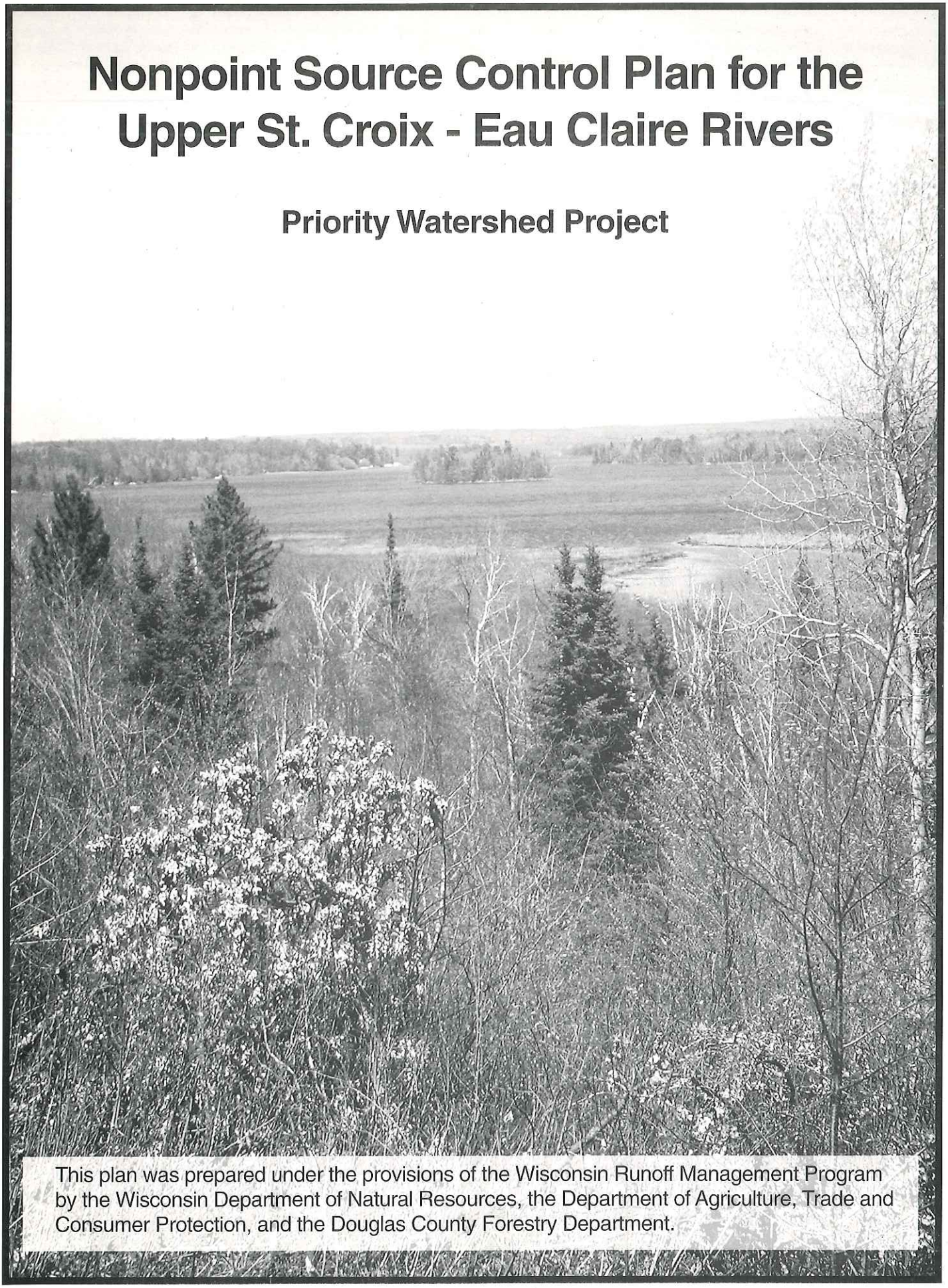
# Nonpoint Source Control Plan for the Upper St. Croix - Eau Claire Rivers

## Priority Watershed Project



This plan was prepared under the provisions of the Wisconsin Runoff Management Program by the Wisconsin Department of Natural Resources, the Department of Agriculture, Trade and Consumer Protection, and the Douglas County Forestry Department.

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# Nonpoint Source Control Plan for the Upper St. Croix - Eau Claire Rivers Priority Watershed Project

**The Wisconsin Nonpoint Source Water Pollution Abatement Program**

Plan Approved
June, 1997

**This Plan Was Cooperatively Prepared By:**

The Wisconsin Department of Natural Resources
Wisconsin Department of Agriculture, Trade and Consumer Protection
Douglas County Forestry Department
and
The Upper St. Croix- Eau Claire Rivers Watershed Partnership Group

**Publication WT-489-97**

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# List of Acronyms

| | |
|---|---|
| ACP | Agricultural Conservation Program |
| ABDI | Ashland, Barron, Douglas & Iron Counties Land Conservation Department |
| BARNY | Barnyard nutrient analysis model |
| BIM-GEO | DNR Bureau of Information Management-Geographical Unit |
| BMP | Best Management Practice |
| CAC | Citizen Advisory Committee |
| CFSA | Consolidated Farm Services Agency (United States Department of Agriculture) |
| COD | Chemical Oxygen Demand |
| CRP | Federal Cropland Reserve Program |
| CSA | Cost share agreement |
| DATCP | Wisconsin Department of Agriculture, Trade, and Consumer Protection |
| DILHR | Department of Industry, Labor, and Human Relations |
| DNR | Wisconsin Department of Natural Resources |
| FFA | Future Farmers of America |
| FOCS | Field Offices Computing System |
| FPP | Wisconsin Farmland Protection Program |
| FSA | Food Security Act |
| GW | Groundwater |
| I&E | Information and Education |
| LCC | Land Conservation Committee |
| LCD | Land Conservation Department |
| LWCB | Land and Water Conservation Board |
| NPM | Nutrient and Pest Management |
| NPS | Nonpoint Source |
| NRCS | Natural Resource Conservation Service |
| SHS | Wisconsin State Historical Society |
| SIP | Stewardship Incentive Program |
| SOS | Signs of Success monitoring program |
| USDA | United States Department of Agriculture |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| UWEX | University of Wisconsin-Extension |
| WGNHS | Wisconsin Geological and Natural History Survey |
| WINHUSLE | Sediment transfer model based on the Universal Soil Loss Equation |
| WPDES | Wisconsin Pollutant Discharge Elimination System [permit system] |
| WUWN | Wisconsin Unique Well Number assigned to well sample sites |

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

WISCONSIN
DEPT. OF NATURAL RESOURCES

George E. Meyer
Secretary

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
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June 3, 1997

IN REPLY REFER TO: 3200

Doug Finn, County Chairman
Douglas County Courthouse
1313 Belknap Street
Superior, WI 54880

Dear Mr. Finn: Doug

I am pleased to approve the Upper St. Croix - Eau Claire Rivers Priority Watershed Plan. This plan meets the intent and conditions of s. 281.65, Wisconsin Statutes, and Chapter NR 120, Wisconsin Administrative Code. This plan has been reviewed by the Department of Agriculture, Trade and Consumer Protection. This plan went before the Land and Water Conservation Board on June 3, 1997 and was approved at that time. My approval of the watershed plan completes the plan approval process as set forth in Wisconsin Statutes and allows the granting of funds through the Nonpoint Source Water Pollution Abatement Program. I am also approving the plan as an amendment to the St. Croix River Areawide Water Quality Management Plan.

I would like to express the Department's appreciation to the Douglas County staff and Partnership Group that participated in preparing this plan. We look forward to assisting Douglas County, the Partnership Steering Committee and other units of government in the watershed in the implementation of the Upper St. Croix - Eau Claire Rivers Priority Watershed Plan.

Sincerely,

George

Good luck on your project

George E. Meyer
Secretary

cc: Bill Smith, DNR Northern Region
Fran Barrett, Douglas County LCC Chairman
Paul Hlina, Douglas County Forestry Department
Steve Hanson, Douglas County Forestry Committee Chairman
Dave Epperly, Douglas County Forestry Department
Len Olson, DATCP
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# RESOLUTION #70-97
# RESOLUTION BY THE FOREST, PARKS AND RECREATION AND COMMITTEES

Subject: Upper St. Croix - Eau Claire Rivers Nonpoint Source Priority Watershed Plan

WHEREAS, the Upper St. Croix - Eau Claire Rivers Watershed was designated by the Department of Natural Resources in 1994 under the Wisconsin Nonpoint Source Water Pollution Abatement Program, and

WHEREAS, this project is a continuation of the Upper St. Croix - Eau Claire Rivers Watershed Project and complements the goals of improved water quality in the Upper St. Croix - Eau Claire Rivers Watershed, and

WHEREAS, the Douglas County Forestry and Land Conservation Departments, in cooperation with the Department of Natural Resources and the Department of Agriculture, Trade and Consumer Protection conducted a detailed inventory of the land use within the watershed in 1995 and 1996, and

WHEREAS, a number of public informational meetings have been conducted through the watershed, and an official public hearing was conducted on April 29, 1997, and

WHEREAS, pertinent public comments have been incorporated into the plan, and

WHEREAS, the county wishing to receive cost sharing grants for landowners in the watershed must first adopt the Upper St. Croix - Eau Claire Watershed Plan.

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the County of Douglas, that the Upper St. Croix - Eau Claire Rivers Watershed Nonpoint Source Priority Watershed Plan be adopted and the implementation of the plan begin as soon as possible.

BE IT FURTHER RESOLVED that the staff of 1.75, as recommended in the plan, be funded 100% by the State of Wisconsin and payment from the state for said staff will be reviewed on a yearly basis.

Dated this 15th day of May, 1997.

(Committee Action: Unanimous)
(Fiscal Note: Costs to the county for implementation of this watershed plan will be reimbursed at close to 100% by the state)

STATE OF WISCONSIN )
) SS:
COUNTY OF DOUGLAS )

I, Raymond H. Somerville, County Clerk in and for said County, do hereby certify that the above Resolution is a true and correct copy of a resolution adopted by the Douglas County Board of Supervisors at their meeting held on the 15th of May, 1997.

Raymond H. Somerville
County Clerk

"The St. Croix River, flowing out of St. Croix Lake, drains an area roughly 120 miles long by 50 miles wide. There are countless lakes and hundreds of fast flowing brooks which carry their clear cold waters to the larger streams, cutting the broad valley perpendicularly to its general pitch to the south. The earliest travelers commented on the beauty of this rolling country, the quantity and variety of the game which found refuge there, and the abundance of fish in the rivers and lakes."

- Henry Schoolcraft (1800)

"Clustered among the pines, firs, birches, and maples among the hill sides are the summer cottages hidden by deep foliage. Here, in a climate which gives buoyancy and vigor alike, to youth and old age, in early May come the city folks, tired and restless, to recuperate. They come from the "Twin Cities" on the Mississippi, the "Twin Ports" of Lake Superior, from Chicago, St. Louis, yes, from the Pacific and the Atlantic coasts and many points in between. And here they wile away the summer until the crisp air of September or October reminds them of work or other ties at home. Year after year finds the same tourists coming back for rejuvenation, and with them come new visitors attracted by the stories of peace and new found joys to be had in this northern clime with its tang of fir, and birch, balsam, and pine in the rarefied air of the high uplands of Wisconsin."

- C. H. Crownhart, 1925

# The Upper St. Croix - Eau Claire Rivers Priority Watershed

# Project Summary

## Introduction

The Wisconsin Land and Water Conservation Board selected the Upper St. Croix - Eau Claire Rivers Priority Watershed project in October 1994. The Wisconsin Nonpoint Source Water Pollution Abatement Program (NPS) was established by the Legislature in 1978 to improve and protect the water quality of streams, lakes, wetlands and groundwater by reducing pollutants from urban and rural sources. This plan was created to apply the NPS program to the Upper St. Croix - Eau Claire Rivers priority watershed, and is driven by 5 tenets:

* The Upper St. Croix and Eau Claire Rivers are not only significant in their own right, but are also critical headwaters to rivers of national significance.

* A partnership among stakeholder groups in the area will carry out and evaluate project goals during and following state priority watershed project funding.

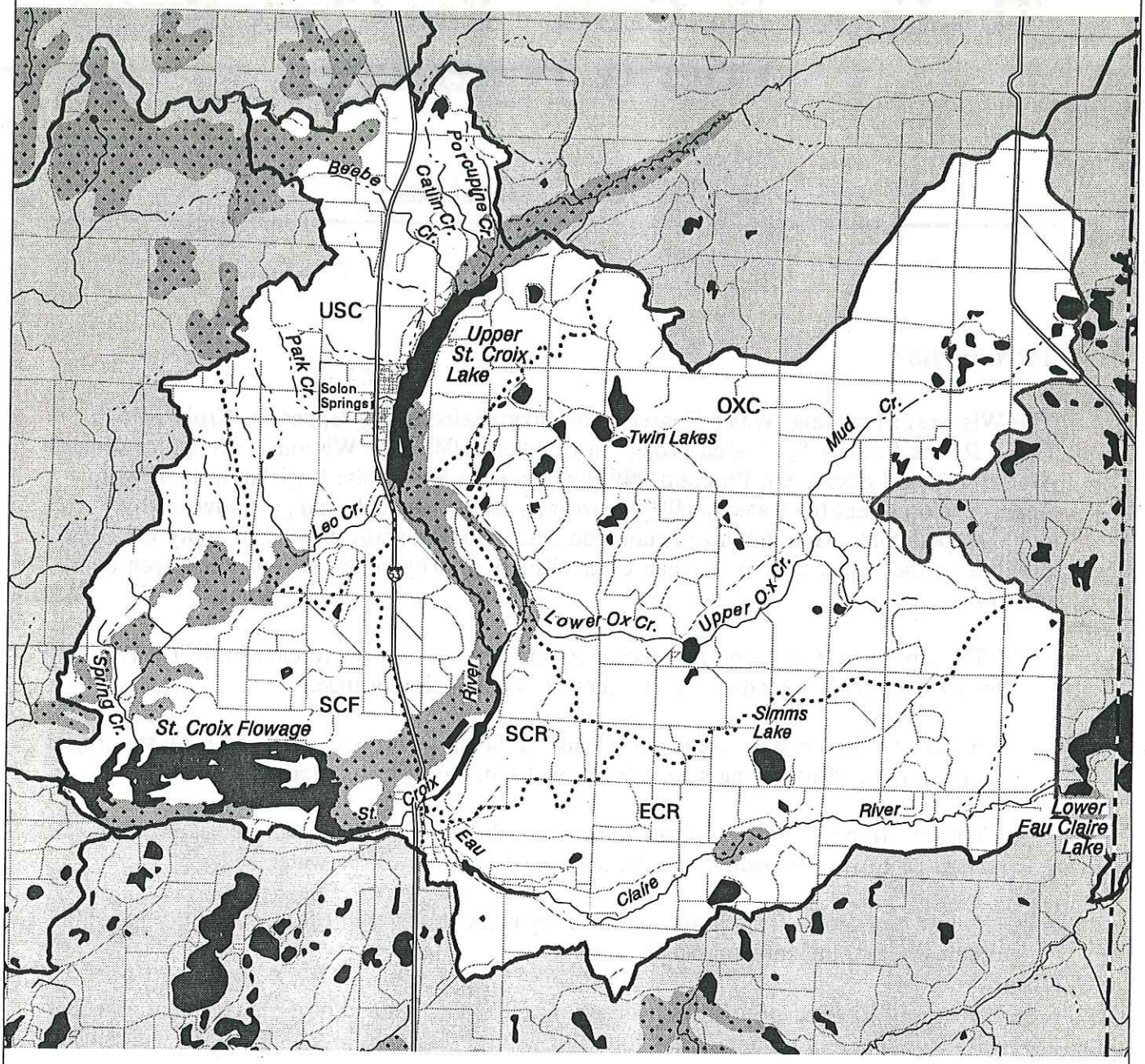
* Threats from uncontrolled development and the invasion of exotic species pose a serious risk to water quality and the biological integrity of the watershed.

* A low cost, cost-effective resource management strategy will protect healthy natural systems before they are degraded.

* The utilization of information, education, citizen action and best management practices can be effective in protecting the future of natural resources when combined with existing regulations.

The Upper St. Croix - Eau Claire Rivers Priority Watershed is at the headwaters of the St. Croix River and the Mississippi River system. The historical significance of this resource is well documented in many accounts referring to the beauty and abundance of this outstanding resource. The St. Croix River was designated in 1968 under the National Wild and Scenic Rivers Act as a Scenic Riverway, a national treasure to be protected for future generations.

# Map 1 The Upper St. Croix –Eau Claire Rivers Priority Watershed Project




Study Area

Subwatershed Codes and Names

SCF= St. Croix (Gordon) Flowage
OXC= Ox Creek
USC= Upper St. Croix Lake
ECR= Eau Claire River
SCR= St. Croix River

0 1 2 3 4 Miles

0 1 2 3 4 5 6 Kilometers

Scale 1:169,905

LEGEND

- Watershed Boundary
- Project Boundary
- Subproject Boundary
- Major Highway
- Local Roads
- Perennial Stream
- Intermittent Stream
- County Boundary
- Wetland
- Open Water
- Municipal Area

Wisconsin Department of Natural Resources
Watershed Management
October 1997

In 1988, the St. Croix River was designated as an **Outstanding Resource Water** by the State of Wisconsin.

The Upper St. Croix - Eau Claire Rivers watershed project has a protection orientation, as opposed to the more traditional remediation based watershed projects, and takes a proactive approach to prevent nonpoint pollution before it happens. The main land uses are forestry (85.4%) and rural and lakeshore non-farm communities (3.0%), not agriculture (1%) or urban uses (1.7%).

Significant local support for the watershed project comes from a variety of citizens who are interested in protecting this unique lake and river system from abuses. While many of the water resources in the watershed are of the highest quality, watershed residents recognize the potentially serious future threats to the watershed. A "Partnership Group" with a proactive philosophy for the watershed - "an ounce of prevention is worth a pound of cure" - has been formed and has been instrumental in the completion of this management plan.

## The "Partnership" Concept in the Upper St. Croix - Eau Claire Rivers Priority Watershed

The Partnership Agreement Model (Northwest Michigan RC & D Council, Inc., 1991)[1] empowers local people to take ownership in a project by setting priorities and managing activities. The Partnership Agreement Model has been used throughout this watershed's planning process, and ideally, the Partners will be closely involved with the implementation of the watershed plan as well. The theme of a Partnership Agreement is for diverse groups and citizens who have a stake in the future of the natural, social, and economic resources of the watershed, to join together and take responsibility for the success of the project. The integration of people, programs and resources around the common goal of long-term protection of the watershed is what the Partnership Agreement is all about. A schematic drawing can be found in Figure 1 depicting the relationships between support teams, citizens and Partners that makeup the Partnership.

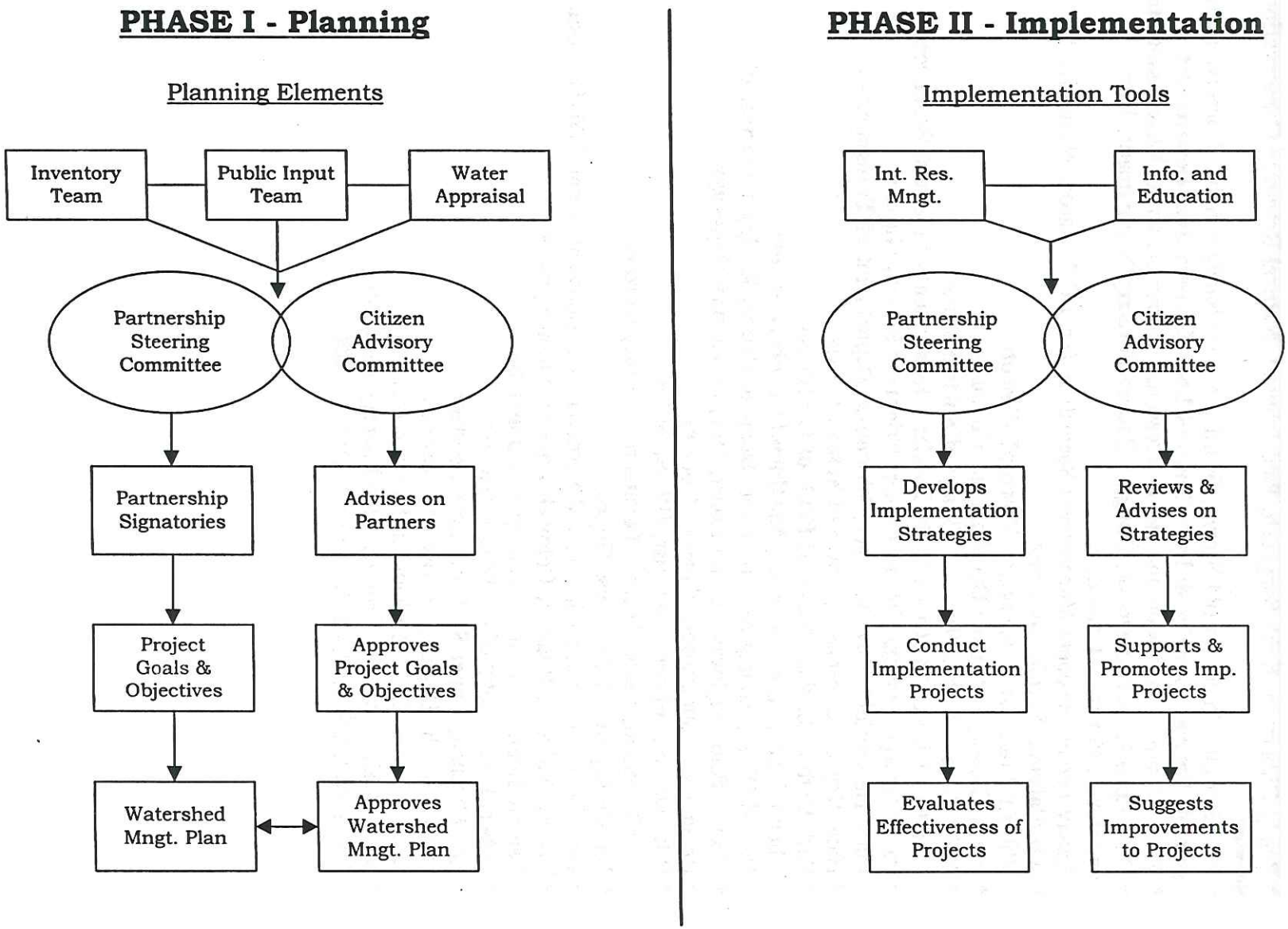
The Partnership Agreement model is not binding, but is meant to instill a sense of ownership in the watershed project and provides a quorum that is critical in gaining technical, political and financial assistance. By signing the "Partnership Agreement Document," the Partners recognize that the region's future quality of life and economic health are dependent on the protection and sustainability of the natural resources in the watershed. Most importantly, the Partnership Agreement sets the tone of balance between the health of the watershed and land uses, including growth and development. Those who sign the Partnership Agreement for the project will become the Partnership Steering Committee and will play a significant role in meeting the objectives of this plan.

---

[1]Northwest Michigan Resource Conservation & Development Council, Developing Partnership Agreements - A Process to Resolve Resource & Community Issues in the 1990's, Traverse City, Michigan, 1991.

In October 1996 the potential Partners came together as a loosely formed working group. The group developed a list of priority issues and concerns and developed the projects' goals and objectives. The group focused on identifying opportunities for protecting the water resources within the project. It is envisioned that within twelve to eighteen months of approval of this plan, more that 20 stakeholders will have committed to the Partnership. To date, 16 Partners have signed the "Partnership Agreement", including every municipality within the project boundaries. As this organization matures, it will aspire to become a Watershed Protection Association that will carry on well beyond the 8-year implementation phase of this project.

Figure 1 Partnership Agreement Model



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* Dave Epperly, Administrator, **Douglas County Forestry Department**; Jean Longnecker, **Forestry Committee**
* Randy Ferrin, Resident Management Specialist; Terry O'Hallaron, Naturalist; **St. Croix National Scenic Riverway**
* William Frahm Jr., Supervisor, **Town of Wascott**
* Frank Giesen, **Economic Development Commission**
* Todd Gilbert, Village Trustee, **Village of Solon Springs**
* John Gozdzialski, **St. Croix Basin Leader, Department of Natural Resources**
* Pat & George Gravens, Resort Owner, **Etienne's Resort, Gordon**
* Mark Herschfield, Env. Manager, **Wisconsin Department of Transportation**
* Hank Kryger, Supervisor, **Town of Solon Springs**
* Barb Defore, Banker, **National Bank of Commerce**
* Allen O'Leary, Env. Manager, **Northland Cranberries, Inc.**
* Harold Olson, Zoning Administrator, **Douglas County Zoning Department**
* George Palo, Highway Commissioner, **Douglas County Highways**
* Roger Postl, Supervisor, **Town of Gordon**
* Bill Swenson, Fishery Biologist, **UW-Superior**
* Ron Tuverson, Resort Owner, **Tuverson's Resort, Gordon**
* Jim Upthegrove, **U.S. Coast Guard**
* Geof Wendorf, Community Natural Resources Development Agent, **UW-Extension**
* Robert Williams, **Realtor, Coldwell Banker, Solon Springs**
* Lauren Sloan, resident, **ex-county board member**
* Robert Bruce, Lake of the Woods **resident**
* Lee Matchett, Upper St. Croix Lake **resident**
* Ludwig Koch, Upper St. Croix Lake **resident**
* Dave Krueger, St. Croix/Gordon Flowage **resident**
* Steve & Ester Alf, St. Croix/Gordon Flowage **residents**
* Jan & Walt Billie, Upper St. Croix Lake **residents**

## General Watershed Characteristics and Existing Water Quality Conditions

The Upper St. Croix - Eau Claire Rivers watershed encompasses 180.5 miles in south-central Douglas County. The Town of Gordon is located at the southern end of the watershed, and the Village of Solon Springs is at the northern end. The entire watershed area is widely known for its scenic beauty and numerous recreational opportunities. Five major water bodies are included in the watershed; the St. Croix (Gordon) Flowage, the St. Croix River, the Eau Claire River, Upper St. Croix Lake and Ox Creek. There are a total of 55 miles of streams, 31 named lakes and 66 unnamed lakes in the watershed. Thirteen of the fifteen streams in the watershed are Class I, II or III trout water. While several of the lakes have been mostly developed, the majority of the lakes in the watershed are classified as wild, and are primarily undeveloped.

The watershed is characterized by stratified sand and gravel outwash deposited by glacial melt-water systems. Most of the soil associations are characterized by well drained sandy and loamy sands, somewhat poorly drained sandy loams and very poorly drained organics. Topography is flat to gently rolling, with relatively high local relief along the Upper St. Croix and Eau Claire Rivers. The watershed is characterized by numerous closed depressional systems and seepage lakes throughout. Major land uses within the watershed include recreation, forestry and wildlife habitat.

The watershed is divided into five subwatersheds.

**Upper St. Croix Lake Subwatershed** - 23,585 acres, 36.9 sq miles. Designated an Outstanding Resource Water (ORW) in 1968. A Lake Association was formed in 1996. The lake has an excellent fishery and provides renowned recreational opportunities. A municipal sewage collection and treatment system has been installed and services most of the lakeshore. This lake exhibits some symptoms of eutrophication that are somewhat unexpected in a headwaters water body. Overall, water quality during the spring/summer is "good" to "very good." Late summer and fall water quality conditions range from "fair" to "poor." Heavy lakeshore development (>60%) has contributed pollutants such as sediment, phosphorus, pesticides and heavy metals to the lake through runoff. Shoreline vegetated buffer areas have been removed or altered because of development. The restoration of vegetated buffers in riparian areas will reduce nonpoint pollution by filtering runoff. The Shoreline Habitat Restoration Interim BMP[2] has been identified as a low cost and effective best management practice that will be a priority on this lake and throughout the watershed.

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[2]The Shoreline Habitat Restoration Interim BMP is currently being reviewed by the DNR's Watershed Management Section for its ability to protect water quality. Upon approval, the practice will be eligible for implementation in this watershed.

