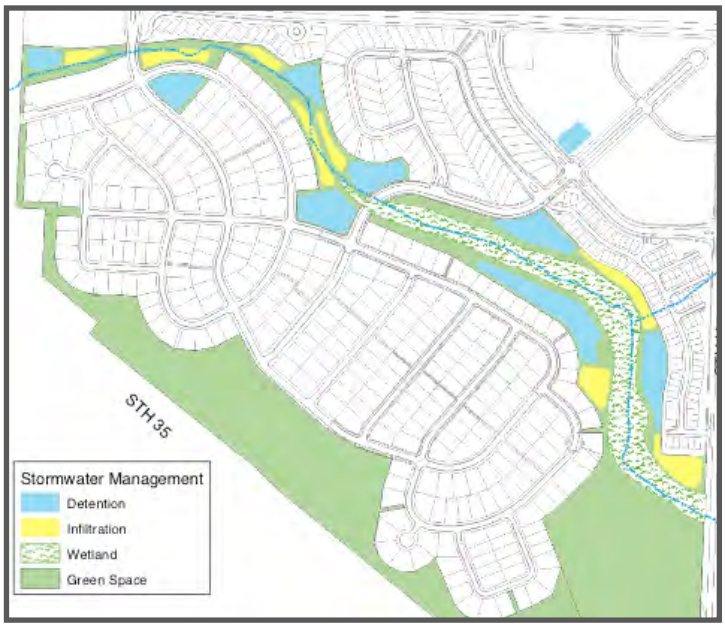
Project Management and Tracking

In 2011, the Pierce County Conservation Department is updating its five-year work plan. New tillage advancements, easements, and buffers will be stressed as conservation tools to compliment conservation practices traditionally used in Pierce County. In the county work plan, priorities will be directed toward crop field tillage practices in the Kinnickinnic River watershed and to sediment stabilization in the South Fork of the Kinnickinnic River. Pierce County will work cooperatively and energetically with all multi-agency St. Croix Basin team members to protect and enhance the land and river resources of the St. Croix River as well as other Class I and II coldwater streams in Pierce County.

THE CITY OF RIVER FALLS, WISCONSIN [23]

River Falls, Wisconsin, with a population of over 15,000, is what many people would classify as a small town. However, River Falls holds the distinction of being the largest city in Wisconsin that sits on a Class I trout stream; the Kinnickinnic River. Class I trout streams are high quality trout waters that have sufficient natural reproduction to sustain populations of wild trout, at or near carrying capacity. Consequently, streams in this category require no stocking of hatchery trout.

Located only 25 miles southeast of downtown St. Paul, Minnesota, River Falls is experiencing development pressures from the Minneapolis/St. Paul Metropolitan area that has the potential to degrade the physical and biological characteristics of the Kinnickinnic River and its tributaries. The Kinnickinnic River and its tributaries are a major natural amenity of the community. The City's leadership and dedication in protecting the Kinnickinnic River are an outstanding example of excellence in the public sector. Many of the City's efforts are made possible or enhanced by its ability to work collaboratively and in partnership with a diverse group of organizations who share a common vision of protecting the Kinnickinnic River from adverse effects of stormwater runoff. Although River Falls is a rather small community, it is often cited as leading in the area of progressive stormwater management.



Leadership

Stormwater Management Ordinance - A key issue for the City of River Falls was the need to update the City's stormwater management requirements to prevent impairment of the Kinnickinnic River from new developments. These efforts led the City Council to adopt a Stormwater Management Ordinance on April 9, 2002, which set forth stormwater management and erosion control standards applying to all land development activities. This ordinance was most recently updated in 2012 and will be updated again in 2016.

The first runoff of stormwater from impervious surfaces carries the pollutants typical of urban areas. Studies in the Midwest have shown that 90% of the average annual rainfall depth is produced from rains equal to or less than about one inch. Management practices designed for water quality control need to adequately treat these frequent, relatively small storms.

The City of River Falls chose a higher threshold in its Stormwater Ordinance. It requires infiltration of additional runoff generated by a 1.5 inch rainfall. Furthermore, before being accepted by the City, infiltration performance must be tested and shown to be twice that required by the ordinance. This safety factor is required to account for anticipated degradation in performance over time.