**Table 1 Land Uses in the Upper St. Croix - Eau Claire Rivers Priority Watershed**

| Land Uses | Acres | % of Use |
|---|---|---|
| | | |
| Agricultural | 1,187.9 | 1.0% |
| Developed - commercial | 793.7 | 0.7% |
| Developed - residential | 4,674.7 | 4.0% |
| Forest - County | 26,133.0 | 22.5% |
| Forest - Private | 33,298.0 | 28.5% |
| Forest - Productive | 30,008.0 | 25.7% |
| Forest - Misc. | 5,334.3 | 3.8% |
| Forest - State | 4,030.01 | 4.9% |
| Lakes | 4,398.5 | 3.7% |
| Rivers | 590.2 | 0.5% |
| Special Protective Use | 3,479.4 | 2.9% |
| Wetlands | 2,106.0 | 1.8% |
| | | |
| TOTAL | 115,505 | 100% |

* *These estimates are from the zoning classification system developed by Douglas County. Many of the forested acres and special protective use acres are wetland type lands as well.*

**St. Croix Flowage (a.k.a. Gordon Flowage) Subwatershed** - 18,085 acres, 28.3 sq miles. Ranked as having the best water quality of nine flowages studied by WDNR in 1995. A Flowage Association was formed in 1992. This 1,913-acre impoundment was created in 1937. The flowage is adjacent to more than 1,000 acres of wetland. Overall water quality is "very good" to "good." Most of the shoreline vegetation in the developed parts of the flowage (<7%) has been removed or altered. Visible increases in aquatic vegetation in recent years is a major concern of local residents and others who frequent the flowage. Similar to Upper St. Croix Lake Subwatershed, the restoration of vegetated buffers in riparian areas will reduce nonpoint pollution by filtering runoff. Use of the Shoreline Habitat Restoration Interim BMP will be a priority on this lake.

**St. Croix River Subwatershed** - 9,123 acres, 14.3 sq miles. The river is bordered by wetlands between the Upper St. Croix Lake outflow and the St. Croix Flowage. The river

lacks large, deep pools, which limits the number of predatory fish in this section of the river. The macroinvertabrate community in the river is in good condition. A commercial cranberry operation is located on this section of the river. Local citizens are concerned about the use of fertilizers and pesticides in the cranberry bogs. Implementing nutrient and pest management best management practices will be the primary focus of this subwatershed.

**Eau Claire River Subwatershed** - 21,686 acres, 33.8 sq miles. The Eau Claire River enters the St. Croix River just above the St. Croix Flowage. Most of the shoreline is currently well buffered by natural vegetation, however, increased human activity throughout the watershed poses serious threats to the river's water quality. Increasing the overhead vegetative cover within shoreline buffer areas could improve in-stream aquatic habitat. The installation of low cost BMPs for construction site erosion control from anticipated future development and maintenance of existing shoreline buffers are priorities for this subwatershed.

**Ox Creek Subwatershed** - 40,030 acres, 62.5 sq miles. The majority of both Upper Ox Creek and Lower Ox Creek is a Class II brook trout fishery. The water quality rating is generally "very good." Forestry and road maintenance practices are the greatest threat to the water quality in this subwatershed. Possible future development in this area could pose a serious threat to water quality if construction site erosion and shoreline vegetation aren't properly managed. The installation of low cost BMPs to alleviate these runoff sources is a priority in this subwatershed.

## Project Goals

*The goal of the Upper St. Croix - Eau Claire Rivers Watershed project is to enhance water quality by strengthening education and voluntary action, thus maintaining the biological integrity and natural character of the watershed.*

The Upper St. Croix - Eau Claire Rivers watershed project is unique due to its heavily forested land cover and generally pristine nature. The project is protection oriented, and planning for the project has been driven by a Partnership Group. Lake water quality, once degraded, is often difficult or impossible to fully restore. The protection orientation of this project will focus on the prevention of water pollution caused by existing and future land uses. This project will consider the ecosystem of the watershed, including fish and wildlife habitat and other natural functions. The watershed will focus on:

* **Nutrient reduction:** Nutrients are carried in runoff from developed riparian lots, roadways, and agricultural areas.

* **Reduction of erosion and sediment loading:** Sources of erosion and sediment loading include roads, developed riparian shoreline, forestry practices and agricultural practices.

* **Riparian Habitat Restoration:** Areas targeted for Riparian Habitat Restoration include developed riparian lots.

## Priority Issues

The project's Partnership Group, along with DNR staff, UW Extension, the Douglas County Forestry Department and the Ashland-Bayfield-Douglas-Iron-Counties (ABDI) Land Conservation Department identified priority issues to be addressed by the watershed project.

The issues that emerged as most important are:

1. Watershed related education programs and promotional activities.
2. Development and riparian management.
3. Road maintenance and construction activities.
4. Development of strong watershed management activities.

This early dialogue laid the groundwork for the following goals and management strategies.

**1) Educational Programs & Promotion:**

Goal: To educate the citizenry about water resource protection.

**2) Development and Riparian Management:**

Goal: To guide current and future development to optimize the water resources of the watershed.

**3) Road Maintenance and Construction:**

Goal: To control erosion during construction and maintenance activities.

**4) Development of strong watershed management activities:**

Goal: To have ample resources to conduct watershed management activities.

**5) Other Issues:**

In addition to the four priority issues identified above, two other issues were recognized as important.

**A. Forestry**

Goal: To prevent water quality degradation caused by forestry practices.

## B. Agriculture

Goal: To prevent water quality degradation caused by agricultural practices.

### Critical Sites and Their Impacts

Nonpoint source pollutant reduction in the Upper St. Croix - Eau Claire Rivers Watershed project will be achieved mainly through voluntary participation. However, state statutes require that the nonpoint source control plan contain the necessary language to ensure the reasonable likelihood of achieving water quality goals and objectives. Landowners with sites that meet the established critical site criteria are required by law to address those specific sites by reducing the nonpoint source pollution load to an acceptable level. Pollutant load reduction can occur solely through the action of the landowner with guidance from county staff or through watershed cost-sharing participation. Each identified critical site will be field verified before receiving notification as a critical site, with the findings sent to the DNR.

There are no sites in the watershed at this time that were shown to meet the critical site criteria developed for this project. As this watershed project is focused on *protection* of the resource, developing the criteria for possible critical sites can be considered a proactive management strategy. By working to protect water quality throughout the watershed, it is possible that critical sites may never become an issue.

Landowners interested in receiving cost-share assistance for installing best management practices will need to sign a cost-share agreement with the Douglas County Forestry Department.

<u>Shoreline Erosion Critical Sites</u>

* Human activities resulting in a visible lateral recession rate of 1 foot/year or more on the streambank or shoreline or erosion rates of more than 10/tons/acre/year.

Of the 293 shoreline lots inventoried on St. Croix Lake and St. Croix Flowage, zero (0) sites were shown to meet the critical site criteria.

<u>Road Maintenance and Construction Critical Sites</u>

* Sites over 5-acres in size delivering greater than 45 tons/sediment/year to surface waters are defined as critical sites.

Of the 180 road crossings near surface water that were inventoried (town roads, village gravel roads and abandoned forest roads) zero (0) sites were shown to meet the established critical site criteria.

Agricultural Critical Sites

* A site where livestock have unlimited access to surface waters and 50% or more of that site is non-vegetated and actively eroding.

Agriculture accounts for less than 1% of the land use in the watershed, and is considered to have minimal impacts on water quality. None of the agricultural sites in the watershed were shown to meet the critical site criteria.

## Management Activities and Project Implementation

Some of the lakes in the watershed are becoming intensely developed. With development comes many consequences such as alteration of wetlands, removal of shoreline vegetation, inadequate sewage treatment, construction site erosion, degradation of fish and wildlife habitat and exotic species introduction. Low-cost, effective management actions, demonstration projects and a comprehensive information and education program are intended to direct efforts toward the prevention of water pollution from existing and future land use activities. The following strategies have been endorsed by the Partnership Group and the Integrated Resource Management Team.

### Implementation Strategies

* The reduction of streambank and shoreline erosion - at least 25% on developed lots.
* The restoration and improvement of streambank and shoreline habitat - at least 25% on developed lots.
* The management of runoff.
* The management of agricultural shorelands.
* The improvement of nutrient and pest management on agricultural lands.
* Protection of the resource from the destructive impacts of exotic aquatic and plant species.
* Demonstration of proper road maintenance and construction practices.
* Demonstration of forestry best management practices.

### Landowner Eligibility

All owners of public and private land within the watershed are eligible to participate in the watershed project. Implementation is scheduled to begin in 1997 and continue for 8 years. Participating landowners will enter into agreements with the Douglas County Forestry Department to install best management practices on their property to reduce nonpoint source pollution. Project staff will work with landowners to develop water quality protection or habitat restoration plans for their property. These landowners will be eligible to enter into cost-share agreements.

## 1. Riparian Development and Management

Shoreline/streambank erosion

Priority will be given to the inventoried, eroding shorelines and streambanks on Upper St. Croix Lake, the St. Croix Flowage, the St. Croix River and the Eau Claire River. Approximately 7,000 feet of shoreline was found to be eroding at low to moderate rates on Upper St. Croix Lake and 5,300 feet was identified on the St. Croix Flowage.

Objectives:

1. Stabilize a minimum of 1,750 feet of shoreline on Upper St. Croix Lake.
2. Stabilize a minimum of 1,325 feet of shoreline on the St. Croix Flowage.

Shoreline/Streambank Habitat Restoration

All developed lots that do not meet the 1985 Douglas County Shoreland Zoning Ordinance for vegetative removal requirements will be eligible for cost sharing. Section 6.21 of the ordinance requires that no more than 30 feet in any 100 feet, as measured along the ordinary high water mark, may be clear cut to within 35 feet of the shoreline. The majority (85-90%) of the developed riparian lots in the watershed were built prior to 1985 and do not meet the minimum requirements of the current zoning ordinance.

Runoff Management on Riparian Lots

Eligibility will be determined by the project implementation team and project manager on a case-by-case basis during the site analysis. Selection criteria will include the slope of the site, placement, type and condition of existing vegetation, and the sites' impact on water quality.

## 2. Agricultural Practices

Streambank/Shoreline Erosion

Farms located throughout the watershed where livestock have unlimited access to streams will be eligible for cost-sharing. The length of streambank that the animals have access to will be reduced by 50%.

Nutrient and Pest Management

Project staff will assist all agricultural producers in the watershed in the development of farm plans. Information will be provided to farmers about crop rotation, agricultural shoreland management, nutrient and pest management and the proper handling and storage of manure. Agriculture makes up less than 1% of the total land use in the watershed.

### 3. Road Maintenance and Construction Best Management Practices

Town and County Roads

Three actively eroding sites will receive funding to install BMPs for erosion control demonstration projects in collaboration with the Douglas County Forestry Department, Land Conservation Department and each municipality in the watershed (Town of Gordon, Town of Solon Springs, Village of Solon Springs). These demonstration projects will provide an illustration of best management practices that can be used to address other eroding road sites in these municipalities.

The information and education component of the project will inform county and township road crews about the implementation of construction techniques that will protect surface waters. These crews will be encouraged to consult with Douglas County Forestry and Land Conservation Departments before beginning road maintenance and construction projects.

Forestry Roads

All newly constructed forest roads will be eligible for technical and design consultation from the Douglas County Forestry Department and Land Conservation Department. Cost-sharing will be provided for BMPs for closed forestry roads (Holaday, S., Wisconsin's Forestry Best Management Practices for Water Quality, Wisconsin Department of Natural Resources, 1995, pg 37.) and critical area seeding. These best management practices will only be available for abandoned logging roads where timber will not be sold throughout the 8-year operation and maintenance period for the BMPs.

### 4. Forestry Activities

Funding for best management practices for forestry activities are not cost-shared through the nonpoint source program, although they were identified by the Partnership Group as important. The Partners identified the following priority:

* Training in the implementation of forestry BMP's should be provided to at least 25% of the woodland owners and to at least 50% of the loggers and other timber crews in the watershed.

### Estimated Cost of Project Implementation

The Partnership Steering Committee in conjunction with the Douglas County Forestry Department will review and approve specific project plans and progress. They will continue to provide staff for the project and to report to the County Board of Supervisors. The Forestry Department is responsible for landowner contacts and cost-share agreements in cooperation with the ABDI Land Conservation Department, who will also provide conservation plans and technical assistance for BMP implementation.

**Table 2 Estimated Douglas County Staff Needs for 8-years of Project Implementation:**

| Activity | Staff Hours (based on 75% participation) |
|---|---|
| Project and Financial Management | 4,160 |
| Information and Education Program | 10,120 |
| Inventory and Planning | 3,000 |
| Practice Design and Installation | 4,000 |
| Upland Sediment Control | 967 |
| Streambank and Shoreline Management | 2,564 |
| Easements and Miscellaneous | 110 |
| Plan Revisions and Monitoring | 1,000 |
| Training | 480 |
| Total: | 26,401 |
| Estimated Staff Required per year | 1.75 |
| Hours per year | 3,696 |

Source: DNR, Douglas County Forestry Department and ABDI-LCD

**Table 3 Projected State Share of Project Costs at 75% Landowner Participation Rate:**

| Item | State Share of Costs |
|---|---|
| Cost-Share Funds: Practices | $299,450 |
| Cost-Share Funds: Easements | $10,000 |
| Local Assistance Staff Support* | $509,600 |
| Information/Education Direct | $80,000 |
| Other Direct (travel, supplies, etc.) | $60,000 |
| Engineering Assistance | $25,000 |
| * Salary + Indirect = $36,400/year Total | $984,050 |

Source: DNR and ABDI Counties Land Conservation Department

## Information and Education Program

The Douglas County Forestry Department will take lead responsibility for the implementation of the project's information and education (I&E) strategy. The Land Conservation Department, the University of Wisconsin Cooperative Extension (UW-EX), the Department of Natural Resources, (DNR), and the Natural Resources Conservation Service (NRCS) will provide assistance. The Upper St. Croix Lake Association, the St. Croix/Gordon Flowage Association, local units of government, The University of Wisconsin-Superior (Water-watch program), the St. Croix School District, the St. Croix National Scenic Riverway and the U.S. Coastguard have offered their support throughout the implementation of the I&E strategy.

An 8-year strategy has been outlined that identifies educational objectives, delivery systems, target audiences and frequency of occurrence. In addition, an annual I&E plan will be developed by the Partnership Steering Committee. These plans will include key messages and activities designed to communicate them. Evaluation of these activities, as well as an annual review of the overall I&E program, will be conducted on a regular basis.

The primary goal of the Information and Education Strategy is:

**To educate the citizenry about water resources protection.**

This goal will be reached through the following objectives:

1. To develop an information exchange between all partners and others interested in the watershed project.

2. To inform watershed residents about the goals of the watershed project by demonstrating best management practices (BMP's) that protect water resources.

3. To teach residents how to reduce their contributions to runoff pollution.

4. To recognize watershed residents for their participation in the watershed program.

5. To inform watershed visitors about how their personal actions affect the watershed.

6. To encourage local governments to adopt minimum standards for guiding growth and development.

7. To teach youth how their actions affect water resources and ways they can help protect them.

8. To involve students in water quality monitoring activities.

9. To provide learning activities for youth that instil an environmental ethic and respect for the outdoors.

10. To organize residents to protect the resource from the destructive impacts of exotic aquatic and plant species.

## Project Evaluation and Monitoring

The evaluation strategy for the project involves collecting, analyzing and reporting information to track progress in these areas:

1. **Partnership Agreement:** The capacity of the Partnership Agreement Model to be executed throughout the 8-year implementation period of the project will be the most important evaluation consideration in this watershed. The use of the Partnership Agreement Model can be considered successful when the citizens and groups who commit to the project as Partners remain involved in the protection of the watershed well into the future. At the first meeting of the Partnership Steering Committee, more specific evaluation criteria will be developed. These will be based on measuring the effectiveness of the project's information and education activities to affect real change in each landowner's lifestyle choices and in larger, local land use decisions that effect the entire region.

2. **Administrative:** This category includes the progress in providing technical and financial assistance to eligible landowners, and carrying out education activities identified in the plan. The Douglas County Forestry Department will track the progress in this area and report to the DNR and DATCP on a regular basis.

3. **Pollutant Reduction Levels:** This evaluation will be based on a pre- and post-survey of watershed residents regarding changes in land use practices. Repeated observations of relative size and number of sites impacting water quality will also be monitored.

4. **Water Resources:** The DNR will monitor changes in water quality, habitat, and water resources characteristics periodically during the project and at the end of the project.

# Partnership Agreement

## Upper St. Croix - Eau Claire Rivers Priority Watershed Project

This document serves as a partnership agreement between various units of government, private sector organizations, and education, business, economic development, and special interest groups that are interested in the future of the Upper St. Croix - Eau Claire Rivers Priority Watershed. The parties associated with this partnership are united through a mutual concern for the environmental integrity of the watershed. These partners recognize the importance of protecting water quality within the watershed for continued use by future generations. The region's quality of life and economic health are dependent on the maintenance and sustainability of the watershed's natural resources.

### Background

The Upper St. Croix - Eau Claire Rivers watershed is an area of scenic beauty and exists in a relatively unpolluted condition. It is an area of sandy outwash deposits from the last glacial period and is dominated by managed forests and significant wetland complexes used by waterfowl. The two dominant water bodies in the watershed are the 850.5-acre Upper St. Croix Lake and the 1,912-acre St. Croix Flowage. Both are important natural and recreational resources. The lake has received the designation of "Outstanding Resource Water" and the flowage has one of the highest water quality rankings in the state. Linkages between the watershed's resource base and the economic health and quality of life in the region is pervasive. Forestry, tourism and outdoor recreation are the leading activities that bring revenue to the area, and are fundamentally dependent on high quality water resources. This protection based project will serve as a "model" for future watershed projects.

### Shared Vision

To enhance water quality by strengthening education and voluntary action, thus maintaining the biological integrity and natural character of the Upper St. Croix - Eau Claire Rivers watershed.

### Action

We, the undersigned, considering the best interests of the water, natural resources and future growth of the region, mutually agree to remain involved with and informed about the Upper St. Croix - Eau Claire Rivers Watershed project. Coordination, planning, implementation and outreach are to be accomplished through the Partnership Steering Committee, composed of members who sign this Partnership Agreement. A watershed citizen advisory committee will review, advise and promote the activities of the Partnership Steering Committee.

Organization _____

Name & Title _____

Date _____

# CHAPTER ONE
# Purpose, Legal Status and General Description

## Wisconsin Nonpoint Source Water Pollution Abatement Program

The State Legislature created the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1978. The goal of the Program is to improve and protect the water quality of streams, lakes, wetlands, and groundwater by reducing pollutants from urban and rural nonpoint sources. The 180.5 square mile Upper St. Croix - Eau Claire Rivers Watershed, located in Douglas County, was designated a "priority watershed" in 1994. The primary objective of this project is to protect the water quality of the streams, groundwater and lakes in the watershed. The Upper St. Croix - Eau Claire Rivers Watershed is part of the St. Croix River Basin.

The surface waters within the watershed are of high quality and are important enough to merit special management efforts directed at protecting existing water quality and developing an effective strategy to deal with future threats before they become problematic. This watershed project is set apart from others in that it is heavily forested and dotted with pristine lakes and streams. The watershed is not heavily developed (<5%) and supports light agricultural activity. Presently, existing nonpoint sources of pollution in the watershed include: runoff from developed riparian areas on lakes, streams and urban areas, eroding gravel roads, erosion from forestry practices and runoff from agricultural practices. Pollutants from nonpoint sources are carried to the surface water or groundwater through rainfall runoff or seepage, and snowmelt.

The following is an overview of the Nonpoint Source (NPS) Priority Watershed Program:

- The Department of Natural Resources (DNR) administers the program in cooperation with the Department of Agriculture, Trade and Consumer Protection (DATCP). Wisconsin is divided into 333 discrete hydrologic units called watersheds. These watersheds are assessed for water quality concerns as part of a comprehensive basin planning program. Watersheds with surface waters that are important enough to merit special protection efforts, as well as watersheds with a high degree of water quality impairment from nonpoint sources of pollution become eligible for consideration as a priority watershed project. As directed by the state legislature, all of these high ranking watersheds must be planned by 2015. Designation as a priority watershed project enables special

financial support to local governments and private landowners in the watershed to reduce nonpoint source pollution.

- A priority watershed project is guided by a plan such as this one, prepared cooperatively by the DNR, DATCP and a group of local Partners that includes significant input from local citizens. Project staff evaluate the conditions of surface water and groundwater, and inventory the types of land use and nonpoint sources of pollution throughout the watershed. The priority watershed plan assesses nonpoint and other sources of water pollution and identifies best management practices (BMPs) needed to control pollutants to meet specific water resource objectives. The plan guides implementation of these practices in an effort to improve water quality.

- Upon approval by state and local authorities, local units of government implement the plan. Water quality improvement and protection is achieved through voluntary implementation of nonpoint source controls (BMPs), potential mandatory implementation for critical sites, a strong Information and Education effort, a Partnership between all concerned agencies, organizations and citizens throughout the watershed, and the review of existing ordinances for their effectiveness and the possible implementation of new ordinances. Landowners, land renters, counties, cities, villages, towns, sanitary districts, lake districts, and regional planning commissions are eligible to participate.

- Technical assistance is provided to aid in the design of BMPs. State level cost-share assistance is available to help offset the cost of installing these practices. Eligible landowners and local units of government are contacted by the local staff to determine their interest in installing the BMPs identified in the plan. Signed cost-share agreements list the practices, costs, cost-share amounts and a schedule to install management practices. Municipal governments are also assisted in developing and installing BMPs to reduce urban pollutants.

- Informational and educational activities are developed to encourage participation.

- The DNR and DATCP review the progress of the counties and other implementing units of government, and provide assistance throughout the eight-year project. The DNR monitors improvements in water quality resulting from control of nonpoint sources in the watershed.

# Legal Status of the Nonpoint Source Control Plan

The Upper St. Croix - Eau Claire Rivers Priority Watershed Plan was prepared under the authority of the Wisconsin Nonpoint Source Water Pollution Abatement Program described in Section 281 of the Wisconsin Statutes and Chapter NR 120 of the Wisconsin Administrative

Code. It was prepared through the cooperative efforts of the DNR, DATCP, Douglas County Forestry Department, the Douglas County Land Conservation Department and the Partnership Group. This watershed plan is the basis for the DNR to enter into cost-share and local assistance grants with agencies responsible for project implementation and will be used as a guide to implement measures to achieve desired water quality conditions. If a discrepancy occurs between this plan and the statutes or the administrative rules, or if statutes or rules change during implementation, the statutes and rules will supersede the plan. This watershed plan does not in any way preclude the use by local, state or federal governments of normal regulatory procedures developed to protect the environment. All local, state and federal permit procedures must be followed. In addition, this plan does not preclude the DNR from using its authority under chapters 283 and 281 of the state statutes to regulate significant nonpoint pollution sources in the project area.

This priority watershed plan was approved by DNR following approvals by the Land and Water Conservation Board, and Douglas County.

**Amendments to the Plan**

This plan is subject to the amendment process under NR120.08(4) for substantive changes. The Department of Natural Resources will make the determination with the local sponsors if a proposed change will require a formal plan amendment.

**Relationship of the Nonpoint Source Control Plan to the Stormwater Discharge Permit Program**

Wisconsin's Pollution Discharge Elimination System (WPDES) Storm Water Permit Program is administered by DNR's Bureau of Wastewater Management under Chapter 147 of the Wisconsin Statutes. This program is separate from the Nonpoint Source program and applies to certain classes of dischargers statewide as identified in NR 216. In cases where the programs do overlap, implementation grants may only apply to activities identified in the watershed plan. Practices to control construction site erosion and storm water runoff from new development are not eligible for cost sharing. In industrial areas, cost sharing is available as specified in NR 120.17 — only in the non-industrial parts of facilities where a problem has also been identified in the priority watershed plan.

# Priority Watershed Project Planning and Implementation Phases

## Planning Phase

The planning phase of the Upper St. Croix - Eau Claire Rivers project began in 1995. In consultation with the DNR, a "Partnership Agreement Model" was chosen to provide leadership to watershed activities including the drafting of this management plan. The theme of a partnership agreement is for group representatives and local citizens who have a stake in the future of the natural, social, and economic resources of the watershed, to come together and make commitments to protect the watershed. The center piece is an integrated, inter-coordination of people, programs and resources that drive the project's activities. The shared goal of the Partners is the long-term protection of the watershed (i.e. improved water quality, sustained biological diversity, improvement in fish and wildlife habitat, etc.)

Historically, most of the watersheds designated as priority watersheds through Wisconsin's Nonpoint Source Program have been watersheds dominated by either agricultural or urban land uses. The Nonpoint program's priorities are expanding to include more "protection" oriented projects. Protection projects are those in which the main land use is not agriculture or urban, but more likely forestry or rural and lakeshore non-farm communities which are in need of protective activities as opposed to remedial. This project will be driven by members of the Partnership Steering Committee and not by the needs of a degraded water resource requiring immediate corrective action. The planning phase of the watershed project has been substantially adapted from the more standard watershed project planning process.

A systematic NPS inventory of agricultural sources was not necessary in this watershed because farms represent just 1% of the watershed's overall land use, with 95% of the agricultural land being used for hay production. The existing agricultural sites were identified, but were not used to develop a "mass balance" for sediment and phosphorus as is done in agriculturally focused projects.

The water quality survey for the watershed project included an inventory of forestry practices, roadway erosion, recreational trail erosion, riparian and lakeshore land uses, and other riparian land uses. Overall, the water quality information collected for the watershed project developed a *baseline* of information that will be used to monitor how protection efforts are working over the course of the watershed project and beyond.

The following information gathering and evaluation activities were completed during the planning stage:

* Determine the conditions and uses of streams, lakes and groundwater.

* Inventory types of land uses and severity of nonpoint sources affecting streams, lakes and groundwater.

* Determine nonpoint source controls and other measures necessary to protect and/or improve water quality.

* Prepare and gain approval of a program for local implementation of the project so that plan recommendations will be carried out.

* Evaluate the types and severity of other factors which may be affecting water quality, such as natural or endemic stream conditions. (This has been completed through the ongoing integrated resource management planning efforts in the St. Croix River Basin).

* The formation of a Partnership Group comprised of interested agencies, organizations and local citizens who provide input into the planning phase of the project and will also commit their time and resources to the watershed project throughout the implementation phase.

## Implementation Phase

The implementation phase of the Upper St. Croix - Eau Claire Rivers Priority Watershed Project began following review of the draft priority watershed plan, a public hearing, and approval by the DNR, LWCB, and the Board of Supervisors for Douglas County. Public review during plan development occurred primarily through the efforts of the Upper St. Croix - Eau Claire Rivers Partnership Group and Citizen Advisory Committee.

During the implementation phase:

* DNR enters into local assistance agreements with local units of government that have implementation responsibilities identified in the plan. These agreements provide funds necessary to maintain the resources and staff required for plan implementation.

* In the rural portions of the watershed, the Douglas County Forestry Department contacts eligible landowners to determine their interest in installing best management practices identified in the plan.

* In the urban portions of the watershed, the DNR or its designee, contacts local units of government to discuss in detail the required actions for implementing the plan recommendations.

* In rural areas, the landowner signs a cost-share agreement with the Douglas County Forestry Department that outlines the practices, costs, cost-share amounts and a schedule for installation of management practices. Practices are scheduled for installation after an agreement is signed. Practices must be maintained for at least 8 years. Easements purchased through the NPS Program are perpetual.

* In urban areas, similar processes are used. In some cases, the local units of government and the DNR sign agreements for urban practices. In other cases the agreements will be between the Douglas County Forestry Department and private landowners.

# Location and Community Information

The Upper St. Croix - Eau Claire Rivers Watershed is a 180.5 square mile drainage basin located in the south central and southeastern parts of Douglas County, Wisconsin. The Project is located to the west and north of the St. Croix National Scenic Riverway, and includes the drainage area of Upper St. Croix Lake and the St. Croix Flowage (a.k.a. The Gordon Flowage). (Map 1-1). The Upper St. Croix - Eau Claire Rivers Watershed is within the St. Croix River Basin.

## History

From the first European accounts by Daniel Greysolon de Du Lhut (1680) to the 1992 Solon Springs Economic Diversification Plan, the St. Croix River Basin area has been recognized for its scenic beauty, its rich natural resources and its abundant fish and wildlife populations. Centuries earlier, the Ojibwa tribe had located the now famous Brule/St. Croix Rivers connection and migrated into the area for summer forays of food and subsistence. It was these native Americans who would later guide the early explorers to discover the linkage between the Great Lakes travel route and the inland Mississippi River. Much has been written concerning the St. Croix/Brule/La Pointe northern woods and its people. In fact, the history continues to inspire residents and visitors of the area to this day. A wise and informed society acknowledges its ancestors, remembers their deeds, and learns from their activities. The following narrative recounts the early settler's relationship with the land and water resources of the St. Croix River Basin.

For generations untold, the Ojibwa tribe of North America lived and subsisted in relative harmony with the land and water resources of the Northern Great Lakes, including Lake Superior, Lake Michigan and Lake Huron. The Upper St. Croix - Eau Claire Rivers watershed is a part of the water resources used by the Ojibwa. There is no written history of these people until the late 17th century. By 1854, after a century of guiding, feeding, marrying and fighting European fur traders and settlers, the La Pointe treaty was signed, ceding tribal lands to the U.S. government. At that time, the Fond du Lac Reservation, near Cloquet, Minnesota was created. (Mary Ann Walt, a descendent of Chief Osaugie, a principal signer of the 1854 La Pointe treaty, lives near St. Croix Lake.) Many of the Indians who used the Upper St. Croix as a summer hunting and fishing grounds were removed to the reservation. In 1894, the Indian Allotment Act was passed by the U.S. government, allocating 80 acre parcels throughout the Upper Great Lakes region to Indian families living on the Fond du Lac Reservation. This was a disastrous policy from the

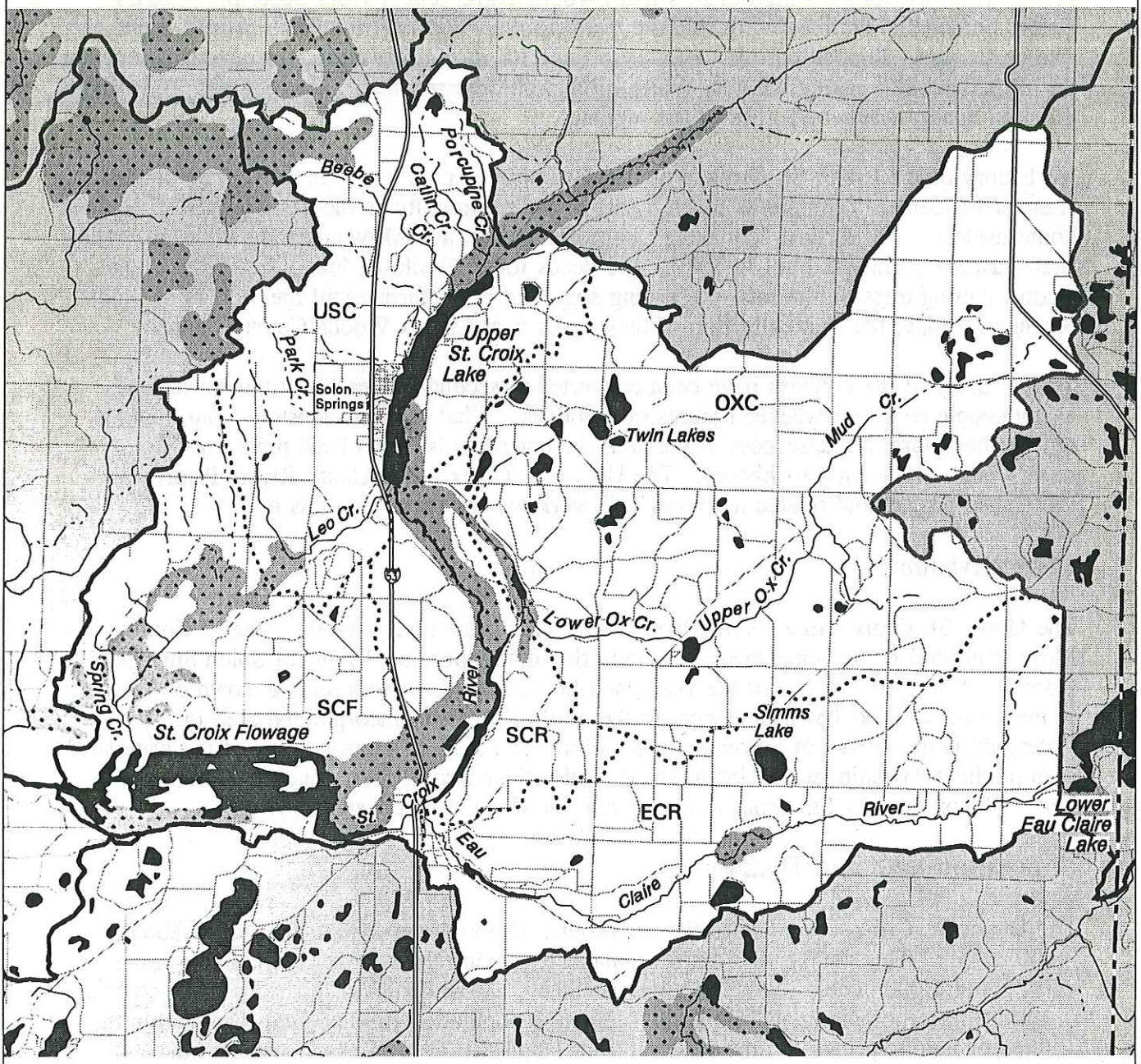
Ojibwa point of view, in that many could not make a sustained living on the parcels and either migrated to St. Paul or returned to the Fond du Lac reservation.

More than 300 years ago, the first French fur trader, Du Lhut, crossed over the Brule/St.Croix Rivers portage trail, blowing up more than 100 beaver dams on the Brule River to reach the headwaters of the St. Croix River at the head of the lake. For the next 100 years the French would claim this area as part of New France. The fur trade thrived and forts were built at Chequamegon Bay and at the mouth of the St. Croix River, linking the Great Lakes with the Mississippi River. It was the Ojibwa who taught the French how to use birch bark in designing canoes. This period set in motion the inevitable replacement of native, indigenous cultures with a European influence in religion, dress, and use of natural resources. The fur trade, fueled by fashion in Europe, continued to extirpate the resource (beaver), moving on to utilize new lands. The French influence is seen in the names of many natural waterways such as Bois Brule, St. Croix, and Eau Claire. However, by the early 1800's the dominant European culture shifted from French to English.

In 1848, the area we know as Wisconsin became a State. The area was little traveled and had a scattered population. In the 1860's, Antoine Gordon opened the first trading post in the area, on the St. Croix trail which ran from Iron River to Gordon. By 1880, the Northwestern Railroad was built from Duluth/Superior to Solon Springs. In addition, rail lines were reaching up from the south to Gordon. Along with the railroad, logging activities had finally reached northern Wisconsin. It was during this time that the first "cottagers" (summer residents) began constructing cabins on Crownhart Island, on Upper St. Croix Lake. From 1890-1910, lumber companies (Mauser-Sauntry, Dobie Brothers Lumber Co. and others) came to take the tall and straight pines for a growing and demanding country. The Village of White Birch, later named Solon Springs, located on the shores of the largest lake in the area (St. Croix Lake), became the headquarters for these companies. Logging camps were usually opened in late September and operated through March. The trees were cut and piled on skids, and when the roads were iced, the logs were hauled to lakes and rivers to await the spring snowmelt. All of the waterways, including lakes, second order streams and rivers were diverted, dammed and channelized to float logs. The majority of logs were floated down the St. Croix by "riverhogs" to Stillwater and beyond. In a blink of the historic eye - 20 years - the forest was gone. Immediately following this period, accounts tell of standing on a hill near Gordon and seeing barren landscape reaching north beyond Solon Springs for miles.

Another incentive to entice people to move to this area of the state was the Homestead Act, in which free land was offered if it was improved upon in a given number of years. The majority of the settling in the area occurred between 1900-1920. Many of these homesteaders farmed in the summer and logged in the winter. Most homesteaders soon realized that the sandy outwash plain left by the last glacier had created relatively infertile conditions for long-term farming. The infertile soil, the short growing season and the harsh climate caused the failure of hundreds of farms in the area.

# Map 1–1 The Upper St. Croix –Eau Claire Rivers Priority Watershed Project Boundaries




Study Area

Subwatershed Codes and Names

SCF= St. Croix (Gordon) Flowage
OXO= Ox Creek
USO= Upper St. Croix Lake
ECR= Eau Claire River
SCR= St. Croix River

0 1 2 3 4 Miles
0 1 2 3 4 5 6 Kilometers

Scale 1:169,905

LEGEND
- Watershed Boundary
- Project Boundary
- Subproject Boundary
- Major Highway
- Local Roads
- Perennial Stream
- Intermittent Stream
- County Boundary
- Wetland
- Open Water
- Municipal Area

Wisconsin Department of Natural Resources
Watershed Management
October 1997

During the early 1890's, springs on the west side of St. Croix Lake were discovered. The spring water was of such high quality that a young entrepreneur from Superior, Thomas Solon, bottled and commercially sold the water to the Twin Port markets. At one point, the "Solon Springs" shipped barrels of water to Superior, providing clean, uncontaminated water during a typhoid breakout. Later, White Birch would be renamed Solon Springs, reflecting the high quality water resources of the region.

No history of the Upper St. Croix Watershed would be complete without mention of the summer residents. They are as much a part of the community as the descendants of the first homesteaders. The earliest "cottagers" came from Superior, Milwaukee and Chicago. The first seasonal cabin was built in 1887. The deeds for the building lots placed restrictions against cutting trees on the lots, preserving some old pines throughout the Village of Solon Springs. Today, the best collection of these trees is at Lucius Woods County Park.

Today, many of the cottages have been converted to second homes or retirement havens. Many people come for weekend jaunts or Holidays. What remains constant from then to now is the natural attractiveness of the area, its northwoods aura of tall pines and cool waters, and a rich sense of history. The Upper St. Croix - Eau Claire Rivers Priority Watershed project and related activities will work toward protecting this quality of life.

## Civil Divisions

The Upper St. Croix - Eau Claire Rivers Watershed lies entirely within Douglas County. More than 95% of the watershed lies within the unincorporated Towns of Solon Springs and Gordon. Very minor tracts of the watershed lie within the unincorporated Town of Wascott to the south, and the Town of Bennet to the north. The only incorporated area in the watershed is the village of Solon Springs. More than 30% of the total area of the watershed is in public ownership, which includes the Brule River State Forest, Lucius Woods State Park, Wilcox Island - St. Croix Flowage, and the Gordon Bird Sanctuary.

## Population Size and Distribution

The Upper St. Croix - Eau Claire Rivers Watershed population is estimated to be about 2,000 people. This number increases dramatically during the summer recreation season, when about 6,000 people live within the watershed. Most of the watershed population lives in rural unincorporated areas, while the remaining population (590 people) lives within the Village of Solon Springs, on the west shore of Upper St. Croix Lake. Although the population is about the same as it was in 1980, the population growth rates in the watershed are expected to increase. Much of the population growth in the watershed is due to increasing recreational home development in riparian areas, particularly on the eastern side of Upper St. Croix Lake. Some of the smaller lakes within the watershed were designated as "Wild Lakes" by Douglas County in 1996, providing stricter regulations for future development. However, development trends similar to those on the Upper St. Croix Lake are likely to occur on other lakes within the watershed as the population centers of the Twin Cities and the Twin Ports continue to look to Douglas County for recreational opportunities.

## Land Uses

Rural land uses predominate in the watershed. Forestry is the dominant land use, comprising 85 percent of the watershed. Much of this forested land is owned by Douglas County, industrial forestry companies and private citizens. Agricultural activities account for just 1 percent of the watershed's land use, with 95% of the agricultural land in hay production. Developed land represents less than 5 percent of the watershed, however, 60 percent of this development is within riparian areas (Table 1-1).

**Table 1-1 Summary of Land Uses in the Upper St. Croix - Eau Claire Rivers Watershed**

| Land Uses | Acres | % of Use |
|---|---|---|
| Agricultural | 1,187.9 | 1.0% |
| Developed - commercial | 793.7 | 0.7% |
| Developed - residential | 4,674.7 | 4.0% |
| Forest - County | 26,133.0 | 22.5% |
| Forest - Private | 33,298.0 | 28.5% |
| Forest - Productive | 30,008.0 | 28.5% |
| Forest - State | 5,334.4 | 4.9% |
| Forest - Misc. | 4,030.0 | 3.8% |
| Lakes | 4,398.5 | 3.7% |
| Rivers/Streams | 590.2 | 0.5% |
| Special Protective Use | 2,950.4 | 2.9% |
| Wetlands | 2,106.0 | 1.8% |
| TOTAL | 115,504.7 | 100% |

* *These estimates are from the land use classification system developed by Douglas County. Many of the forested acres and special protective use acres are wetland type lands as well.*

# CHAPTER TWO
# Watershed Conditions, Land Use Conditions, and Threats to Water Quality

This chapter discusses the physical characteristics, existing conditions, nonpoint sources, objectives and management categories for the water resources in the Upper St. Croix - Eau Claire Rivers priority watershed. Information is presented for each subwatershed and by pollution source.

## Physical Characteristics

The Upper St. Croix - Eau Claire Rivers watershed is located in southeastern Douglas County. It is an area of sandy pitted outwash deposits and is almost entirely wooded. The western portion of the watershed is dominated by the St. Croix Flowage (a.k.a. Gordon Flowage) and peat and bog type soils. The northeastern section of the watershed has sandy outwash plains, terraces, and fans. The two river systems of the St. Croix and Eau Claire Rivers surface water resources have experienced impacts from development and are threatened by the potential for further development and expanding recreational uses.

The sandy soils which make up the majority of the watershed help to minimize the amount of surface runoff during annual runoff events. However, during higher precipitation events or during snowmelt, runoff can carry sediments and other related pollutants from yards, roadways, roofs, parking lots, riparian lawns and other surfaces to drainageways that deliver runoff directly to streams and lakes within the watershed.

Dams occur on both of the primary rivers in the watershed. The Mooney and Dahlberg Power Dam are on the Eau Claire River, and the Gordon Dam is on the St. Croix River.

### Climate and Precipitation

The frequency, duration and amount of precipitation influences surface and groundwater quality and quantity, soil moisture content, runoff characteristics, and the physical condition of waterways. The watershed lies in the continental zone which is characterized by winters which are long and relatively cold and snowy and summers which are mostly warm with periods of hot humid conditions. Mean annual precipitation for the region is about 30 inches of rain and melted snow. Approximately 18 inches of this precipitation is returned to the atmosphere through the process of evapotranspiration, leaving a net gain of 12 inches of

precipitation that contributes either surface runoff to surface waters or infiltration to groundwater recharge (Young, 1973).

## Topography

The topography in the watershed plays an important role in groundwater/surface water interactions. Natural landscapes in the watershed tend to be highly variable with closed depressions and irregular surface areas which interrupt surface flow and provide ample opportunity for infiltration and recharge of groundwater. As the natural landscape becomes more developed, surface soils are leveled, eliminating infiltration areas for the express purpose of encouraging rapid runoff of precipitation to eliminate wet areas with standing water. The region is flat to gently rolling. Along the Upper St. Croix - Eau Claire Rivers there are well dissected valleys, with relatively high local relief.

## Geology

Glacial deposits in the watershed are mostly pitted outwash with small areas of end moraine and ground moraine along the northwest edge. Pitted outwash contains numerous closed depressions and has poorly developed drainage patterns. This coupled with the high infiltration rates results in high rates of groundwater recharge and low rates of surface runoff. The glacial geology within the watershed boundaries is characterized by stratified sand and gravel deposited as outwash by melt-water streams from stagnating glaciers.

## Ecological Subregion

The watershed is located in the Laurentian Mixed Forest - Province 212, section K - Western Superior. It is flat to slightly rolling ground moraine and plain-pitted outwash with kettles intermittently overlain by low, undulating ridges (glacial end moraines) and drumlins. Poor to unintegrated (chaotic) drainage dominates, except along the St. Croix river where dendritic drainage is established in and adjacent to a glacial channel.

Most of this section is covered by either or both Pleistoscene (Wisconsian) till and stratified drift, ranging in thickness from 100 to 600 feet. Beneath the drift, bedrock is composed mostly of proterozoic igneous rocks - volcanics and plutonics, both felsic and mafic. Proterozoic and lower Cambrian quartzite occur in scattered areas.

The dominant biological community within the watershed is the Pine Barrens. This biological community is associated with jack pine, scrub oak, aspen and red pine with dominating glacial outwash sand plains. The climax forest will ultimately be red pine on the mesic sands, and scrub oak and jack pine will climax on the drier, nutrient poor sands.

Therefore, a climax forest would be a patchwork of trees, associated shrubs and openings throughout.[3]

## Soils

Most of the soils throughout the watershed can be characterized as sandy loams and some loamy sands, with smaller areas of organic soils in low-lying wetland areas. The permeability for these soils is very high, averaging between 5-10 inches of infiltration per hour (Young, 1973). Wetland and low lying areas along the northwest edge of the watershed are typically characterized as having mucky peats with poorer infiltration rates, as low as 0.8-2.5 in/hr., making them unsuitable for septic systems.

# Water Resource Conditions

This section describes the general conditions of the surface and groundwater resources in the Upper St. Croix - Eau Claire Rivers watershed. It describes the classifications used for Wisconsin's waters, then describes the surface water and recreational resources in the watershed. Descriptions of subwatersheds are also included and several tables provide summaries of the watershed's resources. Groundwater resources and quality are also discussed.

## Water Use Classifications

Surface water quality standards and criteria are expressions of the conditions considered necessary to support biological and recreational uses. Water quality standards for recreational and biological uses are contained in Chapters NR 102, NR 104, and NR 105 Wisconsin Administrative Code.

In addition to these standards, other criteria were used to assess the suitability of surface waters for recreational and biological uses. Data characterizing stream size and accessibility were used to help determine the suitability and types of recreation a stream is capable of supporting. Information on current recreational use of surface waters (provided by users at public access points and discussions with local officials) is also used to assess suitability of surface waters for recreation. Use classifications and supporting water quality standards used in evaluating water resource conditions are discussed below.

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[3]Ecological Subregions of the United States: Section Descriptions - USDA Forest Service, July, 1994, compiled by W. Henry McNab and Peter E. Avers.

**Biological Stream Use**

Wisconsin streams are classified according to the biological uses desired for each stream. These classifications are listed for each stream in the water quality management plans developed for each basin.in the subwatershed discussions. Stream classification determines allowable pollutant loads to the system. Resources are classified as one of the following:

> **COLD = Coldwater Communities** include surface waters capable of supporting a community of coldwater fish and other aquatic life or serving as a spawning area for coldwater fish species.
> **WWSF = Warmwater Sport Fish Communities** include surface waters capable of supporting a community of warmwater sport fish and/or serving as a spawning area for warmwater sport fish.
> **WWFF = Warmwater Forage Fish Communities** include surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.
> **LFF = Limited Forage Fish Communities**

Trout streams carry a separate designation found in "Wisconsin Trout Streams" (DNR Publication number 6-3600(80)) and in Wisconsin Administrative Code NR 102.20 and NR 102.11, pertaining to Outstanding and Exceptional Resource Waters. Trout classes are:

> **Class I** trout streams are high quality, and populations are sustained by natural reproduction.
> **Class II** trout streams have some natural reproduction but may need stocking to maintain a desirable fishery.
> **Class III** trout streams have no natural reproduction and require annual stocking of legal-size fish to provide sport fishing.

**Recreational Stream Use**

Recreational stream use classifications are described by a level of human body contact determined to be safe and reasonable. The system applies to all surface waters including those categorized as intermediate or marginal under the above referenced biological use classification system. Three designations are used under the recreational stream classification system. These designations are full body contact, partial body contact, and non-contact. Most major water bodies in the watershed are classified as "full body contact".

Table 2-1 summarizes the water resource classification and conditions for the Upper St. Croix - Eau Claire Rivers Watershed. See Table 2-2 (named lakes) for the general conditions of major water resources in the watershed.

**Table 2-1 Water resource classification and conditions for the Upper St. Croix - Eau Claire Rivers Watershed.**

| Name | Length (miles) | Direct Drainage | Flow (cfs) | HBI* | Classification | Substrate |
|---|---|---|---|---|---|---|
| Eau Claire River | 13.4 | 13.88 | 88 | 3.28 | Cold Water - Class III | sand/rubble |
| St. Croix River** | 7.9 | 36.65 | 134 | 3.6 | Warmwater fish and aquatic life | predominantly shifting sands |
| Beebe Creek | 1.9 | 2.61 | 3.1 | 2.9 | Cold Water - Class I | gravel/rubble |
| Catlin Creek | 2.7 | 3.21 | 2.5 | 4.05 | Cold Water - Class I & III | sand/gravel/rubble |
| "Evergreen"Creek | 2.4 | 1.76 | No data | NA | Cold Water | sand |
| "Jackson"Creek | 0.7 | 0.3 | 0.2 | NA | Cold Water | sand |
| Leo Creek | 4.5 | 4.78 | 3.7 | 3.14 | Cold Water - Class II & III | sand |
| Lord Creek | 2 | 8.07 | 1 | 3.23 | Currently warm water, prior to 1967 cold water | silt/sand |
| Lower Ox Creek | 3.5 | 3.08 | 15.5 | No data | Cold Water - Class II & III | sand/gravel/rubble |
| Upper Ox Creek | 5.5 | 6.2 | 3.5 | 3.97 | Cold Water - Class II | silt/sand |
| Park Creek | 1.4 | 1.96 | 1.5 | 1.88 | Cold Water - Class II & III | rubble/gravel |
| Rock Cut - "Sauntry" Creek | 2.1 | 3.94 | 2.1 | 2.1 | Cold Water - Class I | gravel/rubble/sand |
| St. Croix Creek | 0.8 | 0.35 | 3 | NA | Cold Water - Class I | silt |
| "Smith" Creek | 3.7 | 2.45 | 0.8 | NA | Cold Water | sand/gravel/rubble |
| Spring Creek | 2.5 | 3.08 | 2.5 | 2.75 | Cold Water - Class II | sand |

* Hilsenhoff Biotic Index (HBI) scores are calculated by averaging the individual tolerance values for all macroinvertebrates in the sample. Water quality ratings are based on the HBI score. An HBI score of 0.00 to 3.50 represents an excellent water quality rating, 3.51 to 4.50 represents very good with possibly some organic pollution, 4.51 to 5.50 represents good with some organic pollution occurring, 5.51 to 6.50 represents fair and an indication of fairly significant organic pollution, 6.51 to 7.50 represents fairly poor with significant organic pollution occurring, 7.51 to 8.50 represents poor with very significant organic pollution occurring, and 8.51 to 10.00 represents very poor with severe organic pollution occurring (Hilsenhoff 1987). These scores and ratings should not be interpreted by themselves because some streams have higher biotic potential and may reflect a polluted condition at a lower score. The physical habitat differences (flow, depth, and substrate) between two sites may account for a greater portion of the differences in HBI scores than the differences in water quality making it difficult to interpret data without firsthand knowledge of the sampling sites.

** This only includes the section of river between Upper St Croix Lake and the St Croix Flowage.

## Surface Water Resources

There are five dominate water bodies in the watershed;

* Upper St. Croix Lake
* St. Croix Flowage (a.k.a. Gordon Flowage)
* St. Croix River - 8 miles which is free flowing between the lake and flowage
* Eau Claire River - 13 miles
* Ox Creek - 9 miles

Each of these is important as a natural and recreational resource, and are known for their scenic beauty. Upper St. Croix Lake has been designated an **Outstanding Resource Water** (ORW). In a 1994 Department of Natural Resources review of ORW standards for nine flowages in Wisconsin, the St. Croix Flowage was ranked highest in water quality.

For the purposes of this project, the Upper St. Croix - Eau Claire Rivers Watershed is subdivided into five subwatersheds. Each subwatershed conveys surface water to the Upper St. Croix - Eau Claire Rivers. Major tributaries, associated streams, wetlands, and subwatershed divides are shown in Map 1-1.

**Subwatersheds in the Upper St. Croix - Eau Claire Rivers Watershed**

| | |
|---|---|
| St. Croix Flowage | (SCF) |
| Upper St. Croix Lake | (USC) |
| St. Croix River | (SCR) |
| Eau Claire River | (ECR) |
| Ox Creek | (OC) |

## Streams

The watershed encompasses a 7.9 mile segment of the St. Croix River between Upper St. Croix Lake and the St. Croix (Gordon) Flowage. The Eau Claire River empties into the St. Croix River 6.8 miles downstream from Upper St. Croix Lake. Perennial streams in the watershed maintain at least a small continuous flow throughout most of the year. Upper St. Croix Lake has five named and four unnamed perennial streams running into it. The St. Croix (Gordon) Flowage has only one perennial stream entering it, other than the St. Croix River itself. Other primary streams in the watershed are listed in Table 2-1.

Most of the streams in the Upper St. Croix - Eau Claire Rivers watershed are cold water streams, rated from Class I to Class III trout water. The St. Croix River currently supports a warm water fishery. While most of the streams in the watershed are in relatively pristine condition at this time, there are increasing threats to the surface waters in the Upper St. Croix - Eau Claire Rivers watershed. Forestry practices, road construction and increasing residential development are all potential sources of nonpoint pollution in the watershed. Lord Creek is not reaching its highest potential use due to thermal changes in the stream

caused by beaver dams. Eroding streambanks and livestock pasturing are sources of nonpoint pollution in the watershed.

The remaining streams in the watershed will be described in more detail in the subwatershed descriptions later in this chapter.

## Lakes

There are a thirty-one named lakes within the watershed (see Table 2-2). Upper St. Croix Lake, Lake of the Woods, Island Lake, Park Creek Pond, Long, and Sand Lake are moderately to heavily developed. The remaining watershed lakes are either sparsely developed or not developed at all and many have no public access. In July, 1996, Douglas County amended their Shoreland Zoning Ordinance to include a special category for "Wild Lakes". Wild lakes, as designated by the amended zoning ordinance, receive special protection, and developed lots on these lakes are required to have minimum setbacks of 300 feet and a minimum lot size of 10 acres. All of the unnamed lakes in the watershed have received the "Wild Lake" designation (see Appendix B).

The two dominant water bodies in the watershed - Upper St. Croix Lake and the St. Croix Flowage - are known for their scenic beauty. These uniquely valuable water resources are very attractive and draw people from the Twin Cities and the Twin Ports of Superior and Duluth to the area for recreation and associated development. This increase of use poses one of the greatest threats to the value of the watershed.

A shoreline erosion inventory was conducted on Upper St. Croix Lake and the St. Croix Flowage to determine the amount of sediment being delivered from the shoreline. The results of this inventory are listed later in this chapter.

A sediment core was taken from the deepest part of Upper St. Croix Lake in August, 1996. Information obtained from this core will be analyzed to learn the history of the lake's water quality. Plants and animals, as well as certain chemical parameters that were present in the past are preserved in the sediments. By examining these fossils, changes in the lake's water quality can be studied. This information will be used to determine the best course of action to take to manage the lake for optimum water quality.

Due to budgetary restraints and a back log of sediment core samples taken previously, an analysis of the Upper St. Croix Lake core sample was not completed by the time this plan was drafted. The watershed planners expect to receive this information sometime during the summer of 1997. Additionally, a second sediment core sample will be taken from the lake in the fall of 1997. This information will be utilized throughout the implementation period of the project.