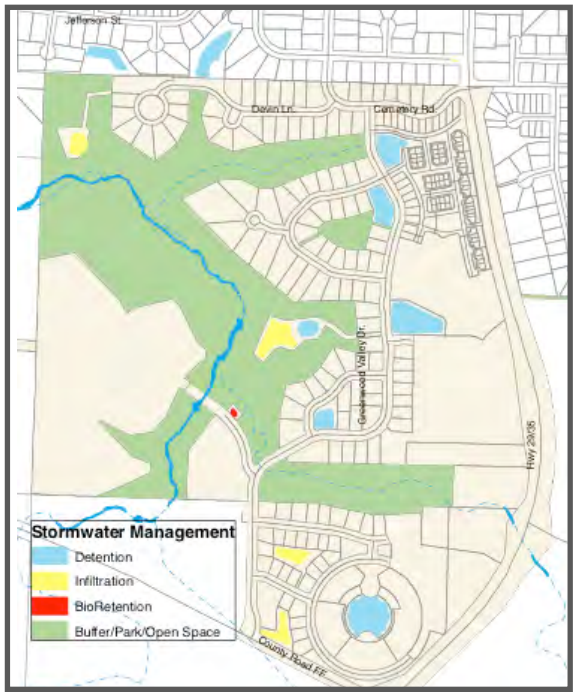
23 This section of the report is provided by the City of River Falls Engineering Department.

Since its adoption, this ordinance has proven to be workable in development situations ranging from the construction of small apartment buildings, to church additions, to 200-acre residential subdivisions. Based on critique and feedback from other professionals working to comply with the ordinance and the City's experience, changes have been implemented to the ordinance to make it more workable without compromising its ultimate purpose of resource protection.

While not noticeably different, the following are examples of projects developed since 2002 in accordance with these new requirements:

- Sterling Ponds
- S&C Bank
- WestConsin Credit Union
- Ezekiel Church
- Cascade Avenue Apartments
- City Hall
- Family Fresh
- Spring Creek Estates
- St. Bridget's Church

Stream Buffer Ordinance - In another related and important matter, the City amended its shoreland and floodplain protection regulations. This amendment created stream buffers along the Kinnickinnic River and its tributaries with setbacks greater than the State and County mandated minimum of 75 feet. In fact, the amended ordinance requires setbacks from the Kinnickinnic River ranging from 125 to 175 feet depending on the slope of land adjacent to the river. In some floodplain and wetland areas, the buffer extends beyond 175 feet, reaching distances exceeding 750 feet. This is because the ordinance requires a minimum 25 foot buffer from floodplains and wetlands. The new stream buffer regulations are based on a model ordinance from the Center for Watershed Protection. This regulation protects over 1,200 acres of shoreland immediately adjacent to the Kinnickinnic River and its tributaries, twice the amount protected under State and County setback codes.



Illicit Discharge Detection and Elimination Ordinance - In December 2007, the City of River Falls adopted an Illicit Discharge Detection and Elimination Ordinance as part of a program to develop, implement and enforce a program to detect and remove illicit connections and discharges to the MS4.

Regulations For Fertilizer Application - In April 2009, Governor Jim Doyle signed the Wisconsin Zero-Phosphorus Fertilizer Law. It took effect on April 1, 2010 and restricts the use, sale and display of lawn and turf fertilizer containing phosphorus.

Innovation

The City of River Falls has implemented a variety of innovative strategies involving stormwater management.

Lake George Area Stormwater Treatment Concept Plan

In 2003, the City led a diverse group of stakeholders in a study to analyze the stormwater runoff related benefits of reconfiguring Lake George. Lake George is an impoundment of the Kinnickinnic River formed behind a hydroelectric dam in downtown River Falls. The reconfiguration concept is to separate the cold, spring-fed, rapidly-flowing waters of the Kinnickinnic River from the warm, stagnant waters of Lake George. The study analyzed the benefits to the river of reconfiguring the isolated portion of the lake into a series of wetland treatment cells to treat the first flush of runoff from the highly impervious downtown area of the City. Furthermore, it analyzed the associated daily base flow benefits imparted on the river by the reconfiguration. Significant technical and scientific work was performed to convince stakeholders that this project, if constructed, will result in overall benefits to the Kinnickinnic River. This project, when constructed, will be unique in that thermal benefits to the river will be realized under base flow conditions as well as under stormwater runoff events. Benefits of the proposed project include improvements to hydrologic, thermal, sediment, phosphorous and biological regimes of the Kinnickinnic River.

On December 16, 2004, at a combined meeting of the Technical Advisory Committee and the Stakeholders Committee, there was consensus that a multi-pronged approach involving strategic execution of both end-of-the pipe and small scale/small site watershed management actions as well as reconfiguring Lake George and implementing a phased construction of interceptor pipes along the east side of the river was the best strategy to follow. In 2005, the Final Report of the Lake George Area Stormwater Treatment Concept Plan was endorsed by the Park Board, Plan Commission, and City Council, and Staff was encouraged to pursue funding opportunities for implementing the Plan.