**Table 2-2 Named lakes in the Upper St. Croix - Eau Claire Rivers Watershed**

| Lake Name | Location | Lake Type | Max.Depth (feet) | Size (acres) | Watershed Drainage (sq. miles) | Shoreline (miles) | Development Pressure ** |
|---|---|---|---|---|---|---|---|
| Upper St. Croix | 45-12-25 | Drain | 22 | 855.4 | 28.25 | 9.39 | Heavy |
| Lake of the Woods | 45-11-17 | Seep | 18 | 33.8 | 0.6 | 1.31 | Heavy |
| St. Croix Flowage | 44-12-13 | Drain | 28 | 1,912 | 125.24 | 29.1 | Slight |
| Lower Ox | 44-11-28 | Drain | 18 | 38 | 5.22 | 2.13 | Wild |
| Upper Ox | 44-11-14 | Drain | 19 | 64 | 9.79 | 1.76 | Wild |
| Bass | 45-11-33 | Seep | 14 | 52 | 0.4 | 1.5 | Slight |
| Black Fox | 45-10-22 | Seep | 5 | 35.6 | 0.21 | 1.44 | Slight |
| Boot | 45-10-33 | Seep | 2 | 15.8 | 0.22 | 0.68 | Wild |
| Deer Print | 45-10-21 | Seep | 7 | 20 | 0.14 | 1.19 | Wild |
| Ferguson | 45-12-34 | Drain | 7 | 10 | 1.57 | 0.56 | Wild |
| Flamang | 44-11-1 | Seep | 17 | 7 | 0.13 | 0.4 | Moderate |
| Flat | 44-11-3 | Seep | 4 | 58 | 0.55 | 1.97 | Wild |
| Gilbert | 45-11-6 | Seep | 6 | 8.2 | 0.15 | 0.62 | Wild |
| Grover | 43-11-8 | Seep | 10 | 7 | 0.08 | 0.38 | Wild |
| High Life | 45-10-23 | Seep | 6 | 20 | 0.19 | 0.9 | Moderate |
| Island | 45-11-29 | Seep | 17 | 45.6 | 0.52 | 1.27 | Moderate |
| Jack Pine | 45-10-22 | Seep | 12 | 14.5 | 0.1 | 0.64 | Wild |
| Little Simms | 44-10-31 | Seep | 11 | 12 | 0.14 | 0.56 | Wild |
| Long | 45-11-31 | Seep | 25 | 46 | 0.49 | 1.32 | Wild |
| Metzger | 44-11-1 | Seep | 29 | 12 | 0.22 | 0.74 | Slight |
| Muskrat | 45-11-28 | Seep | 9 | 20 | 0.72 | 1.13 | Slight |
| Paradise | 45-10-22 | Seep | 6 | 20.8 | 0.25 | 0.68 | Slight |
| Park Creek Pond | 45-12-26 | Drain | 7 | 10.6 | 1.93 | 0.5 | Moderate |
| Rock | 45-10-33 | Seep | 13 | 41.8 | 1.4 | 2.17 | Slight |
| Sand | 45-10-13,14 | Seep | 16 | 97.6 | 0.41 | 1.45 | Moderate |

| Lake Name | Location | Lake Type | Max. Depth (feet) | Size (acres) | Watershed Drainage (sq. miles) | Shoreline (miles) | Development Pressure ** |
|---|---|---|---|---|---|---|---|
| Sauntry's Pocket | 43-11-1 | Seep | 9 | 109.8 | 0.7 | 1.63 | Slight |
| Simms | 44-11-25 | Seep | 41 | 152 | 0.9 | 1.88 | Slight |
| Swenson | 44-11-23 | Seep | 15 | 15 | 0.12 | 1.13 | Slight |
| Twin (East) | 45-11-27 | Seep | 5 | 112.9 | 1.25 | 2.36 | Moderate |
| Twin (West) | 45-11-28 | Seep | 5 | 66.4 | 0.21 | 1.38 | Wild |
| Whiteside | 44-10-8 | Seep | 19 | 16 | 0.2 | 0.7 | Wild |

** These categories are based on current development pressure and are not intended to suggest the possible extent of future development.

## Wetlands

Wetlands are valuable natural resources. They provide wildlife habitat, fish spawning and rearing areas, recreation, storage of runoff and flood flows and removal of pollutants. In general, the Upper St. Croix - Eau Claire Rivers watershed has not been subjected to much historical wetland drainage, so opportunities for true wetland restoration may be limited. However, existing wetlands can be improved by providing buffers from the adverse impacts of surrounding land uses. Although water level fluctuations cause erosion and other problems for lake property owners, wetland areas can benefit. The greatest wetland values tend to occur at lower water levels, when higher percentages of emergents create favorable wildlife habitat. Where shoreline wetlands exist, they should be protected and encouraged for their habitat and buffering values.

Wetlands in the watershed are mainly in the St. Croix River floodplain. Floodplain wetlands support furbearers and water fowl populations and may provide seasonal habitat for sport fish. There are also extensive wetland areas along the riparian corridor of the St. Croix Flowage in the Town of Gordon.

## Groundwater

Groundwater is a valuable watershed resource. Groundwater provides a high quality source of water supply for residential and commercial use. Groundwater discharge maintains streamflows during dry periods and maintains water temperatures in a suitable range for trout survival in many streams. Water levels in many watershed lakes are supported and controlled by groundwater levels.

Groundwater conditions are determined to a large extent by geology. Glacial deposits in the watershed are mostly pitted outwash with small areas of end moraine and ground moraine along the northwest edge. Soils are mostly sandy loams and loamy sands, with smaller areas

of organic soils in low-lying wetland areas. Infiltration rates for most soils are very high at 5-10 in/hr. Soils along the northwest edge of the watershed have lower infiltration rates, as low as 0.8-2.5 in/hr. Pitted outwash contains numerous closed depressions and has poorly developed drainage patterns. This coupled with the high infiltration rates results in high rates of groundwater recharge and low rates of surface runoff.

Total annual precipitation for the watershed averages 30 inches and 18 inches is returned to the atmosphere through evapotranspiration. This leaves 12 inches to produce groundwater recharge or surface runoff. In most locations in the watershed the vast majority of this 12 inches infiltrates and becomes groundwater recharge with only a small amount becoming surface runoff.

The depth to the water table is generally less than 50 feet throughout the watershed. Depth to bedrock ranges from 50 to 200 feet. Most of the watershed is underlain by Precambrian sandstone, shale, and conglomerate bedrock, with a small area in the watershed's northwest corner underlain by Precambrian basalt.

### Water Supplies

Groundwater is the sole source of water supply for residential and commercial use. Nearly all wells utilize the sand and gravel aquifer which overlies the bedrock. There are no municipal public water supply systems present. Residents of the Villages of Solon Springs and Gordon obtain water from private wells. There are several free-flowing wells located along the east and west shores of Upper St. Croix Lake. Water supplies for domestic, agricultural, and industrial uses in the watershed are obtained from both private groundwater sources and municipal systems.

## Subwatershed Discussions

This section describes the physical and water quality conditions for each subwatershed in the Upper St. Croix - Eau Claire Rivers Priority Watershed Project. A general description of each subwatershed and its water quality conditions are described. A more detailed description of each watershed can be found in the water quality appraisal reports written by Cahow & Roesler, 1996. Table 2-3 summarizes the subwatershed characteristics and lists the major subwatersheds within the project area.

Land drainage patterns in the watershed have been used to delineate this watershed into five major subwatersheds and adjoining subunits. These are the Upper St Croix Lake, St. Croix Flowage, St. Croix River, Eau Claire River and Ox Creek subwatersheds. The Upper St. Croix Lake subwatershed has 5 named and 4 unnamed perennial and intermittent streams that drain into it. These streams and the lake drain 23,585 acres or 36.9 square miles. The St. Croix River and Spring Creek are the two streams that drain to the St. Croix Flowage. This subwatershed comprises 18,085 acres or 28.3 square miles. The St. Croix River subwatershed drains 9,123 acres or 14.3 square miles of land. The Ox Creek subwatershed

drains 40,030 or 62.5 square miles, while the Eau Claire River subwatershed drains over 21,866 acres or 33.8 square miles. There are also numerous closed depression and seepage lakes throughout the watershed.

**Table 2-3 Subwatersheds and Subunits in the Upper St. Croix - Eau Claire Rivers Watershed**

| Subwatershed Name | Subunits | Acres | Square Miles |
|---|---|---|---|
| Eau Claire River | N.A. | 21,686 | 33.8 |
| *Lake of the Woods | N.A. | 1,318 | 2.1 |
| Ox Creek | | | |
| | Lower Ox Creek | 14,600 | 22.8 |
| | Upper Ox Creek | 25,409 | 39.7 |
| St. Croix River | N.A. | 9,123 | 14.3 |
| St. Croix Flowage | | | |
| | Flowage | 10,868 | 17 |
| | Spring Creek | 7,217 | 11.3 |
| *SE Corner of Lake | N.A. | 1,237 | 1.9 |
| *SW Corner of Lake | N.A. | 462 | 0.7 |
| Upper St. Croix Lake | | | |
| | Lake | 6,810 | 10.6 |
| | Beebe Creek | 3,321 | 5.2 |
| | Catlin Creek | 2,636 | 4.1 |
| | "Evergreen Creek" | 749 | 1.2 |
| | "Jackson Creek" | 891 | 1.4 |
| | Leo Creek | 4,582 | 7.2 |
| | Park Creek | 1,095 | 1.7 |
| | Rock Cut "Sauntry" Creek | 1,898 | 3 |
| | "Smith Creek" | 1,065 | 1.7 |
| | St. Croix Creek | 538 | 0.8 |
| TOTAL | | 115,505 | 180.5 |

* These are closed system subwatersheds.

## St. Croix Flowage Subwatershed (SCF) (a.k.a. Gordon Flowage)

### Description

The St. Croix Flowage encompasses 1,913 acres, has an average depth of 10 feet, and about 29 miles of shoreline. Residential development on the shoreline is moderate; about 7 percent of the shoreline is developed. Water quality in the flowage is generally good and indicates mesotrophic conditions.

The area is important for pan fishing as its dense growth of aquatic vegetation provides numerous hiding spots for these fish to escape larger predatory fish. The aquatic plant survey conducted showed the flowage to have a great diversity of aquatic plants (38 species), indicating a very healthy community structure. The aquatic plants may help suppress algae growth and improve water clarity. Maximum depth of plant growth was 2.1 meters with approximately 97% of the littoral area vegetated.

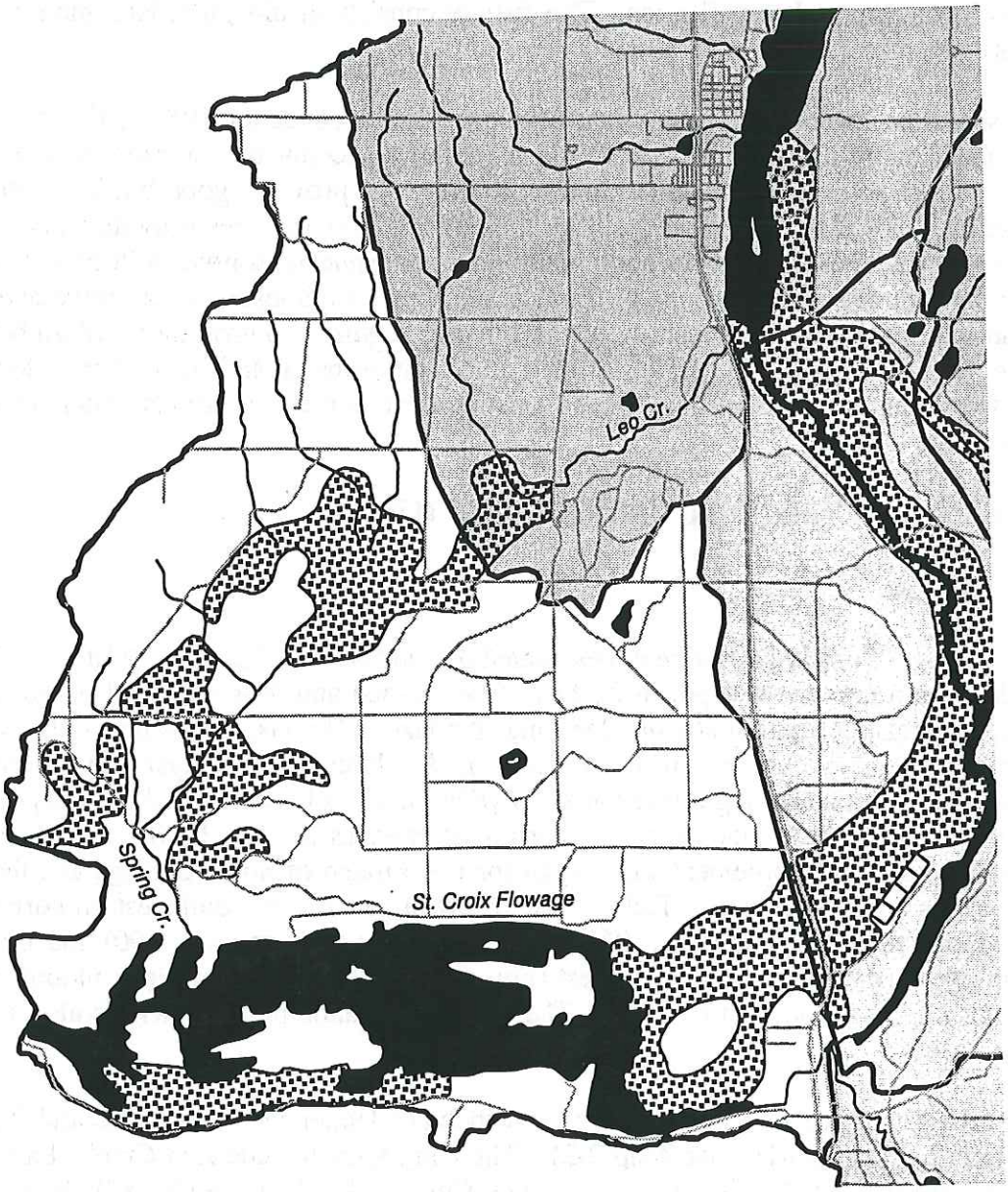
The St. Croix Flowage subwatershed is approximately 18,085 acres or approximately 28.3 square miles in size (See Map 2-1). Of this area, the flowage surface area accounts for approximately 2,508 acres. The entire watershed for the flowage includes Upper St. Croix Lake, Ox Creek, and Eau Claire River subwatersheds. The St. Croix Flowage is a shallow, 1,913 acre impoundment on the St. Croix River. Over 95% of the flowage is less than 10 feet deep. The 12 foot head dam which created the flowage was constructed in 1937.

The first dam at this location was used by Ojibwa Indians to pool fish together during spawning runs. In 1887 an elaborate wooden dam was constructed for logging purposes to store logs and control their movement down the upper reaches of the St. Croix River. By 1912, the logging dam was abandoned, and later partially burned down. The present dam was upgraded and renovated in 1988 by the Douglas County Forestry Department.

Most of the flowage shoreline is undeveloped woods and wetland, with some areas of residential and recreational development. Wilcox Island, with an area of 236 acres, is the largest of several islands in the flowage. The St. Croix River immediately below the flowage has been designated a National Wild and Scenic River and an Outstanding Resource Water. The drainage area for the flowage is about 286 square miles (177,650 acres). It includes the entire Upper St. Croix and Eau Claire Rivers priority watershed (180.5 square miles) along with the headwaters area of the Eau Claire River (106 square miles).

An extensive study was conducted during 1994 to develop an index of flowage quality (WDNR, 1994). The St. Croix Flowage was one of eight flowages included in the study. The study focused on macrophytes but also included the collection of water chemistry data. The results from this study were used, when available, in place of collecting replicate data for the 1995 appraisal. A shoreline inventory was completed during the 1995 appraisal season.

# Map 2-1 St. Croix Flowage Subwatershed (SCF) (a.k.a. Gordon Flowage)




Legend

- State Highway
- Local Road
- River or Stream
- Open Water
- Wetland
- Project Boundary

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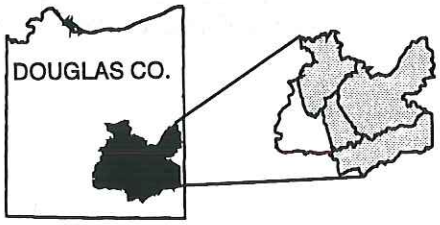
of Natural Resources
Watershed Management
March 1997

Study Area



### Water Quality

Water quality in the St. Croix Flowage is considered "very good" to "good" (mesotrophic to marginally eutrophic). It is a soft water system which can be interpreted to mean the water is not considered sensitive to acid rain. The shallowness of the flowage prevents any significant thermal stratification. The fishery consists of bluegills, largemouth bass and northern pike.

A shoreline inventory revealed that developed lots account for 10% of the total shoreline. Wooded shoreline accounts for 50% and wetlands account for the remaining 40%. The large percentage of undeveloped shoreline on the flowage provides good buffering to protect water quality. However, the large drainage area of this flowage does provide a substantial phosphorus load to the waterbody. Individual phosphorus sources will have a small impact on phosphorus concentrations in the flowage, however impacts are additive and protecting and improving the water quality of the flowage requires controlling all phosphorus sources to the extent practical. Protection of the natural shoreline should be a priority for future development and management of the existing development to protect water quality and shoreline habitat.

## Upper St. Croix Lake Subwatershed (USC)

### Description

Upper St. Croix Lake has been designated an Outstanding Resource Water. It is an 855 acre lake with a maximum depth of 22 feet. Five named and four unnamed perennial streams, and several intermittent streams feed into the lake. The lake has roughly 9.5 miles of shoreline, and about 60% of the shoreline is developed by 235 riparian property owners. The lake is an appealing attraction for a wide variety of recreational pursuits for the visiting public and the local land owners. Starting as early as the late 1970's a sanitary sewer system was planned and implementation began for the Village of Solon Springs and the riparian residents around the lake. Today, only a few homes on the southwestern corner of the lake have private sewage systems. The Village of Solon Springs (pop. 590) and Lucius Woods County Park are located on the west shore of the lake. Summer algae blooms and poor water clarity are known to occur. The extent of aquatic plant growth is also a concern to lake users.

The Upper St. Croix Lake subwatershed includes Upper St. Croix Lake and 9 perennial and intermittent tributaries (see Map 2-2). The tributaries include Leo Creek, Park Creek, "Evergreen Creek", "Smith Creek", Rock Cut Creek ("Sauntry Creek"), Beebe Creek, Catlin Creek, St. Croix Creek, and Jackson Creek. The subwatershed includes 23,585 acres (36.9 square miles). The lake has a surface area of approximately 855 acres and a maximum depth of 22 feet. Residential development exists along much of the shoreline. The Village of Solon Springs (pop. 590) and Lucius Woods County Park are located on the west shore. The Village and nearly the entire developed shoreline are sewered.

**Water Quality**

Phosphorus concentrations during spring and early summer indicate mesotrophic water quality conditions which are considered "good" to "very good". Late summer values indicate eutrophic conditions which are considered "fair" to "poor" water quality conditions.

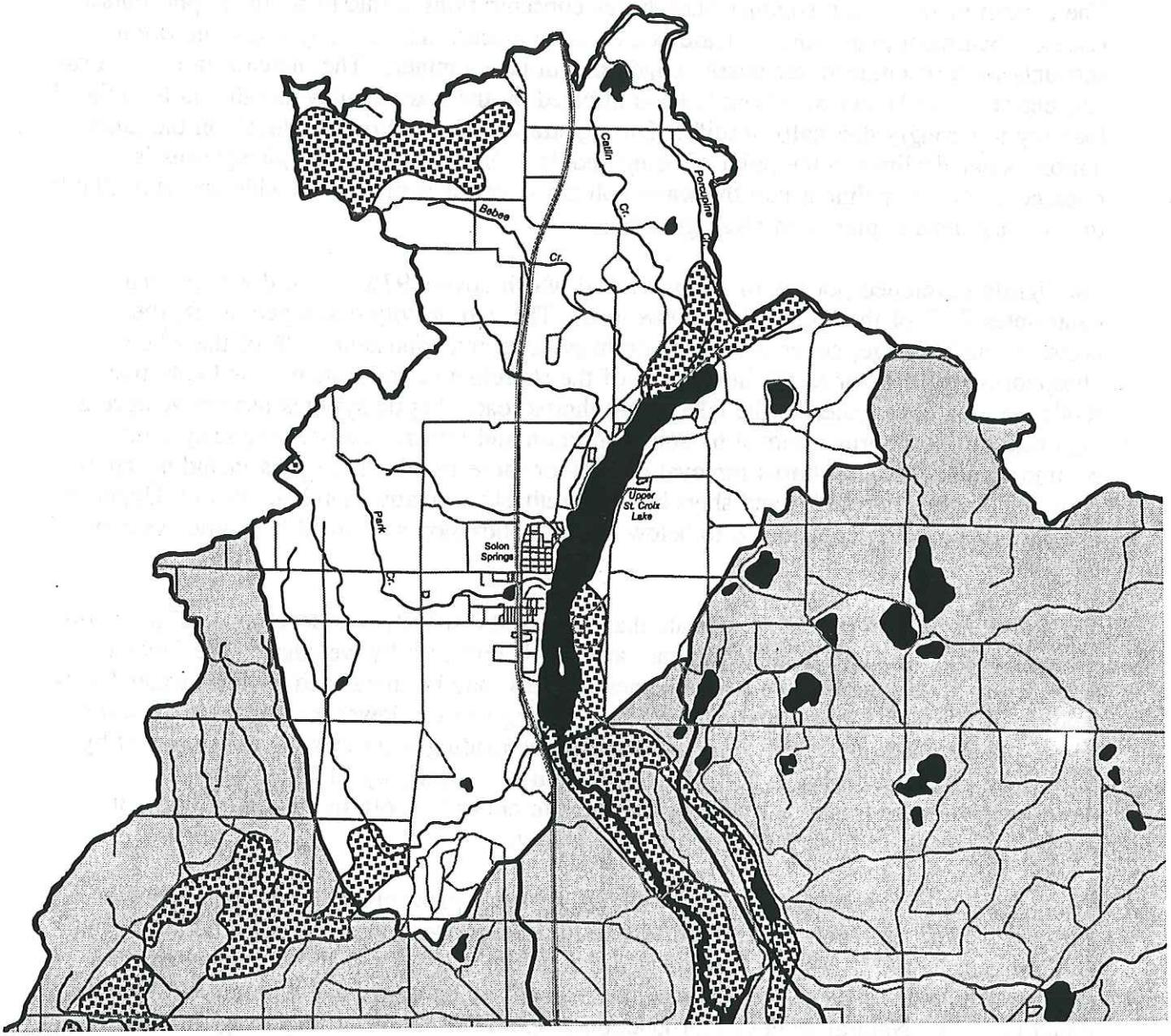
The pattern of increasing summer phosphorus concentrations is due to sediment phosphorus release. Sediment phosphorus release is a common occurrence in many lakes and often accounts for worsening water quality conditions in late summer. The increase in phosphorus concentrations in Upper St. Croix Lake is affected by the lakes shallow depth and the related inability to strongly thermally stratify. During stratification the oxygen levels in the lakes bottom water declines to the point of being anoxic. Once this happens, phosphorus is released from the sediment into the water column where it is mixed lakewide and is available to stimulate aquatic plant and algae growth.

The lightly developed portion of the watershed which covers 97% of the drainage area contributes 76% of the lake's phosphorus load. The two heavily developed areas, the lakeshore and Village, cover 3% of the drainage area and contribute 14% of the lake's phosphorus load. Prior to the installation of the shoreline sewer system, it is likely that septic systems contributed to the lake's phosphorus load. Septic systems usually achieve a high rate of phosphorus removal by soil absorption and mineralization. Septic systems commonly achieve phosphorus removal of 90% or more in most soil types including sands. However, high water tables and short building setbacks at many shoreline sites on Upper St. Croix Lake probably contributed to below average phosphorus removal by septic systems in the past.

The shoreline inventory results indicate that 67% of the shoreline is developed, 27% is still wooded within 5 meters of the shoreline, and 6% is bordered by wetlands. The inventory also identified 45 land owners who's homes and lots may be threatened by high water levels. Another 71 residents may experience partial flooding of their lower lots during high water levels. If measures are taken to reduce phosphorus loading from existing development by 50%, lake spring phosphorus concentrations could be reduced by 11%. Continued development of the watershed without measures to control runoff and the phosphorus it carries will result in further declines in lake quality.

The fishery is composed primarily of walleye, northern pike, bluegill, and black crappie. Historically lake sturgeon thrived and successfully reproduced until the construction of the Gordon dam in 1937. The dam eliminated the natural migration and recruitment from downstream areas. The remaining lake sturgeon are dying of old age with an 84"sturgeon found in 1993. Natural walleye reproduction is sporadic. Walleye fingerlings are stocked in alternating years to supplement that fishery. Local fisheries management identified sedimentation of the lower stretches of the lakes tributaries as a primary concern limiting the success of natural walleye reproduction. Fisheries management also identified lakeshore development as resulting in the loss or degradation of nearshore habitat either by removal of vegetation or by sedimentation.

# Map 2-2 Upper St. Croix Lake Subwatershed (USC)




Legend

- State Highway
- Local Road
- River or Stream
- Open Water
- Wetland
- Project Boundary

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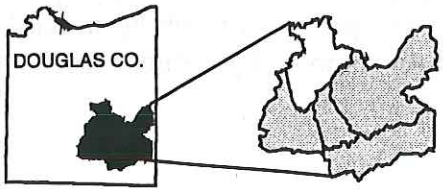
Study Area



## St. Croix River Subwatershed (SCR)

### Description

The portions of the St. Croix River included within the project boundaries includes only the portion between Upper St. Croix Lake and the St. Croix Flowage. The subwatershed includes 9123 acres or approximately 14.3 square miles and begins at the outflow from Upper St. Croix Lake (see Map 2-3). The river flows in a southerly direction for approximately 7.9 miles before entering the St. Croix Flowage just west of the Town of Gordon. A commercial cranberry marsh is located along the river.

### Water Quality

The margins of the stream lack well defined banks in most areas and instead are bordered by wetlands. The river lacks large deep pools which limits the number of large predatory fish in this section of the river. The macroinvertebrate community is in good condition.

## Eau Claire River Subwatershed (ECR)

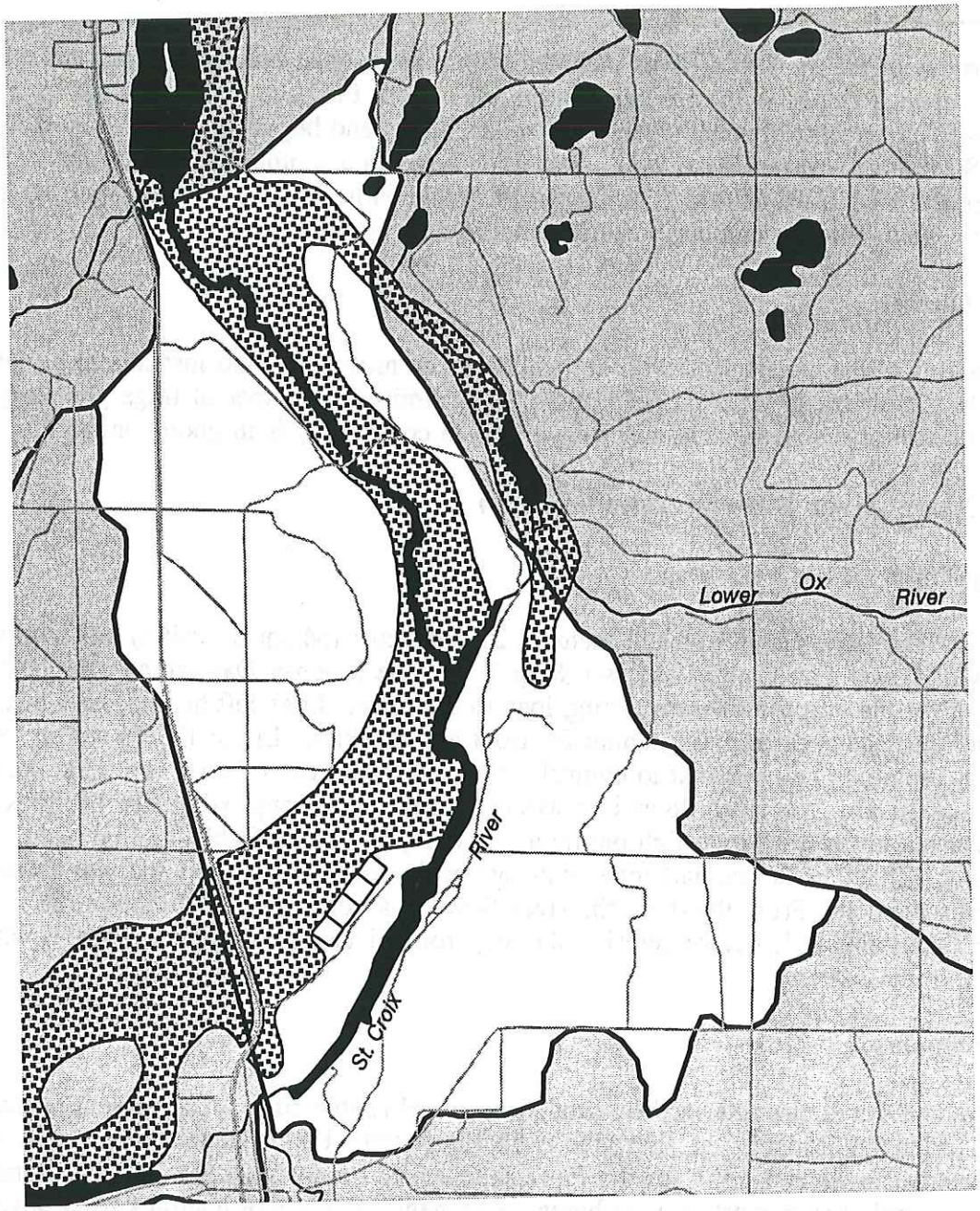
### Description

The Eau Claire River subwatershed includes 21,868 acres (34 square miles) and begins at the outflow of Lower Eau Claire Lake (see Map 2-4). The Mooney Dam creates the lake and was built for the purpose of transporting logs to the river. Logs left behind from this operation provide excellent fish habitat for trout and muskies. In the 1930's and in 1996, the dam was repaired and upgraded to control water levels on Lower Eau Claire Lake and the Eau Claire River. The river flows in a westerly direction for approximately 12 miles before being backed up by a 24 foot high public utility dam, owned by Dahlberg Light and Power Company. This dam is one half mile southeast of the Town of Gordon and was created for energy production. From the dam, the river flows in a northwesterly direction for approximately one mile before entering the St. Croix River just northeast of the Town of Gordon.

### Water Quality

The river habitat is characterized by sand with gravel rubble riffle areas present throughout the entire length. Most of the shoreline is well buffered. Future development poses a serious threat to water quality for the Eau Claire River. Efforts should be made to target erosion control during construction phases. Sediment and nutrient loadings from developing property with exposed soils can be hundreds of times higher than land with suitable vegetative cover. The 12 miles of river above the Eau Claire Flowage is categorized as a class III brown trout fishery indicating a lack of natural reproduction (WDNR 1980). Aquatic habitat could be greatly improved by increasing the amount of overhead cover and the regularity of deeper pools.

# Map 2-3 St. Croix River Subwatershed (SCR)




Legend

- State Highway
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- Project Boundary

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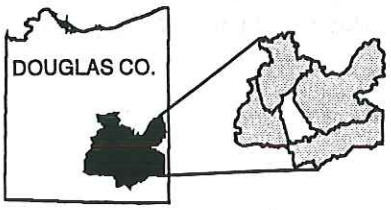
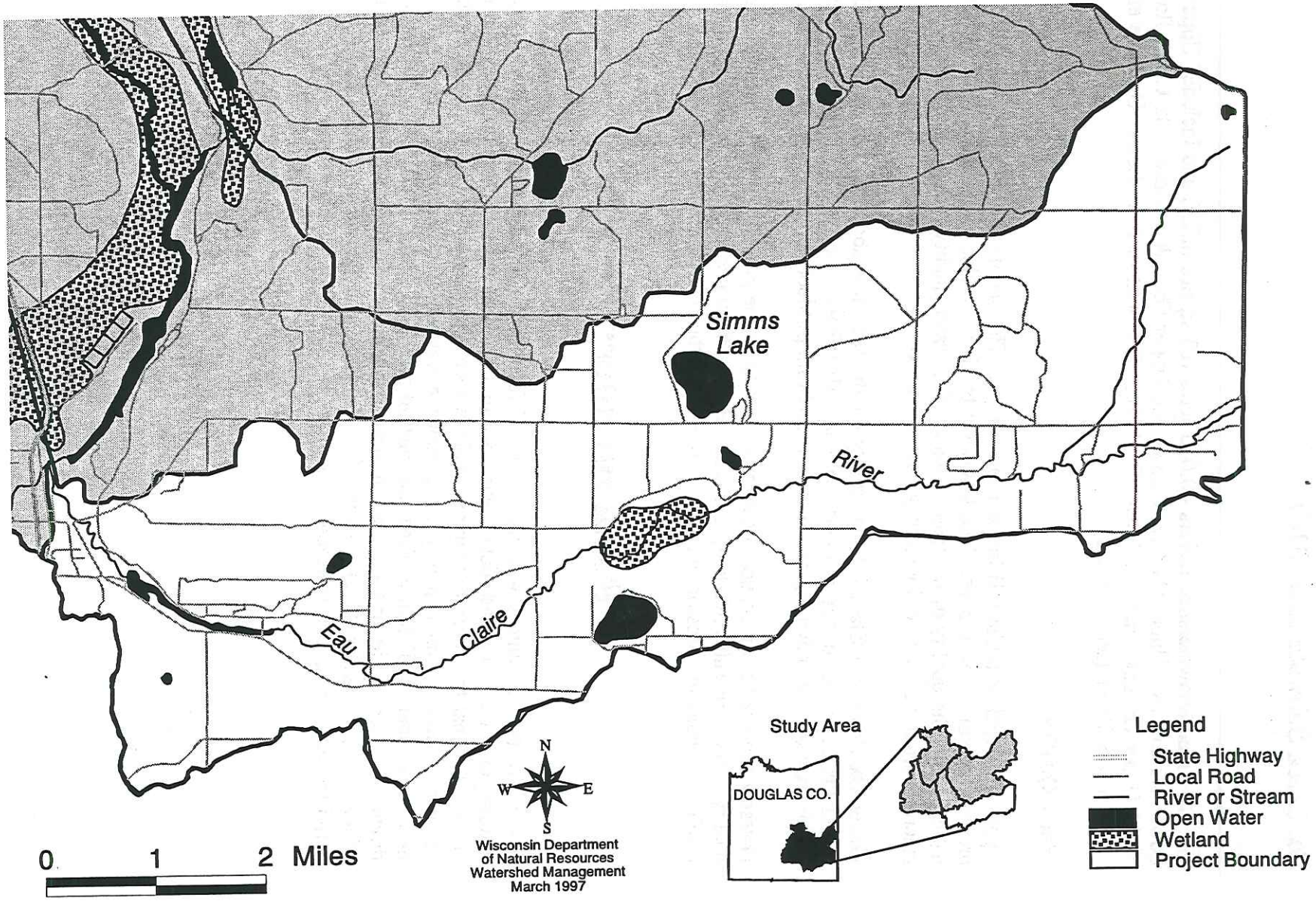
March 1997

Study Area



# Map 2-4 Eau Claire River Subwatershed (ECR)



## Ox Creek Subwatershed (OC)

### Description

The Ox Creek Subwatershed covers 40,030 acres (63 square miles) and includes Upper and Lower Ox Creeks. Upper Ox Creek flows into Upper Ox Lake. Lower Ox Creek flows out of the Upper Ox Lake and into Lower Ox Lake. The outflow from Lower Ox Lake enters the St. Croix River (see Map 2-5).

### Water Quality

Upper Ox Creek is a Class II brook trout stream. The quality of the habitat is limited by the presence of silt in most areas. The heavy silt burden combined with the lack of deeper pool habitat limits the quality of the trout fishery. The water quality rating based on the macroinvertebrate community structure is very good.

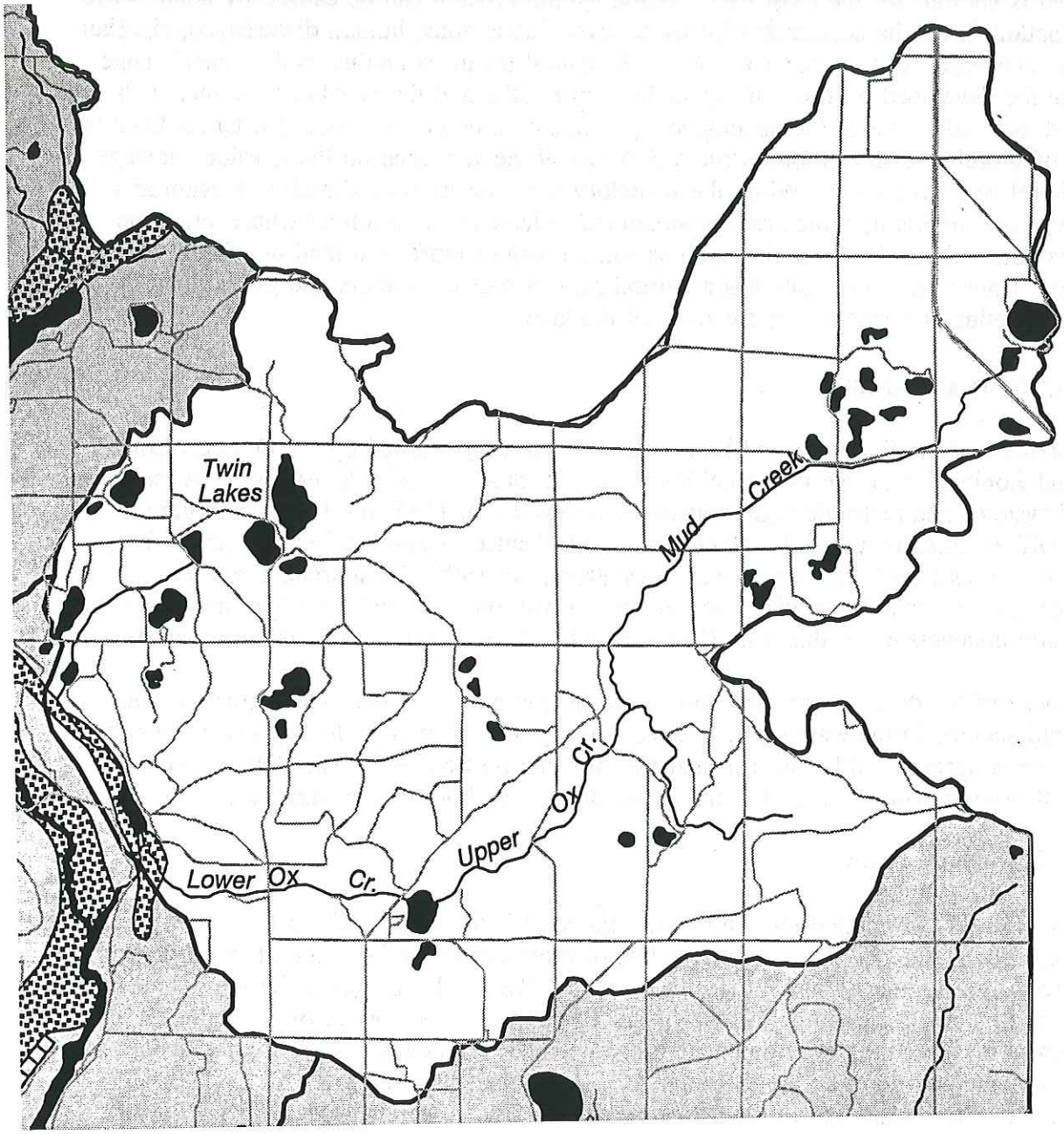
Lower Ox Creek is a Class II trout fishery for the first mile above Lower Ox Lake. Below Upper Ox Lake the stream is a marginal Class III fishery. Lower Ox Creek has gravel and rubble exposed for spawning and macroinvertebrate production.

Forestry and road maintenance practices appear to be the greatest existing threat to water quality within this subwatershed. As future development occurs, riparian land used may result in streambank erosion and a deterioration of the riparian zone.

# Rural Inventory Results

A standard NPS inventory was not conducted for this project, due to its relatively pristine natural conditions. Instead, developed riparian areas, common forestry practices and road and recreational trail construction and maintenance activities underwent a qualitative analysis of their impacts on water quality throughout the watershed. These inventories do not measure standard pollutant loading, but instead provide a series of observations on potential threats to water quality at this time. A similar inventory will be conducted at the conclusion of the project to assess the effectiveness of watershed management strategies and educational activities outlined in this management plan.

# Map 2-5 Ox Creek Subwatershed (OC)




Legend

- State Highway
- Local Road
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- Project Boundary

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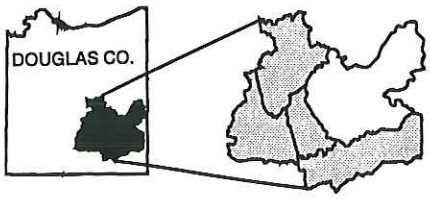
Study Area



## Shoreline Erosion

The shoreline erosion occurring on the lakes in the Upper St. Croix - Eau Claire Rivers watershed is natural, for the most part. While natural erosion can be caused by wind, wave and ice action, it can be accelerated by water level fluctuations, human disturbance, riparian land uses and some recreational activities. Manicured lawns extending to the water's edge dominate the developed portions of Upper St. Croix Lake and the Gordon Flowage. It is estimated that 7,000 feet of the developed riparian shoreline on the Upper St. Croix Lake is in need of shoreline stabilization, while 5,300 feet of the shoreline on the Gordon Flowage needs shoreline stabilization. While the inventory does not identify shoreline erosion as a major sediment problem, some eroding streambanks have been identified where shoreline habitat is being affected. Variables such as soils, upland runoff, and land use factor into site variables. Upper St. Croix Lake has a natural ring of rocks, boulders and gravel that provide shoreline protection in many areas of the lake.

## Development Pressure

The shorelines of the St. Croix and Eau Claire Rivers are governed by the Douglas County Shoreland Zoning Ordinance that specifies increased lot sizes, setback requirements, sewage disposal systems and restrictions on vegetation removal. In 1985, the Douglas County Zoning Office upgraded their Shoreland Zoning Ordinance, giving further protection from development pressures to the areas' water resources. In 1996, the shoreland zoning ordinance was amended to provide even greater protection for "wild lakes" in the region that are literally undeveloped at this time (See Appendix G for a summary of this ordinance).

The purpose of the development assessment was to see how well the 1985 ordinance was being implemented in the watershed. Approximately half of the development of Upper St. Croix Lake is unregulated because jurisdiction for that portion of the lake falls under the Village of Solon Springs, which has no requirements for shoreline development.

### 1) Eau Claire River

There are 37 developed lots on the 13-mile stretch of the Eau Claire River that are included in the watershed project. Nine of these are in the last mile of the Eau Claire River, just before it empties into the St. Croix River. In this area, the Eau Claire runs through a small development strip in the Town of Gordon. Most of these nine lots are typical of shoreline development in the watershed; the lawns are mostly cut, fertilized and manicured down to the shoreline. It is assumed, however, that all of these lots were in place years before the 1985 ordinance. The remaining lots are well spaced, and most are adhering to the 200 foot setback requirement and are maintained with primarily natural vegetation. In addition to requiring a building setback, the Douglas County ordinance also requires that a vegetated buffer strip, minimally 35 feet wide, be retained on the shoreline of each lot that is developed on the river.

The entire Eau Claire River area currently has high water quality and is likely to see further development.

**2) St. Croix River**

The St. Croix River flows for eight miles between the mouth of Upper St. Croix Lake and the St. Croix Flowage. The largest development on the river is the Northland Cranberry Bog and no data exist on their impact to the water resources. Downstream riparian landowners report an increase in free floating algae mats and aquatic plants in the river over the last decade. There are only 21 other developments on the river, in the last two miles before the St. Croix River empties into the St. Croix Flowage. Overall, this 8-mile stretch exhibits high water quality.

**3) St. Croix Flowage (Gordon Flowage)**

There is very little development pressure on the Gordon Flowage. Only 7% of the shoreline is developed. This development is in concentrated areas on the southeast and northcentral quadrants of the flowage. The remaining 93% of the land, including Bubar and Wilcox Islands, are under special management protection status with Douglas County. This special status precludes any development on these lands. Therefore, there is little opportunity for further development on the flowage.

The 58 developed lots on the shoreline of the Gordon Flowage do not appear to heavily impact the water quality. 83% of the developed shoreline has been altered from its natural pine/fir cover type to primarily intensively groomed lawns. Most lawns are devoid of weeds indicating regular fertilizer and pesticide use. This method of lawn maintenance has resulted in the loss of natural buffering to the flowage. The riparian landowners' greatest concerns are fluctuating water levels and the significant quantities of aquatic vegetation in the flowage.

**4) Upper St. Croix Lake**

Upper St. Croix Lake is heavily developed. Approximately 60% of the shoreline is developed with 235 riparian lots. The west side of the lake, under the jurisdiction of the Village of Solon Springs and the Town of Solon Springs is about 75% developed, with the remaining 25% in its natural wetland condition. The east side of the lake, under the jurisdiction of the Town of Solon Springs is about 43% developed with approximately 30% developable land remaining and 25% in wetlands. As with other urban areas, runoff from developed areas along lakeshores contains phosphorus, pesticides, sediment and heavy metals. These pollutants are generated in a very narrow band and proximity to the lake increases the likelihood that these pollutants will have an impact on water quality.

Streets, roads, rooftops and ditches between properties can all export heavy metals, sediments and phosphorus to the lake. 86% of all developed lots (202 lots) are kept as

manicured lawns and can contribute significant quantities of pollutants to the lake due to the application of fertilizers and pesticides.

The quality of runoff that actually enters the lake is determined by the amount of infiltration and filtering that occurs before it reaches the water. In its natural state, Upper St. Croix lake is surrounded by dense forests and wetlands and is capable of filtering large quantities of organic pollutants from runoff. The development patterns seen around Upper St. Croix Lake, Lake of the Woods, and others, has resulted in the removal of this natural buffering area. Loss of permanent vegetative cover certainly contributes to the eutrophic conditions of the lake in late summer. The natural shoreline vegetation, now diminished, also serves as valuable habitat for fish and wildlife. These conditions point to the need for a concentrated educational effort and improved enforcement of the 1985 Douglas County Shoreline Zoning Ordinance.

## Road Maintenance and Construction Activities

Roadways contribute to the sedimentation of the surface waters in the watershed. Many dirt and gravel roads are purposely constructed to have runoff move off the road surface either through ditching or as the road crosses a stream. In either case, excessive sedimentation can occur, which in turn eliminates habitat for aquatic insects who support the base of the riverain food chain. Sediment can also fill in pools and in a typical scenario, impact a healthy pool to riffle ratio necessary to fish populations along a stream channel. As the sediment reaches the mouth of the creek at the lakeshore, the flow slows down and sediment is deposited, resulting in the filling of valuable wetlands on the lake. This sediment combined with run-off from developed areas around the lake, provide a source of phosphorus to the watershed that reduces water quality.

A qualitative assessment method was developed by the project's inventory team (DNR, NRCS, Douglas County LCD) to gauge road erosion levels in relative terms. Key components of the assessment were runoff movement, relative volume of runoff, and culvert design. More than 180 road crossings near surface waters, including boat landings, were inventoried, representing 13.5 miles of road. The evaluation revealed that 36.4% of these sites were causing moderate to heavy erosion, although specific amounts of sediment loading into the watershed were not determined. This erosion is already adversely impacting water quality and contributing to the eutrophic conditions in Upper St. Croix Lake during late summer.

## Forestry Activities on Public Lands

Due to limited amounts of time and resources, only publicly owned forested lands were inventoried (25% of land use in the watershed). All timber harvests believed to impact surface water resources, and all timber harvests conducted throughout the watershed between 1991-96 were inventoried. Wisconsin's Forestry Best Management Practices for Water Quality (Holaday, 1995) was referred to during the inventory process. A

total of 15 timber harvests were inventoried, representing 1,152 acres. Fourteen of the timber harvests were jack pine forests that were clear cut.

The results of the assessment of 15 timber harvests indicated that there were no actively eroding sites visible and the sites were not causing long lasting impacts to the water quality in the watershed. Three of the 15 harvest sites assessed caused some water quality degradation during harvesting, due to the location of skid trails and roads situated within the riparian management zone. An inventory of all the roads and forestry skid trails throughout the watershed indicated that Forestry BMPs were being rigorously practiced. Some moderate erosion was entering closed depressions on a handful of roads. Our findings are consistent with the findings of other assessments conducted on productive forested lands (Holaday, S., Wisconsin's Forestry Best Management Practices for Water Quality, 1995 and 1996).

## Recreational Trails

All snowmobile and known ATV trails were assessed for their impact on water quality. Generally, recreational trials are not a significant source of erosion or siltation to surface water resources in the watershed. Less than 10% of all trails inventoried exhibited signs of trail erosion. Many trails are accessible only during the winter and traverse across large wetland areas near and around the St. Croix River. The majority of these trails are managed by Douglas County Forestry and Parks Department. The heaviest recreational trail erosion occurs in the Park Creek subwatershed, a significant tributary to Upper St. Croix Lake. This trail is a non-designated, but heavily used ATV/snowmobile trail on the east side of Hwy 53 in the Village of Solon Springs. The trail runs between the Wisconsin Central railroad grade and the highway.

## Agricultural Activities

An inventory of the agricultural lands in the watershed was completed through review of existing land use records including USDA Farm Service Agency aerial slides taken between 1982-1996, aerial photos taken in 1986, topographic maps, and available soil and wetland maps. From this information, general crop history, crop proximity to open water and erosion potential were determined.

The majority of the crops grown in the watershed includes trees, small grains, hay and cranberries. The results of the office assessment indicate that 610 acres of cropland fields and cranberry beds have the potential to create some degree of water quality degradation.

Crops such as small grains, hay and tree plantations typically protect soils from excessive runoff and erosion, and reduce a field's potential to contribute to water quality problems. However, over fertilization through commercial fertilizer or manure applications has the potential to cause water quality problems due to the permeability of the sandy soils in the watershed.

Cranberry's are also produced in the watershed. Cranberry operations generally develop pest and nutrient management plans. Basic pest and nutrient management principles include economic justification for pest control and fertilization and selecting control practices that are environmentally sound. Further investigation, to be sure that a plan exists at each operation, is warranted.

Other issues related to agriculture include shoreland management, and nutrient and manure management. Funding should be provided to address agricultural shoreland management and to investigate the potential for a manure storage ordinance.

As a result of this review, three agricultural best management practices were identified for the protection of water quality in Douglas County.

* Agricultural Shoreland Management
* Nutrient and Pest Management
* Manure Storage and proper handling , application and storage of manure.

# Ordinances

## Shoreland Zoning Ordinance

Douglas County passed a shoreland zoning ordinance in October, 1985, as delegated by the Wisconsin Legislature under the authorization of SS. 59.971, 59.99, 87.30 and 281.81 Wisconsin Statutes. In 1995-1996, the Douglas County Ordinance Review Team developed a lake classification system that provided overlay districts for shoreland development based on lake characteristics. Based on this information, in 1996 Douglas County adopted a "Wild Lakes" designation to protect undeveloped, relatively small lakes as part of the Shoreland Zoning Ordinance.

The existing Douglas County Ordinance provides adequate protection for shorelands and water resources if it is fully enforced. The ordinance calls for a minimum set back of 75 feet for all buildings and includes a section prohibiting the removal of vegetation within 35 feet of the shoreline. The Partnership Group recommends the enforcement of this ordinance. The Group also recommends a review of the shoreland/wetland ordinance adopted by the Village of Solon Springs in 1989. This ordinance was developed to provide protection to the shoreland and water resources associated with Upper St. Croix Lake (see Appendix G).

## Construction Site Erosion

A number of local governments recognize that the cost of preventing water quality damage from erosion and sedimentation is often less than the cost of correcting damage from erosion. Also, many believe that the cost of preventing erosion damage should be borne by those benefiting from the development rather than by taxpayers paying to remove sediment from

ditches, culverts, streets, harbors, lakes, and streams. These local governments are developing or amending subdivision ordinances, zoning ordinances, and other local ordinances to include runoff and erosion control requirements for developing land areas.

Chapter 236 of the Wisconsin Statutes gives cities, villages, towns, and counties authority to control erosion from developing subdivisions and smaller land divisions. This chapter establishes the minimum standards and procedures for land division in Wisconsin. The chapter enables local governments that have an established planning agency to adopt subdivision ordinances that are more restrictive than the state standards. Several of these government units have included runoff and erosion control provisions in their ordinances. These ordinances typically require a developer to submit a detailed plan specifying control measure for minimizing erosion and runoff during and after development. Typically, before a final plat is filed the person who reviewed the erosion and runoff control plan visits the development site and certifies that the measures have been installed in accordance with the plan. The DNR suggests that the Wisconsin Construction Site Erosion Best Management Handbook (DNR Publication WR-222-93) be used as a reference for any development that occurs in the Upper St. Croix - Eau Claire Rivers Project.

At this time, there is less than an overall 5% rate of development in the watershed. Therefore, nonpoint sources of pollution caused by construction sites in upland areas of the watershed are not significant. This plan does not ask that the county pass a construction site erosion ordinance at this time. However, the Partnership Group recommends that local Town boards and the Village Trustees of Solon Springs consider the review and adoption of such an ordinance for pollution prevention purposes.

## Manure Storage Ordinance

Surface water and groundwater resources are at risk when animal waste storage facilities are improperly located, designed, or constructed. Manure overflows and storage facility failures are a serious threat to aquatic life. Counties adopt animal waste storage ordinances to prevent ground and surface water pollution by assuring the proper design, construction, location, and management of permitted facilities. An ordinance must meet the guidelines adopted by DATCP and cite the applicable NRCS construction and management standards. Ordinances require permits for the installation, modification and major repair of animal waste storage facilities.

All counties required to adopt manure storage ordinances as part of their project must adopt ordinances to control manure or repay all of the NPS grant at the end of the project.

At this time, Douglas County does not have an existing Manure Storage Ordinance. As only 1% of the land use in the watershed is agricultural, there is no data supporting the need for a county manure storage ordinance. The Partnership Group recommends that the Ashland, Bayfield, Douglas, and Iron Counties Land Conservation Department (ABDI-LCD) conduct a county-wide manure storage analysis and report their findings to the Douglas County Board of Supervisors.

# Other Pollution Sources

Many pollution sources contributing to surface water quality degradation in the watershed are typically not addressed by the priority watershed project. Control of these pollution sources occurs through other state and county regulatory programs, as described below.

## Groundwater Quality

With the exception of one VOC contaminated well in the Village of Solon Springs (see below), there is little evidence of significant contamination problems with water supply wells in the watershed. The groundwater is soft with hardness averaging about 50 mg/l (as $CaCO_3$).

Sandy soils, shallow water table depth, and shallow well depths in the watershed are conditions conducive to the development of some types of contamination problems. The sandy soils allow rapid infiltration and tend to be poor filters of some chemical contaminants. Sandy soils do, however, effectively filter bacteriological contaminants. Chemical contaminants which can be a problem in sandy areas include nitrate, pesticides, and volatile organic compounds.

The drinking water standard for nitrate is 10 milligrams/liter (as nitrogen). Concentrations above this can cause methemoglobinemia in infants, a condition which reduces the blood's ability to conduct oxygen. Potential sources of nitrate contamination of groundwater include nitrogen fertilizer, manure accumulations, and septic systems. Agricultural activities in the watershed are very limited and there are very few heavily fertilized fields and manure accumulation sites. Septic systems can cause very localized nitrate contamination of groundwater, but proper well placement can usually avoid this problem. Areas with high densities of septic systems can develop more widespread nitrate contamination.

Pesticide contamination of groundwater most commonly results from agricultural application of herbicides or from spills at pesticide storage sites. There are few herbicide-treated fields and no pesticide storage sites in the watershed.

Volatile organic compounds (VOC's) are components of petroleum products and various cleaning solvents. VOC contamination of groundwater can occur from leaking underground fuel storage tanks, from surface spills of fuels or solvents, or from improper disposal of fuels or solvents.

VOC contamination is known or suspected at several sites in the watershed. In the Village of Solon Springs VOC contamination of groundwater is documented along both sides of Hwy. 53 near the intersection with C. H. A. Underground fuel tanks have been removed from one site west of Hwy. 53 and additional monitoring will be conducted to determine the effectiveness of clean-up efforts. Two other fuel storage sites west of Hwy. 53 have been identified as potential problems and are being evaluated. A water supply well on the east

side of Hwy. 53 has been contaminated by VOC's. Testing of other water supply wells in the area has found no further contamination. Petroleum-like odors have been noticed intermittently along Park Creek, both immediately east of Hwy. 53 and further downstream in Lucius Woods Park.

In the Town of Gordon, VOC contamination of groundwater has been documented at three fuel storage sites. Clean-up efforts are underway at all three sites. No water supply wells have been found to be contaminated. However, one well was replaced because it was in imminent danger of contamination.

Several shallow monitoring wells and two existing free-flowing wells located along the shoreline of Upper St. Croix Lake and the St. Croix Flowage were sampled during the 1995 appraisal. These wells were sampled to document the quality of groundwater discharging to these water bodies. Sample results are listed in the water quality appraisal report prepared for this watershed project. Phosphorus concentrations were of primary concern due to the influence of phosphorus on algae growth. Seven wells located adjacent to uplands had total phosphorus concentrations ranging from 7 to 60 micrograms/liter (ug/l) with a mean of 19 ug/l and a median of 11 ug/l. Two wells located adjacent to wetlands had total phosphorus concentrations of 29 and 52 ug/l. All these values are within the range commonly found in Wisconsin groundwater and suggest there are no atypical phosphorus sources influencing groundwater.

One well located on the southwest shore of the St. Croix Flowage had a phosphorus concentration of 276 ug/l which is very high for groundwater. This was a free-flowing monitoring well with a depth of only four feet. Iron concentrations in this well also appeared to be high as evidenced by heavy deposits of iron bacteria in the discharge from the well. The reason for the high phosphorus concentration is unknown. There are no wetlands upgradient of the site. C.T.H. Y is upgradient of the site. Past deposition of fill or waste material could be possible. Natural geologic conditions such as a buried wetland is another possibility.

Chloride concentrations in most shoreline wells are elevated. Natural background concentrations of chloride in local groundwater are less than 1 milligram/liter (mg/l). Seven of the nine wells had chloride concentrations ranging from 2.3 to 27.1 mg/l. Road salt application is probably the primary source of the elevated chloride concentrations. Fertilizer use may be a secondary source at some sites. These concentrations of chloride are relatively low and are not harmful to aquatic life. Previously identified sites that pose potential groundwater quality problems in the Upper St. Croix Lake - Eau Claire River watershed include those in Table 2-4.