In 2006, Governor Jim Doyle submitted the Lake George Reconfiguration Project for an EPA Targeted Watershed Grant in order to obtain funding for implementation. The City received letters of support from the following:

- Wisconsin Governor Jim Doyle
- Kinnickinnic Priority Watershed
- Kinnickinnic River Land Trust
- River Falls Chamber of Commerce
- Trout Unlimited
- University of Wisconsin – River Falls
- Wisconsin Department of Natural Resources

The grant application was not successful but the City has not given up on the project. It will be re-visited after completion of the Kinnickinnic River Corridor Plan.

Rainwater Garden Demonstration Project

In 2004, the City wanted to demonstrate the functionality and appearance of rainwater gardens so the City partnered with the Kinnickinnic River Land Trust (KRLT) on a rainwater garden demonstration project. The City received 27 responses from people who were interested in having the garden put in their yard. Potential sites were ranked based on proximity to the river, visibility, and amount of impervious surface draining to the garden. The City purchased all plantings for this project and furnished necessary equipment. Volunteers were organized by KRLT and planted the garden. The goal of the project is to have a local example to show citizens a practical and aesthetic way to help the water quality of the Kinnickinnic River.

Stormwater Management Area Delineation and Education

In 2005, the City began installing signs around stormwater management areas in order to prevent detrimental encroachments into the facility by neighbors and to educate people of the facilities' function. These signs were installed in conjunction with bluebird houses in order to promote wildlife and make the added signs more appealing.

West Side Stormwater Demonstration Project

This project stems out of the Lake George Area Study which suggested implementation of small scale infiltration practices on the west side of the Kinnickinnic River. As a follow up to that study and recommendation, the City, Trout Unlimited, Kinnickinnic River Land Trust, Kinnickinnic River Priority Watershed Project, Wisconsin Department of Natural Resources, and private property owners worked together to demonstrate small scale stormwater management practices. The City initiated planning for this project in 2006 and the project was bid and constructed in 2007.

Two similar watersheds were selected. Within one watershed, audits of private property were conducted, and private improvements to better manage stormwater were recommended. Furthermore, the City implemented practices to capture and treat roadway runoff within the right-of-way. The second watershed acts as a control watershed reflecting no improvements being made.

Flow monitors were installed in the discharge pipes for each watershed. Two years of pre-construction data was collected and were compared with post-construction data to determine effectiveness of the installed practices. Public practices that were installed include 3 rain gardens as well as the following:

Pervious Pavers are similar to regular pavers. However, the corners are cut off to create a void space or there are additional bumps along the sides of the pavers creating more void space between the pavers. These spaces are then filled with a granular rock material that allows water to flow through it into a storage layer below and eventually infiltrate into the ground. These were installed at the end of an alley to capture the runoff from the alley and the garages along it

Curb Bump Outs, where the curb line of the street was bumped out into the existing parking lane of the street, were installed in three locations. A curb cut provided in the gutter allows water into the bump out area where native, long-rooted grasses or plants promote in filtration.

Permeable Concrete allows the movement of water through the concrete material. For this demonstration project, a section of existing curb and gutter was removed on Walnut Street and replaced with a solid concrete curb and a permeable concrete gutter section. A trench filled with open graded rock below the porous gutter receives the water and then infiltrates it under the boulevard area.

Community Service

The City's leadership philosophy in regards to stormwater management promotes education and outreach. Examples of the City's various education and outreach efforts include:

Adopt-A Pond Program

The City has created an Adopt-A Pond Program whereby residents can volunteer to adopt stormwater management areas in the City. Adopters perform a spring and fall clean up each year where they pick up trash, branches and other debris that can be reached from shore. They also check for erosion around the pond and check the inlets and outlets for clogging. The volunteers report their activities on forms provided by the City that become part of the City's NPDES Phase II reporting.

Leadership River Falls

Stormwater management presentations and field trips (See Appendix B) are provided to Leadership River Falls classes and the group has adopted one of the City's stormwater ponds. Leadership River Falls is a training program that brings together existing, emerging and potential leaders from the area to address community needs, strengthen their individual leadership abilities and encourage participants to commit to assuming leadership roles in the community.

KinniFest - The City participated in "KinniFest: A Celebration of Our River," which aimed to create a better understanding of the Kinnickinnic River.