**Sewage Treatment Systems**

Discharges of wastewater from permitted municipal and industrial sources are important considerations for improving and protecting surface water resources. Chapter 281, Wis.

Stats., requires any person discharging pollutants into the waters of the state to obtain a Wisconsin Discharge Elimination System (WPDES) Permit issued by the DNR.

**Table 2-4 Sites that pose potential groundwater quality problems in the Upper St. Croix - Eau Claire Rivers Watershed***

| Site Name | DNR List | Address | Priority |
|---|---|---|---|
| Bednar Oil Co. | Spills | Hwy 53, Solon Springs | High |
| Gordon Correctional Center | L.U.S.T.** | CTH G, Gordon | Medium |
| Heinz Oil - Gordon Bulk Station | L.U.S.T. | Gordon | High |
| L & R Motors | L.U.S.T. | USH 53 & CTH Y, Gordon | High |
| Hwy 76 | L.U.S.T. | USH 53 & CTH Y, Gordon | High |
| H & H Marine (Formerly) | L.U.S.T. | 711 Hillside Street Solon Springs | High |
| Mosinee Paper | L.U.S.T. | CTH A, Solon Springs | High |
| Prevost's Restaurant | L.U.S.T. | HWY 53 & CTH A, Solon Springs | High |
| Smith Union 76 Station | L.U.S.T. | HWY 53, Solon Springs | High |
| Solon Springs Bus Garage | L.U.S.T. | 8993 E. Baldwin Ave. Solon Springs | Medium |

* These sites were listed in DNR Publication SW-144, The Wisconsin Remedial Response Site Evaluation Report (1995) which lists Superfund sites, solid and hazardous waste disposal sites, leaking underground storage tank sites and reported spill sites.

** L.U.S.T. stands for Leaking Underground Storage Tank.

## Municipal Waste Water Treatment

Sanitary sewer service is available to residents of the Town of Gordon, much of the Village of Solon Springs and the town of Solon Springs. Wastewater generated by the residents of

Gordon (the Gordon Sanitary District) is pumped to the Solon Springs wastewater treatment facility. The wastewater treatment facility consists of aerated lagoons with discharge of the treated water to seepage cells where the water can filter through the soil before eventually reaching the groundwater. Wastewater generated by residents outside of the areas served by the sanitary system is disposed of through private on-site systems.

**Private Sewage Systems**

Septic systems consist of a septic tank and a soil absorption field. Septic systems fail due to soil type, location of system, poor design or deferred maintenance (such as not emptying tanks). Pollutants from septic system discharges are nitrates, bacteria, viruses and hazardous materials from household products. Generally, in the Upper St. Croix Lake - Eau Claire Rivers Watershed, the majority of soils are suitable for conventional septic tank soil absorption systems.

Counties can choose to participate in the Wisconsin Fund program. Douglas County is not presently participating in the Wisconsin Fund program. This program has been available since 1981 and is a Private Sewage System Replacement Grant Program. The program offers financial assistance designed to help eligible homeowners and small business operators offset the costs of replacing a failing septic system. The program is typically administered by the County Zoning Department. The grant program applies to principle residences and small businesses built prior to July 1, 1978, and is subject to income and size restrictions. Seasonal homes are not eligible for participation in this program. Douglas County also has a revolving grant program that provides low interest loans to qualified rural residents to replace failing septic systems and wells. Interested individuals should contact their county zoning department for more information.

# CHAPTER THREE
# Water Quality Goals and Project Objectives

The Upper St. Croix - Eau Claire Rivers watershed project is unique due to its heavily forested land cover and generally pristine nature. The project is protection oriented, and planning for the project has been driven by a Partnership Group. The "Partnership Agreement Model" concept involves various groups and organizations that have a stake in the long term health and management of the watershed, and who are committed to protecting the watershed (see Chapter 4 for more information about the Partnership Agreement Model). A listing of the groups involved in the Partnership is listed in Appendix A. DNR staff, with assistance from Douglas County Forestry Department, Ashland-Bayfield-Douglas-Iron Counties (ABDI) Land Conservation Department, and UW Extension staff, and the Partnership Group established water quality goals and project objectives for the watershed project.

The overall vision of the project is to promote voluntary citizen involvement through the use of educational tools that stress the importance of water quality protection in sustaining the pristine character of the watershed. This can be best accomplished through the involvement of the various groups that have committed their time and resources to the Partnership Group. The protection and partnership focus of this project invites local people to be the driving force for protecting the watershed's valued natural resources. The partnership agreement will focus primarily on Upper St. Croix Lake and the Gordon Flowage, but will not be limited to these areas of the watershed.

Lake water quality, once degraded, is often difficult or impossible to fully restore. The protection orientation of this project will focus on the prevention of water pollution from existing and future land uses. This project will consider the ecosystem of the watershed, including fish and wildlife habitat and other natural functions. The watershed project will focus on:

* **Nutrient reduction:** Nutrients are carried in runoff from developed riparian lots, roadways, and agricultural areas.

* **Reduction of erosion and sediment loading:** Sources of erosion and sediment loading include roads, developed riparian shoreline, forestry practices and agricultural practices.

* **Riparian Habitat Restoration:** Areas targeted for Riparian Habitat Restoration include developed riparian lots.

## Priority Issues

The project's Partnership Group, along with DNR staff, UW Extension, the Douglas County Forestry Department and the ABDI Land Conservation Department identified Priority Issues to be addressed by the watershed project. These were further added to by the project's Integrated Resource Management Team (See Appendix C). The Partnership Group brainstormed 42 issues that they believed could contribute to the denigration of water quality in the watershed (see Appendix D). Additionally, a survey was mailed to about 150 watershed residents to determine what their concerns about water quality are, and their interests in the project. The following issues emerged as most important:

1. Watershed related education programs and promotional activities.
2. Development and riparian management.
3. Road maintenance and construction activities.
4. Development of strong watershed management activities.

## I) Educational Programs & Promotion

Goal: To educate citizens, civic leaders and decision makers about how their personal actions and decisions affect water quality, and the importance of taking positive action to protect the water resources in the watershed.

Objectives:

1. To develop an information exchange between all partners in the watershed project - citizens, government agencies, organizations, local government and legislators - for making decisions for water quality protection.

2. To inform watershed residents about the goals and activities of the watershed project through promoting and demonstrating best management practices (BMPs) for the protection of water resources.

3. To teach residents (especially riparian landowners) how to minimize phosphorus, sediment and other polluting inputs from entering the watershed from their property and septic systems.

4. To recognize watershed residents for their participation in the watershed program.

5. To inform watershed visitors about how their use of the resources and their personal actions can affect the watershed.

6. To encourage local government officials to adopt minimum standards that guide future growth and development on riparian lands throughout the watershed.

7. To teach youth about the importance of protecting the surface and groundwater resources in the watershed, how their personal actions can affect water quality and how they can help to protect water quality.

8. To involve students in water quality monitoring activities and information gathering to be shared with local decision makers.

9. To provide informational and educational activities for youth that instill an environmental ethic and respect for the outdoors.

10. To protect the watershed from destructive exotic aquatic and plant species.

## II) Development and riparian management.

Goal: To guide current and future development to optimize water quality and biological integrity throughout the watershed.

Objectives:

1. To solicit local government support and participation in the watershed project. To encourage local governments to develop a land use plan for the watershed that includes the review and consideration of water resource protection ordinances (i.e. stormwater management, construction site erosion control and shoreland/wetland zoning, etc..).

2. To assist the Village of Solon Springs in developing a stormwater runoff management plan to minimize water quality impacts to Upper St. Croix Lake.

3. To encourage improved implementation of existing water quality protection ordinances.

4. To reduce shoreline/streambank erosion and restore vital riparian habitat on at least 25% of the developed riparian lots throughout the watershed.

5. To reduce the use of pesticides and fertilizers on riparian lots throughout the watershed.

6. To reduce the runoff of pollutants and excess nutrients from riparian developments through the use of diversions or sediment/retention basins.

## III) Road Maintenance and Construction

Goal: To aid in the adoption of Best Management Practices (BMPs) on watershed roads during road maintenance and construction activities to protect the water resources in the watershed.

Objectives:

1. To educate developers, surveyors, zoning officials, local government officials and equipment operators about the importance of using BMPs for the protection of water quality, and about the proper installation and maintenance of the BMPs.

2. To facilitate an information exchange between towns and villages in the watershed, regarding BMPs to be utilized in conjunction with road construction and maintenance activities.

3. To reduce by at least 25% the impact on water quality from existing road maintenance practices.

4. To assist the county, towns, villages and private landowners in reviewing and implementing management plans on roads under their jurisdiction to minimize water quality impacts.

5. To demonstrate the proper installation of BMPs for controlling erosion and runoff from road maintenance and construction activities for each town and village within the watershed.

## IV) Development of strong watershed management activities.

Goal: To have relevant information and additional water quality data to develop a complex of practices to meet the water resource objectives of the project.

Objectives:

1. To develop a Partnership Agreement Model between units of government, lake associations, local educators, business groups, economic development organizations, and others interested in the future of the watershed who are willing to dedicate their time and other resources to facilitate the implementation of the watershed project.

2. To secure continued funding through the DNR's Nonpoint program and solicit added financial resources from other sources.

## V) Other Issues

In addition to the four priority issues identified above, two other issues were recognized as important.

### A. Forestry

Goal: To prevent degradation of water quality during site preparation and timber harvesting activities on public, private and industrial forests.

Objectives:

1. To provide training in Forestry BMPs for water quality protection to at least 25% of woodland landowners that harvest timber. Also, provide training to at least 50% of loggers, machinery operators and others involved in timber harvesting.

2. To conduct a demonstration activity that highlights Forestry BMP's for water quality protection.

**B. Agriculture**

Goal: To adopt agricultural BMPs for all agricultural activities within the watershed, focusing on agricultural shoreland management, nutrient and pest management, and proper manure handling, application and storage.

Objectives:

1. To assist agricultural producers in the watershed to promote farm planning, incorporating agricultural BMPs for water quality protection.

2. To restore wetlands to their original levels of functioning.

3. To reduce by 50% the number of farms whose animals have uncontrolled access to streams through the implementation of BMPs such as fencing, the purchase of conservation easements or the Wisconsin DATCP Agriculture Shoreland Management Program. To provide cost-sharing through the Priority Watershed Program to establish agricultural shoreland management zones.

4. To assist in the development of a county wide informational data base that identifies existing manure storage structures. Based on the information gathered, determine whether a manure storage ordinance should be developed for implementation throughout the county.

# CHAPTER FOUR
# Recommendations

## Introduction

This chapter identifies the means for implementing the management actions for nonpoint source pollution control described as part of this chapter. Protection oriented management activities are also described. The structure of the "Partnership Agreement Model", including its support teams and how the Partners will support the project into the future, will also be discussed. The success of this priority watershed project depends on the implementation of these nonpoint source pollution control strategies, as well as the on going involvement of the watershed's Partnership Steering Committee. This chapter also describes the eligibility criteria for cost-share funding for each best management practice. This chapter includes:

* A description of the "Partnerships Agreement Model".
* The best management practices (BMPs) needed to control nonpoint sources of pollution as described in Chapter Two;
* The cost containment policies;
* The cost-share agreement procedures;
* Schedules for implementing the project;
* The estimated project budget for cost-sharing, staffing, and for other support.

Best management practices control nonpoint sources of pollution and are identified in NR 120. Design and installation of all BMPs must meet the conditions listed in NR 120. Generally these practices use standard specifications included in the NRCS Field Office Technical Guide. In some cases additional specifications may apply. The applicable specifications for each BMP can be found in NR 120.14. The Department may also approve other alternative best management practices and design criteria based on the provisions of NR 120.15.

### Partnership Agreement Model

The Partnership Agreement Model (Northwest Michigan Resource Conservation & Development Council, Inc., 1991) empowers local residents to take ownership in a project by setting priorities and managing activities. The Partnership Agreement Model has been used

throughout the watershed planning process, and ideally, the Partners will be closely involved with the implementation of the watershed plan. The theme of a partnership agreement is for diverse groups and citizens who have a stake in the future of the natural, social, and economic resources of the watershed, to join together and take responsibility for the success of the project. The integration of people, programs and resources around the common goal of long-term protection of the watershed is what the partnership agreement is all about. A schematic drawing of the Partnership organization is depicted in Figure 4-1. This flow chart illustrates the relationship between the support teams, citizens and partners that make up the Partnership. The Partnership Agreement model is not binding, but is meant to instill a sense of ownership in the watershed project and provides a quorum that is critical in gaining technical, political and financial assistance. By bonding together as a Partnership, funding and agency staff resources will be more readily available than when fragmented, independent organizations request support.

The "Partnership Agreement Document" (see Appendix A) states the goals of the Partnership for the Upper St. Croix - Eau Claire Rivers watershed and commits the Partners to participating in the protection of the watershed into the future. By entering into the Partnership Agreement, the Partners recognize that the region's future quality of life and economic health are dependent on the protection and sustainability of the natural resources in the watershed. Most importantly, the Partnership Agreement sets the tone of balance between the health of the watershed and land uses, including growth and development, throughout the watershed.

Key components of this model are:

**1) Water Resource Interest:** Each individual and organization involved in the partnership is interested in reaching a personal goal through the Partnership Agreement process. The group has developed a shared vision that articulates their desire to protect the natural, social, and economic viability of the watershed.

**2) Driven by a Partnership Steering Committee:** The Partnership Agreement Model depends on strong leadership and involvement from special interest groups in the watershed. These groups may include local governments, state and federal natural resource management agencies, educators, citizens, lake associations and others. Representatives from each group will join together to form the Partnership Steering Committee.

**3) Roles Defined:** Organizational roles and responsibilities will be defined and understood by all partners.

**4) Communication:** The success of the Partnership Agreement depends on open and frequent communication between all members of the Partnership. Quarterly meetings will be held, and published minutes will be sent to all members of the Partnership, whether or not they attend meetings.

**5) Accounting:** Partners and other organizations that contribute monetary resources to the watershed project need to have a clear picture of where their money is being used in the watershed, and which specific Best Management Practices or other projects are being implemented due to their contribution.

**6) Public Relations:** The Partnership Steering Committee will seek adequate publicity and will have a well-developed educational component. Solid publicity and educational expertise will ensure that all citizens living within the boundaries of the watershed project will be knowledgeable about the project and the goals it is endeavoring to accomplish.

**Roles & Responsibilities**

The Upper St. Croix - Eau Claire Rivers priority watershed project focuses on protection of water resources and on the relationships and interconnections between the Partners. The Partnership Agreement model will facilitate the generation of ideas, demonstration projects and commitment to the preventative actions that will sustain the high quality water in the watershed. It is more cost effective to implement preventative activities in a watershed, including demonstration projects and educational activities, than it is to install remedial measures to correct problems that may develop. Additionally, the Partnership Agreement Model offers public involvement to anyone who wants to be included and an opportunity for each citizen to have a personal stake in the long term protection of the watershed.

In October, 1996 the potential Partners came together as a loosely formed working group. The group developed a list of priority issues and concerns. The Partners also developed the projects' goals and objectives, which were outlined earlier in Chapter 3. The group focused on identifying opportunities for protecting the water resources within the project, rather than focusing on remediation of existing water quality problems. The shared vision developed through the Partnership Agreement Model is:

> *To enhance water quality in the Upper St. Croix - Eau Claire Rivers Watershed by strengthening education and voluntary action, thus maintaining the biological integrity and natural character of the watershed.*

A schematic drawing of the Partnership organization is depicted in Figure 4-1. This flow chart illustrates the relationship between the support teams, citizens and Partners that make up the Partnership. It is estimated that within twelve to eighteen months, the Partnership Agreement model will have all the needed signatories to make up the Partnership Steering Committee (PSC) for implementation. The PSC will meet on a quarterly basis, while the absentee (seasonal) residents who are represented on Citizen Advisory Committee (CAC) arm of the Partnership will meet twice a year. Both meetings of the CAC will be held in the summer to allow seasonal residents of the watershed to attend. As the Partnership Steering Committee matures, it will aspire to become a "Watershed Protection Association".

The roles of the participants in the Partnership Agreement Model are as follows:

**Partners**

The partners in the project will endeavor to develop, design and implement runoff control demonstration projects and educational projects that will maintain or improve water quality in the watershed.

**Citizen Advisory Committee**

The watersheds' Citizen Advisory Committee (CAC) will review the projects' implementation strategies and make suggestions for improvement. One or two members of the CAC will serve on the Partnership Steering Committee and meet with them quarterly. The CAC will support and promote watershed activities.

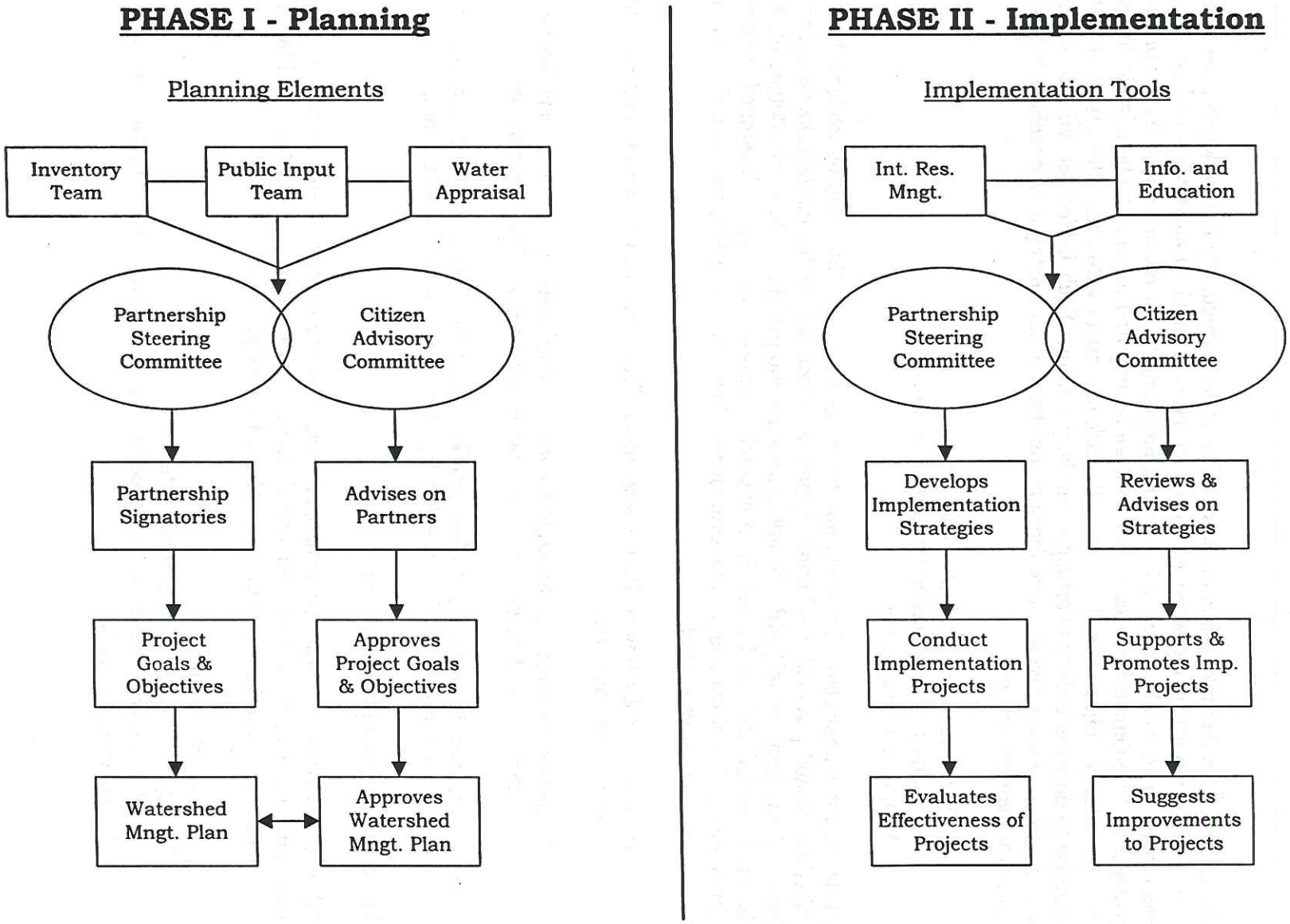
**Integrated Resource Management Team**

The Integrated Resource Management Team (IRM) can be considered a support team or subcommittee to the Partnership Steering Committee. One or two members of the IRM support team will serve on the PSC and meet with them quarterly. The IRM support team will offer technical assistance for the implementation of demonstration projects in the watershed. The IRM support team will focus on activities that will reduce or eliminate runoff that has the potential to degrade water quality.

**Information & Education Team**

The Information & Education (I&E) support team can be considered a support team or subcommittee to the Partnership Steering Committee. One or two members of the I&E support team will serve on the Partnership Steering Committee and meet with them quarterly. The I&E support team will assist the Partners in putting the educational strategies into action, as outlined in Chapter 5.

**Figure 4-1 Partnership Agreement Model**



# Development and Riparian Management Best Management Practices (BMPs)

Human activities that take place in the riparian zone, particularly in developed riparian areas, have a major impact on the water resources in the watershed. Landowners will be encouraged to adopt all shoreline best management practices recommended by the project manager and implementation team, but will not be required to do so to be eligible for cost sharing. Ideally, adjacent landowners will work in tandem with each other, but will not be required to do so in order to participate in the program. Each landowner will be provided with a comprehensive site analysis focusing on three water quality and shoreland habitat issues on their property:

a) Shoreline/Streambank Erosion
b) Suitability for Shoreline Habitat Restoration
c) Run-off Management

All landowners contacted will be eligible for a site analysis. Sites will be evaluated for cost effectiveness and practicality of implementation. Cost-sharing for the Developed Riparian Area Habitat Restoration BMP will not exceed $1,000 per site. The overall objective for shoreline/streambank stabilization is to maintain and restore balanced, integrated, adaptive communities of riparian and aquatic organisms. Wherever possible, the natural vegetation of the area will be incorporated.

Priorities for funding of Best Management Practices in Development and Riparian areas will be based on:

* Practices that restore shoreline habitat on developed riparian lots. The habitat on at least 25% of the developed riparian lots in the watershed will be restored.

* Practices that reduce shoreline erosion. Shoreline erosion will be measurably reduced on at least 25% of the developed riparian lots in the watershed.

**A) Shoreline/streambank erosion**

All bare and eroding shoreline/streambank reaches in the watershed will be eligible for best management practices. Priority for installation of best management practices will be given to those landowner who have one or more of the following:

1) actively eroding sites
2) large areas of non-vegetated surface
3) suburban type lawns that are greater than 30 feet wide within an area of 100 feet of shoreline/streambank.

**Eligible Sites:**

All lakes and rivers: Priority will be given to the inventoried shoreline and streambank segments on the Upper St. Croix Lake, St. Croix Flowage, St. Croix River and Eau Claire River that identify actively eroding sites. Approximately 7,000 feet of shoreline was inventoried on the Upper St. Croix Lake, and about 5,300 feet on the St. Croix Flowage. As other actively eroding sites on developed riparian lots are identified, they will also be eligible for best management practices.

Objectives:

* 1,750 feet of shoreline will be stabilized on Upper St. Croix Lake.
* 1,325 feet of shoreline will be stabilized on the St. Croix Flowage.

**Critical Sites:**

All lakes and rivers: A site will be designated as Critical if human activities result in a visible lateral recession rate of 1 foot/year or more on the shoreline(s)/streambank(s) or result in erosion rates of more than 10 tons/acre/year. No critical sites were found during the inventory process. If the erosion on a site is caused by natural forces such as wave action or fluctuating water levels, that site will not be considered critical. Only sites that are being impacted by human activities will be considered. Also, if there is no cost effective means of correcting a problem site, the critical designation will not apply.

As none of the shorelines/streambanks in the watershed are designated as Critical at this time, defining a Critical Site designation can be considered a proactive management strategy. Throughout the implementation phase of the watershed, the shorelines/streambanks will continue to be monitored. Through a strong information and education campaign and the Partnership Agreement Model used in the watershed design, critical shoreline/streambank sites will be avoided or resolved.

**Eligible BMPs:**

Shoreline Habitat Restoration Interim BMP[4]
(see Appendix E for more information)
Critical Area Stabilization (including bioengineering)
Grade Stabilization Structures
Grassed Waterways
Shoreline and Streambank Protection
Wetland Restoration
Shoreline Buffers

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[4]The Shoreline Habitat Restoration Interim BMP is being reviewed by the DNR's Watershed Management Section for its ability to protect water quality. Upon approval, the practice will be eligible for cost-sharing in this watershed project.

Diversions
Sediment Basins
Structural Urban Best Management Practices

**B) Shoreline/Streambank Habitat Restoration**

**Eligible Sites:**

All lakes and rivers: All developed lots that do not meet the 1985 Douglas County Shoreland Zoning Ordinance for vegetative removal requirements will be eligible for cost-sharing. Section 6.21 of the ordinance requires that no more than 30 feet in any 100 feet, as measured along the ordinary high water mark, may be clear cut to within 35 feet of the shoreline.

**Critical Sites:** None

**Eligible BMPs:**

Shoreline Habitat Restoration Interim BMP
(see Appendix E for more information)
Critical Area Stabilization (including bioengineering)
Grade Stabilization Structures
Grassed Waterways
Shoreline and Streambank Protection
Wetland Restoration
Shoreline Buffers
Diversions
Sediment Basins
Structural Urban Best Management Practices

**C) Run-off Management**

**Eligible Sites:**

All lakes and rivers: Eligibility will be determined by the implementation team and project manager on a case-by-case basis during the site analysis.

**Critical Sites:** None

**Eligible BMPs:**

Grade Stabilization Structures
Run-off management
Grassed waterways
Diversions

Sediment Basins
Shoreline Habitat Restoration Interim BMP
(see Appendix E for more information)
Critical Area Stabilization (including bioengineering)
Wetland Restoration
Shoreline Buffers
Structural Urban Best Management Practices
Shoreline and Streambank Protection

BMPs that are not cost shared, but may be used for water quality protection in developed riparian areas include:

Wildlife Upland Habitat Management
Wildlife Wetland Habitat Management
Lined Waterway/outlet
Woodland Improvement

# Agricultural Best Management Practices

While a conventional agricultural inventory was not performed in the watershed, information available indicates that farms that make up less than 1% of the land use in the watershed. Eligibility criteria for cost-sharing of the traditional agricultural BMPs will not be established for this plan. However, due to the rapid permeability and erodability of the sandy soils in this watershed, some agricultural practices do have the potential to impact water quality.

The BMPs listed in Table 4-1 are eligible for cost sharing assistance to correct water quality problems. In addition to the BMPs listed in the table, the BMPs listed below are also eligible for cost sharing. Landowner eligibility will be determined on a case-by-case evaluation to be completed by the Douglas County Forestry Department and the DNR's North West Region Nonpoint Source Coordinator. The eligibility criteria include, but is not limited to, estimated pollutant load reduction to be accomplished with each BMP, the cost of the practice and the potential impact of the nonpoint source on the water resources of the watershed if the pollution problem is not contained.

**Eligible Sites:**

Farms located throughout the watershed where livestock have unlimited access to streams will be eligible for cost-sharing. The length of streambank that the animals have access to will be reduced by 50%.

All agricultural producers in the watershed will develop farm plans. Farmers will be informed about crop rotation, agricultural shoreland management, nutrient and pest management and the proper management, handling and storage of manure.

**Critical Sites:**

Critical sites in agricultural areas are defined as any site where livestock have unlimited access to the stream, and 50% or more of that site is non-vegetated and actively eroding.

**Eligible BMPs:**

Critical Area Stabilization
Livestock exclusion fencing
Nutrient and Pesticide Management
Barnyard Runoff Management systems
Wetland restoration
Intensive Grazing Management
Manure Storage Facilities
Field Diversions
Terraces
Grassed waterways
Agricultural Sediment basins
Shoreline and Streambank stabilization
Shoreline buffers
Cattle Mounds
Roofs for barnyard runoff management
and manure storage facilities
Well Abandonment
High residue management
Spill Control Basin
Milking center waste control

# Road Maintenance and Construction Best Management Practices

The construction of roads removes the natural vegetative buffer that holds the soil and serves as a barrier for sediment reaching surface waters. Activities associated with the construction of new roads or the maintenance or construction of existing roads (including forest roads) have been identified as contributing nonpoint source pollution throughout the watershed and may result in the creation of gullies. Streams in the watershed have been affected by sedimentation due to human activities. Since cropland and cattle streambank erosion are seldom found in these areas, ephemeral and perennial gullying from roadway erosion are considered key sources of sediment loading in the watershed.

Douglas County Forestry Department conducted a road erosion inventory to determine the extent of the sediment being delivered to surface waters. (See Chapter 2 - Roadway Erosion

section for details.) In coordination with U-W Extension staff and Wisconsin Department of Transportation Staff, watershed staff will work with Douglas County and Gordon and Solon Springs Townships and the Village of Solon Springs Highway Departments to develop a program to improve maintenance on gravel roads and forestry roads in the county. Each of these municipalities will receive a demonstration grant for the installation of best management practices for roads.

Proper road maintenance and grading, as well as the use of Forestry Best Management Practices (see Wisconsin's Forestry Best Management Practices for Water Quality, Holaday, 1995) can decrease erosion by helping get the water off the road before it runs into creeks.

**Forest Roads:**

When forest roads are inactive for extended periods, closing the system will help to protect the road surface and the water quality protection structures. When logging projects are completed and the road is closed, all efforts should be made to install BMPs to minimize future erosion, as stated in Wisconsin's Forestry Best Management Practices for Water Quality, (Holaday, 1995, pg. 37.) Where sediment erodes into streams, lakes and wetlands, grading/critical area stabilization BMPs are recommended.

NR 120.14 (11)(b) also states that as a condition of cost-share eligibility, trees may not be sold during the operation and maintenance period for the BMPs. If cost-sharing for forestry practices are needed on an active forestry site which impacts water quality, a NR 120 code variance may be needed. Cost per ton of soil saved over a 10 year practice life should not exceed $40.00.

All newly constructed forest roads will be eligible for technical and design consultation from the Douglas County Forestry Department and Land Conservation Department. Cost-sharing will be provided for BMPs for closed roads (Holaday, page 37) and critical area seeding. These practices will only be available for closed logging roads where trees will not be sold throughout the 10 year life of the practices. In cases where traditional erosion control techniques are not acceptable for new, existing and closed forestry roads, Interim Best Management Practices and Alternative Design Criteria, as stated in NR 120.15, maybe requested by project staff. Use of interim BMPs is contingent upon DNR - NPS program approval.

Cost-sharing for Critical Sites for closed forest roads will be those sites delivering greater than 45 tons of sediment per year to surface waters.

**Town and County Roads**

Road construction and maintenance have been identified as one of the primary threats to the high water quality in the watershed. All gravel roads in the watershed are susceptible to erosion. Proper maintenance and grading can decrease erosion by helping get the water off the road before it runs into creeks. Ephemeral gulling is the most common source of

roadway erosion. Most erosion was found where grading of the shoulder produced a berm making it difficult for the water to flow off the road and away from the road. The result was erosion on the road sending tons of sediment to intermittent and perennial streams.

All gravel road construction and maintenance projects delivering significant amounts of sediment to surface waters within the watershed shall be addressed for erosion control. County and Township road crews will be encouraged to consult with the Douglas County Forestry and Land Conservation Departments before beginning road maintenance and construction projects. Douglas County project staff will advise the County and township road crews about proper road maintenance procedures. All road maintenance projects should comply with standards and specifications as stated in Wisconsin Transportation Bulletin, No. 5 "Gravel Roads" and Wisconsin Transportation Bulletin, No. 4 "Road Drainage".

Road construction sites over 5 acres are required to receive a WPDES permit. The permit should specify construction site erosion control standards consistent with those stated in the Memorandum of Understanding (MOU) reached between DOT and DNR. Construction and maintenance projects on private land that affect navigable waters of the State require a ch. 30 permit from DNR District Water regulation and zoning staff. Road construction and maintenance projects within municipal boundaries are required to be consistent with Administrative Code TRANS 207. Projects funded by the State are to be consistent with the MOU - liaison agreement between DNR and DOT.

Priorities for funding of Best Management Practices will be based on:

* Practices that reduce the nonpoint pollution delivered from roads to the streams and lakes in the watershed.

* Supporting the development of local village, town and county road management plans.

* Supporting the development of educational programs about proper road maintenance activities to protect water quality. The programs will be targeted to local road work crews, woodland owners, timber crews, and local officials.

<u>Eligible BMPs for the Purpose of Demonstration Projects</u>:

Critical Area Stabilization
Sediment basins
Diversions
Grassed Waterways
Wetland Restoration
Shoreline and Streambank Protection
Grade Stabilization Structures

# Forestry Best Management Practices

Timber activities that take place in the riparian management zone can have a major impact on water resources. Forest roads must be properly constructed and maintained to minimize sediment delivery from active forest sites. (See the previous section; road maintenance and construction BMPs). The Upper St. Croix - Eau Claire Rivers priority watershed project will be working closely with the local DNR Forestry staff to develop management plans for private landowners. Funding for Best Management Practices for forestry practices are not cost-shared through the NPS program, although they were identified by the Partnership Group as important. The Partners identified the following priorities:

* Training in the implementation of forestry BMPs should be provided to at least 25% of the woodland owners in the watershed.

* Training in the implementation of forestry BMPs should be provided to at least 50% of the loggers and other timber crews in the watershed.

# BMPs Eligible for Cost Sharing and Their Rates

Best management practices control nonpoint sources of pollution and are identified in NR 120. Design and installation of all BMPs must meet the conditions listed in NR 120.14. Generally, these practices use standard specifications included in the NRCS Field office Technical guide. In some cases additional specifications may apply.

If the installation of a BMP destroys significant wildlife habitat, NR 120 requires that habitat will be recreated to replace the habitat lost. Every effort shall be made during the planning, design and installation of BMPs to prevent or minimize the loss of existing habitat. The wildlife habitat restoration component of a practice is cost shared at 70%.

Following is a brief description of some of the most commonly used BMPs: A more detailed description of these practices can be found in NR 120.14.

**Shoreline and Streambank Stabilization.** The stabilization and protection of stream and lake banks against erosion and the protection of fish habitat and water quality from livestock access.

**Shoreline Buffers.** A permanently vegetated area immediately adjacent to lakes, streams, channels and wetlands designed and constructed to manage critical nonpoint sources or to filter pollutants from nonpoint sources.

**Shoreline Habitat Restoration (Interim BMP).** The establishment of a mixture of vegetation consisting of native trees, shrubs, grasses or wetland species on a strip or area of land along the shoreline of a lake or stream. The restoration will reduce the intensity of

human activities in the near shore area, enhance littoral zone functions and provide over wintering habitat for aquatic fauna dependent upon nearshore terrestrial habitat for a portion of their lifecycle.

**Nutrient Management.** The management and crediting of nutrients from all sources, including legumes, manure, and soil reserves for the application of manure and commercial fertilizers. Management includes the rate, method and timing of the application of all sources of nutrients to minimize the amount of nutrients entering surface or groundwater. This practice includes manure nutrient testing, routine soil testing, and residual nitrogen soil testing.

**Pesticide Management.** The management of the handling, disposal and application of pesticides including the rate, method and timing of application to minimize the amount of pesticides entering surface and groundwater. This practice includes integrated pest management scouting and planning.

**Field Diversions.** The purpose of this practice is primarily to divert water from areas it is in excess or is doing damage to where it can be transported safely.

**Contour Farming.** The farming of sloped land so that all operations from seed bed preparation to harvest are done on the contour.

**Intensive Grazing Management (Rotational Grazing).** Intensive grazing management is the division of pastures into multiple cells that receive a short but intensive grazing period followed by a period of recovery of the vegetative cover. Rotational grazing systems can correct existing pasturing practices that result in degradation and should replace the practice of summer dry-lots when this practice results in water quality degradation.

**Critical Area Stabilization.** The planting of suitable vegetation on nonpoint source sites and other treatment necessary to stabilize eroding lands.

**Grade Stabilization Structure.** A structure used to reduce the grade in a channel to protect the channel from erosion or to prevent the formation or advance of gullies.

**Agricultural Sediment Basins.** A structure designed to reduce the transport of sediment of other pollutants eroded from agricultural fields to surface waters and wetlands.

**Easements.** Easements are legally binding restrictions on land titles. Easements are purchased to provide permanent vegetative cover.

**Contour Stripcropping.** Growing crops in a systematic arrangement of strips or bands, on the contour, in alternate strips of close grown crops, such as grasses or legumes, and row-crops.

**Barnyard Runoff Management.** Structural measures to redirect surface runoff around the barnyard, and collect, convey or temporarily store runoff from the barnyard.

**Terraces.** A system of ridges and channels with suitable spacing and constructed on the contour with a suitable grade to prevent erosion in the channel.

**Grassed Waterways.** A natural or constructed channel shaped, graded and established with suitable cover as needed to prevent erosion by runoff waters.

**Wetland Restoration.** The construction of berms or destruction of the function of tile lines or drainage ditches to create conditions suitable for wetland vegetation.

**Manure Storage Facility.** A structure for the storage of manure for a period of time that is needed to reduce the impact of manure as a nonpoint source of pollution. Livestock operations where this practice applies are those where manure is winter spread on fields that have a high potential for runoff to lakes, streams and groundwater. The facility is needed to store and properly spread manure according to a management plan.

**Roofs for Barnyard Runoff Management and Manure Storage Facilities.** Roofs for barnyard runoff management and manure storage facilities are a roof and supporting structure constructed specifically to prevent rain and snow from contacting manure.

**Cattle Mounds.** Cattle mounds are earthen mounds used in conjunction with feeding and dry lot operations and are intended to provide a dry and stable surface area for cattle.

**Structural Urban Best Management Practices.** These practices are source area measures, transport systems and end-of-pipe measures designed to control storm water runoff rates, volumes and discharge quality. These practices will reduce the amount of pollutants carried in runoff and flows destructive to stream habitat. These measures include such practices as infiltration trenches, porous pavement, oil water separators, sediment chambers, sand filtration units, grassed swales, infiltration basins and detention/retention basins.

**Livestock Fencing.** The creation of an enclosure, separation or division of one area of land from another in such a manner as to provide a permanent barrier to livestock.

**Well Abandonment.** The proper filling and sealing of a well to prevent it from acting as a channel for contaminants to reach the groundwater or as a channel for vertical movement of surface water to ground water.

**Land Acquisition.** A governmental unit that is eligible for a Nonpoint Source grant may purchase land or an interest in land for the construction of urban structural practices or land that is contributing or will contribute to nonpoint source pollution.

# Eligibility for Wetland Restoration, Easements and Land Acquisition

## Wetlands

An inventory of the watershed wetlands was not conducted in conjunction with this project. Wetlands in the watershed are believed to have had limited negative impacts from development. However, it is believed that some wetlands may benefit from some restoration efforts and it is recognized that wetlands can play an important function in controlling nonpoint sources of pollution by filtering nutrients, settling sediments and trapping organic wastes from surface runoff. A secondary benefit of healthy wetlands is the enhancement of fish and wildlife habitat.

Wetland restoration is considered as a best management practice for the purpose of controlling nonpoint sources of pollution. Wetland restoration includes: the plugging or breaking up of existing tile drainage systems, the plugging of open channel drainage systems, other methods of restoring the pre-development water levels of an altered wetland, and the fencing of wetlands to exclude livestock.

For the purposes of this watershed, there will be no critical areas for wetland restoration. Priority will be given to restoring altered or impacted wetlands in any of the following conditions:

1. Cultivated hydric soils with tile or open channel drainage systems discharging to a stream or tributary.

   Wetland restoration will reduce the amount of nutrients and pesticides draining from the altered wetland to a water resource either by establishing permanent vegetation or altering the drainage system.

2. Pastured wetlands riparian to streams or tributaries.

   Eliminating livestock grazing within wetlands will reduce the organic and sediment loading to the wetland and adjacent water resource, and reduce the direct damage to the wetland from the livestock. Livestock exclusion by fencing will control the pollutants and restore the wetland.

## Easements

Nonpoint source program funds may be used to purchase land easements in order to support specified best management practices. These practices, all of which involve the establishment of permanent vegetative cover, include:

- Shoreline Buffers: vegetative areas which minimize nonpoint source impacts and other direct impacts to streams;

- Critical Area Stabilization: stabilization efforts needed on sites that either erode at an excessive rate, or have high sediment delivery rates to surface water;

- Wetland Restoration: areas where wetlands are intentionally restored or enhanced in order to improve their ecological values, such as natural filters of surface water.

Although easements are not considered a best management practice, they can help achieve desired levels of nonpoint source pollution control in specific conditions. Easements are used to support best management practices, enhance landowner cooperation and more accurately compensate landowners for loss or altered usage of property. The benefits of using easements in conjunction with a management practice are: 1) riparian easements can provide fish and wildlife habitat along with the pollutant reduction function; 2) easements are generally perpetual, so the protection is longer term than a management practice by itself; and 3) an easement may allow for limited public access (depending on the situation). However, the primary justification of an easement must be for water quality improvement.

Easements should be considered in the following situations:

1. To provide a vegetated shoreland buffer in developed riparian areas. Easements are strongly recommended whenever:

   * The easement would reduce the intensity and impact of human activities in the near shore area.

   * It would enhance littoral zone habitat function for a broad range of vertebrate and invertebrate species, including fish, amphibians, reptiles and aquatic insects.

   * The easement provides habitat and overwintering cover for aquatic fauna that are dependent upon nearshore terrestrial habitat for a portion of their life cycle.

2. To exclude livestock from grazed wetlands or along eroding streambanks within the watershed. Easements are strongly recommended whenever:

   - There is any grazing of wetlands.
   - Livestock density is so great that areas of unvegetated soil are within 60 feet of streams or intermittent streams.
   - More than 50% of the area that livestock have access to is severely trampled and eroding.
   - Erosion is such that unvegetated streambanks are two feet or more in height

3. To support eligible wetland restorations. Easements are strongly recommended whenever:

   - The eligible wetland restoration is greater than 1 acre in size.

## Land Acquisition

Units of government within the Upper St. Croix - Eau Claire Lakes watershed area are eligible for nonpoint source grants to supplement the purchase of land (in fee) that is contributing or will contribute nonpoint source pollution. The target objective for land acquisition in the watershed is approximately 10 acres. This may increase after additional inventories and land acquisition strategies are developed by the individual units of government located within the watershed.

Any land acquisition proposal must meet the applicable goals of the Upper St. Croix - Eau Claire Rivers watershed project to be eligible for acquisition.

# Interim Best Management Practices

Under some circumstances, practices may be recommended that are not included on the BMP list, such as the Shoreline Habitat Restoration Interim BMP described earlier in this chapter. Administrative Rule NR 120.15 provides for interim practices where necessary to meet the water resource objectives identified in the watershed plan. The Department may identify in the nonpoint source grant agreement the design criteria and standards and specifications where appropriate, cost share conditions, and cost share rates for each interim best management practice.

**Table 4-1 State Cost-Share Rates for Best Management Practices**

| BEST MANAGEMENT PRACTICE | STATE COST SHARE RATE |
|---|---|
| Nutrient and Pesticide Management | 50% |
| Pesticide Handling Spill Control Basins | 70% |
| Livestock Exclusion from Woodlots | 50% |
| Intensive Grazing Management | 50% [1] |
| Shoreline Habitat Restoration Interim BMP | 70% |
| Manure Storage Facilities | 70% [2] |
| Manure Storage Abandonment | 70% |
| Field Diversions and Terraces | 70% |
| Grassed Waterways | 70% |
| Critical Area Stabilization | 70% [3] |
| Grade Stabilization Structures | 70% |
| Agricultural Sediment Basins | 70% |
| Shoreline and Streambank Stabilization | 70% [3] |
| Shoreline Buffers | 70% [3] |
| Wetland Restoration | 70% [3] |
| Barnyard Runoff Management | 70% |
| Animal Lot Relocation | 70% |
| Roofs for Barnyard Runoff Management and Manure Storage Facilities | 70% |
| Structural Urban BMPs | 70% [4] |
| Milking Center Waste Control | 70% |
| Cattle Mounds | 70% |

[1] To a maximum of $2,000 per watering system
[2] Maximum cost share amount is $35,000 for manure storage including manure transfer equipment
[3] Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See Chapter Four for an explanation of where easements may apply.
[4] The maximum cost-share rate for land acquisition, storm sewer rerouting, and removal of structures necessary to install structural urban BMPs is 50%.

# Practices Not Cost-Shared

Practices not cost-shared, but which shall be included on the cost share agreement if necessary to control the nonpoint sources, are listed below (as listed in NR 120.17):

- That portion of a practice to be funded through other programs.
- Practices previously installed and necessary to support cost-shared practices.
- Changes in crop rotations.
- Changes in location of unconfined manure stacks involving no capital cost.
- Nonstationary manure spreading equipment.
- Practices needed for land use changes during the cost-share agreement period
- Other practices determined necessary to achieve the objectives of the watershed project.
- Minimum levels of street sweeping and leaf collecting.

## Activities and Sources of Pollution Not Eligible For Cost Share Assistance

Priority watershed cost-share funds cannot be used to control sources of pollution and land management activities specifically listed in NR 120.10(2). The following is a partial list of those ineligible activities:

- Operation and maintenance of cost-shared BMPs,
- Actions which have drainage of land or clearing of land as the primary objective,
- Practices already installed,with the exception of repairs to the practices which were rendered ineffective due to circumstances beyond the control of the landowner,
- Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program or covered in other ways by Chapter 147 of Wis. Stats. (including livestock operations with more than 1,000 animal units, or livestock operations issued a notice of discharge under ch. NR 243),
- Septic system controls or maintenance,

- Dredging activities,
- Silvicultural activities,
- Bulk storage of fertilizers and pesticides,
- Activities and structures intended primarily for flood control,
- Practices required to control sources which were adequately controlled at the time the cost-share agreement was signed, with the exception of those that occurred which were beyond the control of the landowner,
- Other practices or activities determined by DNR not to meet the objectives of the program.

# Cost-Share Budget

## Costs of Installing BMPs

The quantity and type of management practices that are required to meet the water quality objectives of this project are listed in Table 4-2. The capital cost of installing the BMPs are listed for a 75 percent landowner participation rate. Units of measurement and cost per unit for the various BMPs are also included.

The capital cost of installing the Best Management Practices is approximately $430,000 assuming 75 percent participation.

- State funds necessary to cost-share this level of control would be approximately $300,000.
- The local share provided by landowners and other cost-share recipients would be approximately $130,000.

## Easement and Land Acquisition Costs

The Easement Eligibility section of this chapter identifies where nonpoint source program funds can be used to purchase easements. The estimated cost of purchasing easements on eligible lands is shown in Table 4-2. At 75 percent participation, the estimated purchase price of easements on eligible lands would be $10,000. Easements are funded at 100 percent.

The Land Acquisition section of this chapter identifies where nonpoint source program funds can be used to purchase land in fee. The estimated cost of land purchases for the watershed is shown in Table 4-2. At 75 percent participation, the estimated purchase price of eligible land would be $20,000. Land Acquisition is funded at 50 percent and local units of government within the watershed boundaries are eligible for funds to purchase land.

# Cost Containment

Chapter NR 120 requires that cost containment procedures be identified in this plan to control the costs of installing BMPs. The cost containment procedure to be used by Douglas County is described below.

## Cost Containment Procedures

The Upper St. Croix - Eau Claire Rivers watershed project will follow the county policy and procedures when requesting bids or quotes from contractors for the design and installation of best management practices estimated to be $5,000 or more. A minimum of two bids from qualified contractors is required and the lowest bidder will be chosen, in accordance with county policy.

If requests for proposals or quotes are not used, the cost share payment estimates will be based on the average cost method. The county will develop an average cost per unit for materials and labor to determine the average cost for the practice components. This list will be reviewed annually and updated with changed economic conditions.

Cost share payments will be based on actual installment costs. If actual costs exceed the amount of cost sharing determined through cost share estimates, then the amount paid to the Grantee may be increased with the approval of the Douglas County Forestry Committee. Payments for "in kind" contributions will be based on county guidelines. The Wisconsin Conservation Corps may be used to install BMPs for cost share recipients, when appropriate. Appropriate documentation regarding the need for changes in these guidelines will be forwarded to the DNR.

# Cost-Share Agreement and Contact Strategy

Money for cost-share agreements will be distributed by the Douglas County Forestry Department from a Nonpoint Source Grant provided by the DNR. The Forestry Department receives additional grant money to support administrative responsibilities. Cost share agreements are binding contracts between landowners and the County Forestry Department. Landowners must meet eligibility requirements defined in Chapter Two.

The following procedure will be used to make landowner contacts.

* During the first months of the implementation period, all landowners or operators will receive a newsletter that explains the Upper St. Croix - Eau Claire Rivers Partnership Agreement Model, and the vision and proposed activities of the Partnership Steering Committee. During the ensuing two months, 25% of eligible landowners and operators will be contacted via telephone or through personal contact by watershed staff. The staff will ascertain the landowners' interest in the installation of best management practices for water quality protection and habitat restoration.

* During the first year of implementation, county staff will make personal contacts with all landowners that have been identified as having critical nonpoint sources of pollution. At this time, no sites have been shown to be critical in the watershed.

* County staff will continue to make contacts with eligible landowners and operators until each of them makes a definite decision regarding participation in the program.

* The remaining eligible landowners will be contacted in person or on the phone by watershed staff over the next four years. In addition, landowners that installed BMPs on their land early in the watershed implementation process, and who understand BMP installation procedures, will provide "peer learning sessions" for their neighbors. These landowners can provide more in depth information about specific BMPs, and the associated benefits to water quality and habitat they have seen on their property.

* Six months prior to the end of the watershed project, watershed staff will make a final appeal, by personal letter, to all eligible landowners and operators who have not signed a cost share agreement with the project.

* Landowners will also have numerous opportunities to participate in watershed related educational activities as outlined in Chapter 5.

**Table 4-2 Cost-Share Budget Needs for Management Practices in Douglas County**

| BMP | Number | Cost/Unit ($) | Total Cost | 75 % Participation | | | |
|---|---|---|---|---|---|---|---|
| | | | | State Share | Local Share | Hours/Unit | Total Hours |
| **Upland Control** | | | | | | | |
| Intensive Grazing Management (Rotational Grazing) | 2 ea | 4,000 | 8,000 | 4,000 | 4,000 | 15 | 30 |
| Critical Area Stabilization | 10 ac | 800 | 8,000 | 5,600 | 2,400 | 0.5 | 5.0 |
| Grass Waterways | 15 ac | 3,000 | 45,000 | 31,500 | 13,500 | 22 | 330 |
| Field Diversions and Terraces | 1500 ft. | 3 | 4,500 | 3,150 | 1,350 | 0.04 | 60 |
| Grade Stabilization | 5 ea | 4,000 | 20,000 | 14,000 | 6,000 | 50 | 250 |
| Agricultural Sediment Basin | 2 ea | 10,000 | 20,000 | 14,000 | 6,000 | 90 | 180 |
| Shoreline Buffers | 5 ac | 400 | 2,000 | 1,400 | 600 | 2 | 10 |
| Wetland Restoration | 3 ea | 2,000 | 6,000 | 4,200 | 1,800 | 34 | 102 |
| Nutrient and Pest Management (1) | 150 ac | $30/ac | 4,500 | 3,150 | 1,350 | 1 | 15 |
| Subtotal | | | 118,000 | 81,000 | 37,000 | | 982 |
| **Barnyard Runoff Control** | | | | | | | |
| Complete Barnyard Runoff Control System (1) | None at this time | | | | | | |
| Roof Gutters (1) | None at this time | | | | | | |
| Clean Water Diversion (1) | None at this time | | | | | | |
| Manure Storage Facility (1) | None at this time | | | | | | |
| Cattle Mounds (1) | None at this time | | | | | | |
| Subtotal | | | | | | | |

| BMP | Number | Cost/Unit ($) | Total Cost | 75 % Participation | | | |
|---|---|---|---|---|---|---|---|
| | | | | State Share | Local Share | Hours/Unit | Total Hours |
| **Streambank Erosion Control** | | | | | | | |
| Shape and Seeding | 2,000 ft. | 10 | 20,000 | 14,000 | 6,000 | 0.1 | 200 |
| Fencing | 2,000 ft. | 1 | 2,000 | 1,400 | 600 | 0.06 | 120 |
| Rock Riprap | 600 ft. | 30 | 18,000 | 12,600 | 5,400 | 0.2 | 120 |
| Bio-Bank Stabilization | 600 ft. | 25 | 15,000 | 10,500 | 4,500 | 0.2 | 120 |
| Crossing | 3 ea | 2,000 | 6,000 | 4,200 | 1,800 | 18 | 54 |
| Remote Watering Systems | 2 ea | 2,000 | 4,000 | 2,850 | 1,200 | 15 | 30 |
| Subtotal | | | 65,000 | 45,500 | 19,500 | | 644 |
| **Shoreline Management** | | | | | | | |
| Riprap | 3,000 ft. | 30 | 90,000 | 63,000 | 27,000 | 0.2 | 600 |
| Bio-Bank Stabilization | 1,000 ft. | 25 | 25,500 | 17,500 | 7,500 | 0.2 | 200 |
| Shoreline Habitat Restoration | 112 ea | 750 | 84,000 | 58,800 | 25,200 | 10 | 1,120 |
| Subtotal | | | 199,000 | 139,300 | 59,700 | | 1,920 |
| **Miscellaneous** | | | | | | | |
| Structural Urban BMPs | 12 ea | 1,500 | 18,000 | 12,600 | 5,400 | | 0 |
| Well Abandonment | 3 ea | 500 | 1,500 | 1,050 | 450 | 10 | 30 |
| Land Acquisition | 10 ac | 2,000 | 20,000 | 10,000 | 10,000 | | 0 |
| Easements | 10 ac | 1,000 | 10,000 | 10,000 | 0 | 8 | 80 |
| Subtotal | | | 49,500 | 33,650 | 15,850 | | 80 |
| **Total** | | | 431,500 | 299,450 | 132,050 | | 3,641 |

(1) Cost-shared at a maximum rate of $10/ac/yr. for up to three (3) years. Cost sharing eligibility will be determined by the DNR's Regional NPS Coordinator. Source: Wisconsin DNR, DATCP, and Douglas County LCD.

# Budget and Staffing Needs

This section estimates the funding and staffing required to provide technical assistance for the rural portion of this project.

Table 4-3 lists the total estimated staff needed to implement the project assuming a 75 percent level of participation by eligible landowners. A total of approximately 26,400 staff hours are required to implement this plan. This includes more than 10,000 staff hours to carry out the information and education program.

Currently, one position is being funded on the Upper St. Croix - Eau Claire Rivers watershed project. The Douglas County Forestry Department, LCD and other agencies will determine the need for additional staff based on the annual workload analysis.

The estimated cost for staff at the 75 percent participation rate is approximately $509,600. These costs will be paid by the state through the Local Assistance Grant Agreement.

**Table 4-3 Estimated Douglas County Staff Needs for Eight Years of Project Implementation**

| Activity | Staff Hours (based on 75% participation) |
|---|---|
| Project and Financial Management | 4,160 |
| Information and Education Program | 10,120 |
| Inventory and Planning | 3,000 |
| Practice Design and Installation | 4,000 |
| Upland Sediment Control | 967 |
| Streambank and Shoreline Management | 2,564 |
| Easements and Miscellaneous | 110 |
| Monitoring | 1,000 |
| Training | 480 |
| Total: | 26,401 |
| Estimated Staff Required per year | 1.75 |
| Hours per year | 3,696 |

Source: DNR and ABDI Counties Land Conservation Department

# Implementation Schedule

## Grant Disbursement and Project Management Schedule

Implementation of this Priority Watershed project shall begin upon both approval of this plan and receipt of the Nonpoint Source grant. The plan must be approved by the Department of Natural Resources (DNR), the Douglas County Board, and the Wisconsin Land and Water Conservation Board. Implementation cannot begin unless a nonpoint source grant has been awarded.

The project implementation period for this project is eight years, although road erosion abatement projects will be completed within the first three years. During the first five years of implementation, cost-share agreements with eligible landowners may be signed. This sign-up period may be extended for two years if an evaluation, conducted by the DNR, shows that an extension is warranted. The sign-up period may be extended for an additional two years following further review by the DNR. Practices listed on any cost-sharing agreement must be installed before the end of the implementation phase. The implementation phase of this project is scheduled to conclude in 2006.

It is important to emphasis that the Upper St. Croix - Eau Claire Rivers watershed project is a protection oriented project and is not a traditional watershed project in the nonpoint source program. The watersheds' uniqueness is characterized by the following:

1) The Upper St. Croix - Eau Claire Rivers watershed is the headwaters of the nationally designated wild and scenic St. Croix River which flows to the Mississippi River.

2) The Upper St. Croix - Eau Claire Rivers watershed is project is based on a new paradigm that focuses on protection and pollution prevention. The tools of public awareness, knowledge, and skills will serve as integral components of the project. One percent (1%) of the land is in agriculture.