University of Wisconsin River Falls and River Falls School District - Stormwater management presentations are made in various land use and site planning classes at UW-River Falls. The City has also done presentations to students of all ages in the River Falls School District.

St. Croix Nutrient and Sediment Conference - The City has presented programs on stormwater management at the St. Croix Nutrient and Sediment Conference.

"Rain as a Resource" Bus Tour - The "Rain as a Resource" bus tour visited River Falls on Sept 15, 2005, and on August 12, 2008 to tour "innovative" stormwater practices sites that were considered low impact development. This tour was sponsored by the St. Croix Basin Partner Team, UW-River Falls, WisDNR, Minnesota Erosion Control Association, and Land and Water Conservation Departments.

Service Learning Award of Excellence - In 2003, UW-River Falls awarded the City of River Falls Engineering Department the "Service Learning Award of Excellence" for an agency, honoring them for their participation in projects that served the community and for its work with students majoring in land use planning.

Catch Basin Markers - The City instituted a stormwater catch basin marking program as a public education and outreach effort. Custom markers were ordered to remind people that the Catch Basin "DRAINS TO KINNI."

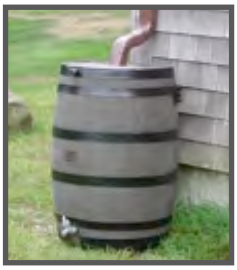
Civic Groups - The City has made numerous presentations regarding stormwater management to local civic groups, such as the River Falls Area Garden Club, Master Gardener's Group, Rotary Club, and Kiwanis.

Earth Day - The City participates in the St. Croix County Earth Day Celebration annually.

RFC-TV16 - With stormwater management as the topic, City staff have been the guest of numerous shows on local cable access RFC-TV16.

Rain to Rivers - The City participates in Rain to Rivers which involves several MS4 permitted municipalities sharing information, work and experience in the area of stormwater management.

Rain Barrel Rebate Program - The City of River Falls, in cooperation with River Falls Municipal Utilities, initiated a rain barrel rebate program providing 50% cash back, up to $30, for any rain barrel purchase. Rain barrels fabricated by St. Croix County Land and Water Conservation Department were sold at City Hall and at Kinnifest for $30 as part of this cooperative effort. River Falls Municipal Utilities promoted the program as a water conservation method whereas the City promoted it as a Stormwater runoff mitigation measure. The City sold 50 rain barrels and granted 28 rebates during the programs first year. The program has been very successful; the city has sold hundreds of rain barrels to residents.



City Website - The City Engineering Department maintains a website with stormwater related information and resources for residents to access. The website provides answers of frequently asked questions, information about various city projects, links to informational brochures, information about the rain barrel and Adopt A Pond program, and many other items.

Accountability

Stormwater pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, there is a nationwide permit program that controls water pollution by regulating pipes and channels that discharge stormwater and pollutants into surface waters. The Phase I of this program targeted cities with populations of 100,000 or more. Phase II of this program targeted cities with populations of 10,000 or more. The City of River Falls received its Phase II Permit October 1, 2006 and received a renewed permit in July 2014. UW-River Falls has their own Phase II permit; the City has signed an intergovernmental agreement with UW-River Falls in 2009 to work together on many of the requirements of these permits.

In most cases, the goal of the permit is to improve water quality, however the Kinnickinnic is a water resource where the water quality is already exceptional. In River Falls, our goal is to maintain this exceptional resource; this is done through 6, regulated, minimum control measures:

1. Public education and outreach.
2. Public participation and involvement.
3. Illicit discharge detection and elimination.
4. Construction site pollutant control
5. Post-construction stormwater management.
6. Pollution prevention/Good housekeeping.

At the end of every year, the City of River Falls conducts a Public Hearing and files an annual report documenting that year's compliance with its Phase II Permit. This information is available on the City's website.

LAKE ST. CROIX TMDL

Summary

The St. Croix River and Lake St. Croix are highly valued resources that provide exceptional recreational opportunities and support a highly diverse ecology of aquatic and terrestrial species. However, over the years eutrophication, or nutrient enrichment, has occurred in Lake St. Croix due to excess phosphorus loading. This loading drives nuisance algae blooms which diminish the enjoyment and use of the lake. The Lake St. Croix TMDL report represents an important step in the improvement of Lake St. Croix by focusing on establishing the needed reduction in phosphorus loading from its contributing basin in order to achieve water quality standards.

The federal Clean Water Act requires states to identify water bodies or stream segments that are not meeting state water quality standards and designated uses and place them on the USEPA impaired waters list. Once listed, the state is required to quantify the amount of a specific pollutant that a listed water body can receive without violating applicable water quality standards and to apportion that allowable load among the sources of the designated pollutant. The maximum allowable pollutant quantity is referred to as the Total Maximum Daily Load (TMDL). A TMDL is the sum of the allowable loads of a single pollutant from all contributing sources. Lake St. Croix was first listed on both the Minnesota and the Wisconsin 2008 303(d) Impaired Waters List due to eutrophication (excess phosphorus).

The primary components of the TMDL were largely based on the results of past lake and nutrient loading studies. The key outcomes of these studies and the TMDL are as follows:

- Lake St. Croix's total annual loading capacity needed to meet an in-lake total phosphorus water quality standard of 40µg/L is 360 metric tons/yr.
- The lake's "current" loading (using a 1990s baseline) is 460 metric tons/yr, meaning a 100 metric ton/yr reduction would be needed. However, this TMDL adopts a margin of safety and a reserve capacity which increases the needed load reduction to about 123 metric tons/yr. This equates to an overall needed phosphorus load reduction of 27 percent.

TMDL Goals for Kinnickinnic Watershed

The Lake St. Croix Basin TMDL Implementation Plan establishes phosphorus reduction goals first by source (urban area MS4 permits, permitted facilities such as wastewater treatment plants, land use such as agricultural) then by watershed and county. The Kinnickinnic River watershed was #6 of 25 watersheds in total watershed phosphorus loading and #1 of 25 in phosphorus loading per unit area (lb./acre). Over 80% of the loading is estimated to come from agricultural sources in the Kinnickinnic River watershed. An overall watershed phosphorus reduction of 37% is called for in rural areas in the TMDL report. The City of River Falls and UW River Falls have separate phosphorus reduction goals of 36% and 37% respectively. Even within city and university boundaries there is significant area of agricultural land. Phosphorus reduction goals are established with the early 1990s as the baseline where tracking of reductions begins.

Agricultural water quality impacts and phosphorus loading are dependent on animal manure handling, crop rotations, fertilizer application rates and practices (such as nutrient management), tillage practices, among other practices, in addition to precipitation frequency and intensity. Improvements will be needed in all of the farming practices listed above to lower the agricultural loading, especially in the watersheds with the highest loading such as the Apple, Kinnickinnic, Willow, Snake, and Sunrise.

TMDL Goals for Pierce & St. Croix Counties

The Implementation Plan for the Lake St. Croix Nutrient TMDL establishes phosphorus reduction goals for both Pierce and St. Croix County within the Kinnickinnic River Watershed.

The Kinnickinnic is one of four watersheds which drain to the St. Croix River in St. Croix County. The Kinnickinnic watershed reduction goal for the entire length of the project is 14,675 lbs./year. While a specific phosphorus reduction goal by 2020 is not stated, it is approximately 10,781 lbs./year.

The Kinnickinnic is the only watershed which drains to the St. Croix River in Pierce County, so the Kinni represents the entire county planned reduction. Two phosphorus reduction goals are stated in the report, the first: 5,500 lbs./year is an overall reduction goal for the entire length of the project. The second goal of 4,100 lbs./year is a phosphorus reduction goal through 2020.

The City of River Falls TMDL goal is to reduce annual phosphorus loading by 521 pounds. The City currently tracks sediment reduction for its MS4 permit. Phosphorus reductions will be modeled in 2016.

The UW River Falls TMDL goal is to reduce annual phosphorus loading by 52 pounds.

Table 9. Lake St. Croix TMDL Kinnickinnic Watershed Phosphorus Reduction Goals

Entity	2020 Goal	End of project
St. Croix County	10,781 lbs./year	14,675 lbs./year
Pierce County	4,100 lbs./year	5,500 lbs./year
City of River Falls		521 lbs./year
UW-River Falls		52 lbs./year

Kinnickinnic Priority Watershed Results for TMDL

Phosphorus reduction tracked through the implementation of the priority watershed project (1999-2010) totaled 2,111 pounds for both Pierce and St. Croix County. This reduction was from barnyards. Cost share agreement maintenance requirements for the best management practices installed in the priority watershed project generally last ten years.

St. Croix County: 1,865 lbs./year
Pierce County: 246 lbs./year

Remaining TMDL Goals for the Kinnickinnic Watershed

St. Croix County

Planned St. Croix County activities and projected reduction in phosphorus are reported countywide rather than by watershed, so plans and projected phosphorus reductions for the Kinnickinnic River watershed are not available.

Installation of best management practices continued in the watershed since the closure of the priority watershed project. Installed practices from 2011-2015 in St. Croix County:

Well abandonment (5)
Critical area stabilization (1, 0.5 acres)
Nutrient management plans (2, 475 acres)
Grassed waterways (4, 3.9 acres)

Pierce County

Installation of best management practices continued in the watershed since the closure of the priority watershed project. Installed practices from 2011-2015 in Pierce County:

Grassed waterways: 14.7 acres
Critical area treatment: 6.9 acres
Roof runoff system: 1 facility

Phosphorus reduction estimates from these practices are not yet available.

Pierce County estimated that 750 lbs. of phosphorus reduction could be achieved with a staffing budget of $80,000 and $250,000 for cost sharing from 2013-2016. In recent years, staffing available for the Kinnickinnic River watershed in Pierce County is about 15-20% of one FTE with actual cost sharing about $25,000/year.

Table 10. Kinnickinnic River Watershed Tracked Phosphorus Reduction (1999-2015)

Entity	2020 Goal	End of project
St. Croix County	10,781 lbs./year	14,675 lbs./year
Pierce County	4,100 lbs./year	5,500 lbs./year
City of River Falls		521 lbs./year
UW-River Falls		52 lbs./year

Implications for Future Kinnickinnic Watershed Planning & Management

It is important to note that while BMP tracking and resulting phosphorus reduction is the best information available to date, it is not equivalent to actual phosphorus loading reductions in the watershed. The location of the BMP installation relative to the water body impacts how much phosphorus was actually delivered prior to installation and therefore the actual loading reduction achieved. Most practices have spatially significant inputs (e.g. soil slope and type and distance from stream) which may not necessarily, be captured with BMP tracking. Factors outside of BMP installation such as changes in field crops planted, tillage methods, livestock numbers and even precipitation amounts and duration, also affect actual delivery of phosphorus to the Kinnickinnic River and Lake St. Croix. Voluntary BMPs may also be installed by producers and not tracked.[24]

Recommended Priorities for Installation

Best Management Practices

Data is not readily available to prioritize best management practice type or priority location. However, a SWAT[25] modeling effort is underway for the Kinnickinnic River Watershed. This work is sponsored by UW River Falls and funded by a USDA grant. It will be completed by the Science Museum of Minnesota in 2016 and 2017. Results may be used to help prioritize best management practice installation.

24 Center for Watershed Protection. Kinnickinnic River Watershed Plan: Phase 1. January 2013.
25 Soil and Water Assessment Tool, Texas A&M.

Location

Critical Source Areas (CSAs) are defined as portions of the landscape that combine high pollutant loading with a high propensity to deliver runoff to surface waters. These areas have a higher likelihood of conveying more pollutants to surface waters than other portions of the landscape. Priority Management Zones (PMZs) are regions of the watershed targeted for conservation practices that address disproportionate or large pollutant loads.[26]

Civic Engagement

Civic engagement is identified as a key strategy for restoring and protecting Lake St. Croix in the TMDL Implementation Plan. "Civic Engagement means making resourceful decisions and taking collective action on public issues through processes of public discussion, reflection and collaboration." 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. [27]

Farmer Led Council

A Farmer Led Council Project is underway in the Rocky Branch and South Fork tributaries of the Kinnickinnic River Watershed. Project objectives are to improve water quality through reduced phosphorus and sediment loading; to increase farmer knowledge about, and engagement with, water quality issues, including the adoption of conservation practices; to develop leadership around water quality among farmers; and to develop a unique collaborative model of water quality improvement through farmer engagement that can be replicated in watersheds throughout the Upper Mississippi River Basin and nationwide.

Phosphorus pollution reductions and the expansion of farm conservation activities will occur by way of an innovative, farmer-directed conservation incentives program. The farmers themselves determine the best paths to conservation success within their watershed, and recruit and encourage other farmers to participate. Pierce County Land Conservation Department staff and University of Wisconsin-Extension staff work closely with the farmer councils to provide technical assistance, facilitation, resource information and education, as well as monitor the project's outcomes.[28]

26 Minnesota Department of Agriculture. 2014 Final Project Report for Identifying Priority Management Zones for Best Management Practice Implementation in Impaired Watersheds.

27 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. February 2013.

28 Olmstead, Julia. UW-Extension. The St. Croix/Red Cedar River Basin Farmer-Led Watershed Council Project. May 2014.