3) Community and citizen groups, state, federal and local governments, agencies and others have started to develop the Partnership Agreement Model described at the beginning of this chapter. The Partners will commit resources to the project, and follow it through its implementation and into the future.

4) In relation to other watersheds in Wisconsin, the quality of the water resources is high.

5) Eighty-Five percent (85%) of the land cover is forested land.

6) One percent (1%) of the land is in agriculture.

7) Present threats to the watershed are relatively low.

These seven unique characteristics explain the need for less funding for engineered and constructed best management practices, and more funding for information and education activities that will empower local citizens to make decisions and develop pride in the watershed project. Two Local Assistance grants (LAGs) will be administered with this project. The Douglas County Forestry Department will remain the primary sponsor for the watershed project, and will be responsible for grants management, project tracking and reporting, land- owner contacts, coordination with other units of government and information and education activities. The second Local Assistance grant will be awarded to the Douglas County Land Conservation Department for the planning, design and construction oversight for structural best management practices.

Local Assistance grants will be disbursed annually to Douglas County to cover the costs of personnel, operating expenses, and equipment. The eligible costs for LAG's are in NR 120.2. The DNR will evaluate a workload analysis and grant application submitted by Douglas County. Much of the cost of the watershed project will be spent on educational activities, and the annual funding request through the Nonpoint Source local assistance grant will reflect this. The amount of the annual local assistance grant request may exceed the $3,000 allotment for promotion and education. (See Chapter 4 - Budget for Educational Plan).

The initial Nonpoint Source grant will cover the cost of practices over the entire eight year implementation phase. The amount of the Nonpoint Source grant is calculated as 75 percent participation by eligible landowners; see Table 4-2 for a detailed explanation. This grant may be amended due to changes needed for time of performance, funding levels, or scope of work.

## Project Cost

The total state funding required to meet the rural nonpoint source pollution control needs at 75 percent level of landowner participation is presented Table 4-4. This figure includes the capital cost of practices, staff support, and easement costs presented above. The estimated cost to the state is $984,050. The estimated cost to landowners and others is $132,050 for a total project cost estimate of $1,116,100.

This cost estimate is based on projections developed by agency planners and local staff. Historically, the actual expenditures for projects are less than the estimated costs. The factors affecting expenditures for this watershed project might include: the participation rate; the amount of cost sharing that is actually expended; the number of staff working on the project; and the amount of support costs.

**Table 4-4 Total Project Costs at 75 percent Landowner Participation Rate**

| Item | Costs |
|---|---|
| Cost-Share Funds: Practices | 299,450 |
| Cost-Share Funds: Easements | 10,000 |
| Local Assistance Staff Support* | 509,600 |
| Information/Education Direct | 80,000 |
| Other Direct (travel, supplies, etc.) | 60,000 |
| Engineering Assistance | 25,000 |
| * Salary + Indirect = $36,400/year Total | 984,050 |

Source: DNR and ABDI Counties Land Conservation Department

# CHAPTER FIVE
# Information and Education Activities

## Goal

**The year-round and summer season residents, as well as civic leaders and other organizational staff will become knowledgeable about the watershed, how their personal actions effect water quality, and what they can do to protect the water resources in the watershed.**

This information and education plan was developed by the Partnership Group and the Citizen Advisory Committee for the watershed. The education plan is designed primarily to teach watershed residents about the importance of protecting water quality. Additionally, the educational activities listed in the plan will perhaps instill a sense of pride and ownership in the Upper St. Croix - Eau Claire Rivers watershed, and an ethic of stewardship of that place.

The information and education program will continue to be developed by the Partnership Steering Committee and its Citizen Advisory Group.

1) The I&E program will be responsive to watershed residents, will include them in watershed projects and will solicit on-going feedback for program improvement.

2) The educational program will foster awareness, understanding and skills for citizen action throughout the watershed.

3) The Partnership Group will evolve into a "Watershed Partnership Association" that will pledge commitment to long-term water quality protection throughout the watershed.

# Objectives

1. To develop an information exchange between all partners in the watershed project - citizens, government agencies, organizations, local government and legislators - for making decisions for water quality protection.

2. To inform watershed residents about the goals and activities of the watershed project through promoting and demonstrating best management practices (BMPs) for the protection of water resources.

3. To teach residents (especially riparian landowners) how to minimize phosphorus, sediment and other polluting inputs from entering the watershed from their property and septic systems.

4. To recognize watershed residents for their participation in the watershed program.

5. To inform watershed visitors about how their use of the resources and their personal actions can affect the watershed.

6. To encourage local government officials to adopt minimum standards that guide future growth and development on riparian lands throughout the watershed.

7. To teach youth about the importance of protecting the surface and groundwater resources in the watershed, how their personal actions can affect water quality and how they can help to protect water quality.

8. To involve students in water quality monitoring activities and information gathering to be shared with local decision makers.

9. To provide informational and educational activities for youth that instil an environmental ethic and respect for the outdoors.

10. To protect the watershed from the destructive impacts of exotic aquatic and plant species.

# Implementation Team

The education strategy was developed by the Partnership Group, as well as watershed staff with assistance from the watershed Citizens Advisory Committee, UW Extension, DNR, and the Douglas County Land Conservation Committee.

The Douglas County Forestry Department will take lead responsibility for the implementation of the information and education strategy. Several watershed Partners have offered to support the implementation of the I&E component of the watershed throughout the life of the project. These include:

* University of Wisconsin Cooperative Extension (UW-EX)
* Department of Natural Resources (DNR)
* Department of Agriculture (DATCP)
* Upper St. Croix Lake Association
* Gordon Flowage Association
* Local units of government
* University of Wisconsin-Superior, (Water-Watch program)
* St. Croix School District
* Ashland-Bayfield-Douglas-Iron Counties (ABDI) Land Conservation Department
* St. Croix National Scenic Riverway
* U.S. Coastguard
* Natural Resources Conservation Service (NRCS).

# Design

People are best able to take action to protect water resources, when they believe they have all the knowledge, skills and technical and financial assistance to make a difference. The education plan for the watershed has been designed with the learner in mind, and considers six elements for success.

**Knowledge:** In order for people to be motivated to take action, they must have enough information and a firm understanding of what is expected of them and why. Additionally, people need to know how to apply that knowledge to improve their lives and their world.

**Skills:** People may feel they lack the skills needed to perform a task. They need to be made aware of resources, equipment, and tools that are available and will support their new skills.

**Attitude:** People have many different ideas, perceptions, values, feelings, and beliefs about the resources within the watershed. Not every person agrees with the watershed project and its protection oriented goals. Attitudes are very difficult to change. The following three areas examine methods that encourage people to change.

**Motivation:** Some residents of the watershed will need financial or technical assistance as a motivation to change their personal actions.

**Feedback:** To stay enthused about a project, people need on-going, positive feedback. Positive feedback will build confidence in watershed residents, and may improve future project performance.

**Recognition Program:** A recognition program is one form of positive feedback. A recognition program with a catchy title and simple rewards may motivate individuals to participate in the watershed project. The recognition awards will be presented once each year.

# Questionnaire Results

A one page questionnaire was sent to all watershed residents in June 1996. The goal of the questionnaire was to gather information about the public's perceptions about water quality in the watershed. Response rate was 19%. Of the respondents, 62% were riparian land owners. Respondents were asked to list what they think are the greatest threats to water quality in the area.

The top-ranking threats were: development, exotic species and failing septic systems. Respondents were also asked to list what they valued most about the water resources of the area. Eight out of ten surveyed placed peace & quiet, natural beauty and hunting/fishing as what they valued the most. See Appendix F for a copy of the questionnaire and complete results.

Activities will be selected and presented in an annual information and education plan. New activities may be included as needed to respond to changing needs of the program and the evaluation of past activities. Recognition programs for cost share participants and residents using BMPs are a part of the strategy.

# Activities

An annual information and education plan will be developed and activities will be selected that will target the projects' stated objectives. Each activity will contain a key message for a key audience. Listed below are some of the potential activities that may be used in the annual plans.

In order to present better educational materials, each educational tool will be designed with a particular intent in mind. The audience, message, and suggested activities for each educational objective will be considered.

**Audience:** Specific groups or individuals that should be targeted. Materials will be designed to suit each audience.

**Message:** Key information to communicate to the target audience. The information is presented a manner that is understandable and tailored to the audience.

**Activities:** Suggested activities to get messages to the target audience and encourage actions.

**Suggested Educational Activities**

**Brochures**

A "general" watershed brochure will be developed to build awareness about the project, identify water quality issues, and discuss protection efforts that will help to lessen future water quality degradation. In addition, other brochures will be developed for specific audiences (riparian residents & users), with a specific theme (value of shoreline vegetation to fish & wildlife) and a specific purpose (to convey the message of balance between natural and human activities).

Time: 20 hours per brochure
Frequency: As needed
Audience: Watershed residents, govt. officials, loggers, woodland owners.

**Building Partnerships**

The intent of the watershed project is to build partnerships with local citizens and organizations, as well as local, state and federal agencies. Potential partners are listed below.

Community Groups: These are groups that have a vested interest in protecting the water quality of the watershed. They include lake associations, fishing & hunting groups or environmental groups.

Local, state & federal government: These groups have the responsibility for providing essential public services and protecting the public good. Some of these groups include towns, villages, Douglas County, UW- Extension, Wisconsin

Department of Natural Resources, Wisconsin Department of Transportation, Natural Resource Conservation Service, National Park Service, area schools and others.

Business/Economic Development Groups: These groups include local businesses and others who work to promote the economic well-being of the region. By working with the watershed project, these groups can identify win-win relationships with others.

Private Citizens: Private citizens will serve on the Citizen Advisory Committee for the project, and will oversee and advise the direction of the Partnership Steering Committee.

As partnerships are formed, they will be formalized through the Partnership Agreement Model. The goal of the partnership model is to identify issues, find common ground and work together on watershed protection projects. The group and its projects will be locally driven and sustainable. The Partnership Steering Committee will remain committed to maintaining watershed protection efforts after the formal watershed project ends. Ultimately, the group will form a "Watershed Protection Association".

Time: 250 hours
Frequency: Quarterly meetings with partners.
Audience: Watershed residents, community groups, govt. officials, businesses, youth.

**Demonstration Projects**

Innovative best management practices that reduce run-off pollution and restore fish and wildlife habitat will be demonstrated. A variety of demonstration projects and workshops will be used to demonstrate simple and cost effective measures that prevent degradation of water quality. At a minimum one demonstration project will be conducted annually. Some of the topics for workshop and demonstration projects include:

* Shoreline Habitat Restoration
* Road Erosion Abatement

* Construction Site Erosion Control Measures
* Best Management Practices for Water Quality Protection on Productive Forestry Lands
* Best Management Practices for Shoreline Activities
* Septic System Maintenance
* Exotic species educational workshop

Time: 50 hours per demonstration
Frequency: Annually
Audience: Riparian landowners, govt. officials, road maintenance crews, loggers, woodland owners, area visitors and other watershed residents.

**Direct Mail**

Various types of written information will periodically be mailed to select groups for a specific purpose.

Time: 40 hours
Frequency: As needed
Audience: Watershed residents and various special interest groups.

**Watershed Project Evaluation**

Throughout the project, residents and other special interest groups will be asked to measure the quality of service that the watershed project is providing to them.

Time: 30 hours
Frequency: Every other year
Audience: Riparian landowners, watershed residents, special interest groups.

**Exhibit**

An informational exhibit will be developed to explain the watershed project, create interest in the project and illustrate project results. The exhibit will be used in various forums and will

be designed to serve as a stand-alone display at area resorts, banks, town halls and other public locations. The exhibit may also be used at speaking engagements, presentations, workshops, fairs and other events where watershed staff will be present. The exhibit will be updated throughout the watershed project.

Time: 30 hours each
Frequency: As needed
Audience: Watershed residents, youth, visitors, special interest groups.

**Fact Sheets**

Fact sheets will be developed to illustrate the ways runoff pollution can occur from many different sources. "It all adds up" will be a reoccurring theme for each fact sheet. The fact sheets will be included in the information packets described below. Existing fact sheets from other states, agencies and groups will be used whenever applicable.

Time: 30 hours/fact sheet
Frequency: Annually
Audience: Riparian landowners, govt. officials, youth, watershed residents.

**Feature Stories**

We will create feature stories to appear in newsletters and newspapers. Features will also be created for radio and television interviews. The stories will highlight the efforts of individuals and groups who have worked on watershed enhancement projects and have endeavored to better understand project related issues.

Time: 70 hours
Frequency: Annually
Audience: Riparian landowners, govt. officials, grader operators, loggers, youth and other watershed residents.

**Field Day(s)**

Field days will be held for any interested watershed residents. On-site instruction will be provided to learn about the operation and maintenance of best management practices.

Time: 20 hours per field day
Frequency: As needed
Audience: Riparian landowners, grader operators, loggers, woodland owners and other watershed residents.

**Information packets**

Information packets will be created to describe the vision and goals of the watershed project, potential threats to water quality, and specific management activities that protect water quality from degradation. The packets will be targeted to the following groups and will contain the following messages:

Riparian Landowners:

The value of fish and wildlife habitat in relation to water quality.
The importance of erosion and run-off control.
The importance of properly functioning septic systems (where applicable).
Information regarding on-going water quality monitoring programs.
Lawn care information - how to reduce fertilizer & pesticide use.
Protecting groundwater - wells and springs.
How the invasion of exotic species can threaten the watershed's biological integrity.

Roads:

How to provide temporary erosion control during road construction, and permanent erosion control after completing construction.
Dirt vs. paved roads (runoff factors, maintenance needs, etc.).
Grading operations to protect water quality.
Potential cost-benefit analysis for using BMP's for road erosion control.

Foresters:

Planning timber management activities that consider water quality protection.
Site preparation for harvesting and re-planting.
Harvesting techniques to protect water quality.
Forestry BMPs for water quality protection.

Government:

Highlight the benefits of working as a partner with the watershed project.
Encouraging larger scale land use planning to prevent future water resource degradation.
Evaluation of current regulations for their water resource protection potential.

Time: 150 hours
Frequency: In annual information packets (packets completed by fourth year).
Audience: Local Town and Village officials, economic development groups, planners, interested citizens.

**Lake Fair and Tour**

Each year a lake fair and tour will be conducted on Upper St. Croix Lake which will highlight the progress that has been made to improve and enhance water quality. Specific shoreline BMPs implemented by lakeshore owners will be emphasized. Also highlighted will be the on-going water quality monitoring program, the importance of lake ecosystems and the overall goals of the watershed project. Watershed staff will also work with the Gordon Flowage Association to conduct educational tours highlighting the watershed project and its relationship to the protection of the flowage.

Time: 150 hours
Frequency: Annually
Audience: Riparian landowners, visitors, youth, riparian business owners.

**Media Coverage**

Watershed project events will be publicized through area newspapers and radio stations. Television coverage will be sought from Superior and Duluth stations when appropriate. Media coverage is a low cost method to increase public awareness of the project, and increase participation in project activities.

| | |
|---|---|
| Time: | 100 hours |
| Frequency: | Annually |
| Audience: | Watershed residents, youth, special interest groups, local govt. officials, businesses. |

**Newsletter(s)**

A watershed newsletter will be designed and published 2 to 3 times per year. The newsletter will highlight the positive contributions being made by specific individuals and their commitment to protecting the watershed. The newsletter will keep watershed residents informed about watershed events, and remind people of potential solutions to water quality degradation that they can effect.

| | |
|---|---|
| Time: | 90 hours |
| Frequency: | 2 or 3 times a year |
| Audience: | All watershed residents. |

**One-on-One Instruction**

Individuals from the Partnership Steering Committee will work on a one-to-one basis with landowners to help them learn how their participation in installing BMPs can make a difference in water quality. These meetings will be a vital part of generating landowner interest and participation in the project. Instruction cam also be provided regarding proper management of BMPs.

Time: 100 hours
Frequency: Annually
Audience: Riparian landowners, farmers, woodland owners.

**Peer Learning**

Watershed residents who have successfully adopted BMPs on their land ("Early Adopters") will meet with their neighbors and lead discussions to interest other landowners in making life style changes and personal decisions that help to protect water quality.

Time: 30 hours
Frequency: Starting the third year - during winter months only.
Audience: Riparian landowners

**Photography**

Photographs will be taken to illustrate potential runoff problems throughout the watershed. The photos will be used as a baseline visual record prior, during and following the implementation of BMPs. These photos will be used in press releases, newsletters and feature stories. Slide presentations will also be developed with these photographs.

Time: 40 hours
Frequency: Annually
Audience: Watershed residents

**Slide Presentations**

Slide presentations will be developed for specific audiences. The presentations will illustrate potential water quality problems, preventative actions and restoration projects. Informational slide shows will also be developed and presented for the Citizen Advisory Committee and the Partnership Steering Committee.

Time: 70 hours
Frequency: Aa needed
Audience: Govt. officials, riparian landowners, youth, watershed committee participants.

**Videos**

Existing videos produced by a variety of educators and others will be used. The videos will highlight shoreline BMPs, forestry BMPs and road maintenance activities for water quality protection. Information about implementing and managing best management practices will be conveyed in the videos.

Time: 20 hours
Frequency: As needed
Audience: Govt. officials, riparian landowners, youth, forestry workers and road construction workers.

**Project WET Workshops (Water Education for Teachers)**

Workshops will be held for teachers and other youth educators to demonstrate the integration of water quality education materials into existing curriculum. Workshops will emphasize regional concerns for the Upper St. Croix - Eau Claire Rivers watershed. Youth educators will have opportunities to experience the value of hands-on, process oriented education that taps into children's natural interest in learning.

Time: 50 hours
Frequency: Every other year
Audience: Teachers and youth leaders.

**Quarterly Phone Calls**

Phone calls will be made on a quarterly basis to landowners. Landowners whose actions can make a significant impact on water quality ("high priority landowners") will be contacted first.

Time: 20 hours
Frequency: Quarterly
Audience: Watershed residents, especially riparian landowners.

**Recognition Program**

A recognition program for watershed project participants will be held annually. The program will award residents for the successful implementation of watershed protection or improvement efforts. At a minimum, awards will be given publicly in the following categories:

shoreline and other riparian projects
road projects
forestry projects

Winners will be recognized during the third quarter meeting of the Partnership Steering Committee, as well as in the watershed newsletter and news releases.

Time: 50 hours
Frequency: Annually
Audience: Watershed Residents, riparian landowners, youth, grader operators, loggers, special interest groups, businesses.

**School Programs**

Watershed staff will assist local school districts and individual teachers in incorporating water resource education materials into existing curriculum. The St. Croix School District will be encouraged to apply for a grant to include the school in an ADOPT-A-LAKE program for Upper St. Croix Lake. Watershed staff will work with local educators to incorporate the voluntary water quality monitoring program for Park Creek (a tributary to Upper St. Croix Lake) into existing curriculum. Watershed staff will visit area schools and make water quality related presentations to generate awareness and knowledge about the watershed project.

Time: 70 hours
Frequency: Annually
Audience: Youth, teachers, other educators.

**Sediment Core Study**

The results of the sediment core sample taken during the Lake Tour in August, 1996, will be published in the watershed newsletter and area newspapers. The sample provides an historical representation of the changes in water conditions that have taken place on Upper St. Croix Lake from early settlement days to the present. Study results will also be incorporated into other educational programs (i.e. presentations, exhibits, etc.).

Time: 30 hours
Frequency: As needed
Audience: All watershed residents, riparian landowners.

**Signs**

Lake stewardship signs will be presented to every lakeshore landowner who participates in the watershed project. Each landowner will be given two signs and instructed to display them proudly so others in the community will know about their participation.

A general "Upper St. Croix Watershed Project Area" sign will be developed in cooperation with the Department of Transportation. The signs will be placed just north of Solon Springs and south of Gordon, and will inform travellers that they are within the boundaries of the watershed project.

Informational signs will also be placed at major boat landings to inform water resource users about the importance of "stopping the invasion" of exotic species that threaten water resources, and what they can do to help.

Additional signs will be developed as needed to highlight innovative practices being used to protect water quality.

Time: 20 hours/sign
Frequency: As needed
Audience: Riparian landowners, boaters and other water resources users, all watershed residents.

**Water Quality Volunteer Monitoring**

Watershed staff will assist lake associations and others who are currently volunteering to conduct water quality monitoring. Testing for water clarity, phosphorus levels and dissolved oxygen on Upper St. Croix Lake and the Gordon Flowage will continue to be monitored. The results of the monitoring will be published in the watershed newsletter.

Watershed staff, along with DNR staff, will continue to assist schools in the analysis of local streams. The physical, chemical and biological conditions of the streams will be measured. The results of this monitoring will be used for educational purposes.

Time: 50 hours
Frequency: Annually
Audience: Riparian landowners, area visitors, youth, special interest groups.

Table 5-1 combines the educational objectives described above with activities that will address them. Each activity is given a range of years in which the activity will be practiced, within the 8-year length of the project's implementation period. In the first year shown in the table, the activity will be planned. Some activities will be used to meet several objectives. For example: a newsletter's feature story might highlight a local landowner who is restoring shoreline habitat on his/her property. The landowner's efforts at implementing BMPs for water quality protection might also be awarded through a recognition program. This story may also achieve the objective of developing an information exchange between groups, or start a peer learning group. The activities described and listed in this educational section are not meant to be an exhaustive list of educational tools, but rather to provide general guidance for future activities that will meet the stated objectives. Table 5-2 illustrates the educational activities planned for 1997-1998.

**Table 5-1 Educational Activities for the Upper St. Croix - Eau Claire Rivers Watershed**

| Activity | Objective #1 | Objective #2 | Objective #3 | Objective #4 | Objective #5 | Objective #6 | Objective #7 | Objective #8 | Objective #9 | Objective #10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Brochures | | '98,'00,'02 | '96-'98 | | '98,'00,'02 | | | | | '97 |
| Building Partnerships | '96-'04 | | | | | '97-'02 | | '96-'04 | | '97-'04 |
| Demonstration Projects | | '97-'02 | '96-'00 | | '96-'02 | 97-'02 | | | '96-'02 | |
| Direct Mailing | | | | '97-'04 | '97-'00 | | | | | |
| Evaluation | '98,'00,'02,'04 | | | | | | | | | |
| Exhibit | '96-'04 | '98-'02 | '96-'00 | | '98-'04 | | '96-'04 | 96-'04 | | '98 |
| Fact Sheets | | | '97-'99 | | '97-'04 | '97-'02 | '97-'04 | | | '97-'04 |
| Feature Stories | | '97-'03 | '97-'00 | '97-'04 | | '97-'02 | '96-'98 | '97-'04 | | |
| Field Day | '97-'04 | '97-'00 | '97-'00 | | | | | | | |
| Information Packets | '97-'00 | | '97-'00 | | | '97-'00 | | | | '97-'00 |
| Lake Fair/Tours | '96-'04 | '97-'00 | '97-'00 | '98-'04 | '96-'04 | '96-'04 | '96-'04 | | | '97-'04 |
| Media Coverage | '97-'04 | '97-'04 | '96-'02 | '97-'04 | | '97-'02 | | '97-'04 | '97-'04 | |
| Newsletter | '96-'04 | '96-'04 | '96-'04 | '97-'04 | | | | | '97-'04 | '97-'04 |
| One-On-One | '96-'04 | | '96-'04 | | | | | | | |
| Peer Learning | '98-'02 | '98-'02 | '98-'02 | | | | | | | '97-'04 |
| Photography | '96-'03 | '96-'03 | '96-'03 | '97-'04 | '96-'04 | | '96-'04 | '96-'04 | | '97-'04 |
| Project Wet | | | | | | | | '96,'98,'00,'02 | | '96,'98,'00, '02 |

| Activity | Objective #1 | Objective #2 | Objective #3 | Objective #4 | Objective #5 | Objective #6 | Objective #7 | Objective #8 | Objective #9 | Objective #10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Quarterly Phone Calls | '98-'04 | | '98-'04 | | '97-'02 | | | | | |
| Recognition Program | | | | '97-'04 | | | | | | |
| School Programs | | | | | | | '96-'04 | '96-'04 | '96-'04 | '96-'04 |
| Sediment Core | | | '97-'00 | | | | '97-'00 | | | |
| Signs | '97-'04 | | | '97-'04 | '97-'04 | | | | | '97-'04 |
| Slide Presentations | '96-'04 | '96-'04 | '96-'04 | '96-'04 | | '96-'02 | | | | '97-'04 |
| Videos | | | '97-'02 | | | | '97-'02 | | | |
| Water Quality Monitoring | '96-'04 | | '96-'04 | | | | | '96-04 | '96-'04 | '96-'04 |
| Corresponding Objectives are listed below. | | | | | | | | | | |

Objective #1 To develop an information exchange between all partners in the watershed project - citizens, government agencies, organizations, local government and legislators - for making decisions for water quality protection.

Objective #2 To inform watershed residents about the goals and activities of the watershed project through promoting and demonstrating best management practices (BMPs) for the protection of water resources.

Objective #3 To teach residents (especially riparian landowners) how to minimize phosphorus, sediment and other polluting inputs from entering the watershed from their property and septic systems.

Objective #4 To recognize watershed residents for their participation in the watershed program.

Objective #5 To inform watershed visitors about how their use of the resources and their personal actions can affect the watershed.

Objective #6 To encourage local government officials to adopt minimum standards that guide future growth and development on riparian lands throughout the watershed.

Objective #7 To teach youth about the importance of protecting the surface and groundwater resources in the watershed, how their personal actions can affect water quality and how they can help to protect water quality.

Objective #8 To involve students in water quality monitoring activities and information gathering to be shared with local decision makers.

Objective #9 To provide informational and educational activities for youth that instil an environmental ethic and respect for the outdoors.

Objective #10 To organize watershed residents to protect the resource from the destructive impacts of exotic aquatic and plant species.

## Table 5-2 Educational Activities planned for 1997-1998

| Activity | Who Will Do It? | When Will We Do It? | Target Audiences | Objectives Met |
|---|---|---|---|---|
| Signs | UW-Superior & watershed project staff | Early summer, 1997 | Watershed residents, area visitors | #2, #3, #5, #10 |
| Newsletters | Watershed project staff | Spring, Summer, Fall 1997 | Watershed Residents | #2, #3, #4, #10 |
| Lake Ecology Workshop Series (6 total) | Watershed project staff, UW-Superior, UW-Extension | Summer 1997 | Riparian landowners, watershed residents | #2, #3, #6, #10 |
| Partnership Steering Committee (PSC) Meetings | Partners | Jan, Feb, March, June, Sept, Dec, 1997 | Partners | #1 through #10 |
| Citizen Advisory Committee (CAC) | Committee members & other citizens | June & August, 1997 | Committee members & citizens | #1 through #10 |
| One-on-One Contacts | Watershed project staff, Lake Association, Land Conservation Department (LCD) | On-going | Watershed residents, riparian landowners | #2, #3, #4, #10 |
| Implementation Exhibit | Watershed project staff | Early summer 1997 | Visitors | #2, #3, #5, #10 |
| Lake Association Meetings | Lake Associations | As needed/requested | Lake Association members | #2, #3, #4, #10 |
| Community Survey | CAC, PSC, UW-Extension, Lake Associations, watershed project staff | Summer 1997 | Riparian Landowners | #1, #2 |
| Demonstration of Shoreline BMPs | Watershed staff, LCD | Late summer, early fall 1997 | Riparian landowners, watershed residents | #2, #3, #4 |
| Lake Fair/Tour | Watershed project staff, Lake Associations, UW-Extension, LCD | Late summer, early fall 1997 | Lake Associations, Visitors, All watershed residents | #2, #3, #5, #6, #10 |
| Community Family Events (Good neighbor days, etc..) | Watershed project staff | Summer 1997 | Watershed residents, youth, visitors | #2, #3, #5, #6, #7, #10 |
| School Programs | School staff, watershed project staff | Fall 1997, Spring 1998 | Youth, teachers | #7, #8, #9 |
| Water Quality Monitoring | School staff, watershed project staff | Fall 1997, Spring 1998 | Youth, teachers | #7, #8, #9 |
| Project WET | School staff, watershed project staff | Fall 1997, Spring 1998 | Youth, teachers | #7, #8, #9 |
| Fact Sheets | Watershed project staff | Summer 1997 | Riparian landowners, builders & construction workers, loggers, developers, farmers | #2, #3, #10 |

| Activity | Who Will Do It? | When Will We Do It? | Target Audiences | Objectives Met |
|---|---|---|---|---|
| Information packets | UW-Extension | Summer, Fall 1997 | Riparian landowners | #2, #3, #10 |
| Recognition programs | Watershed project staff | Fall 1997 or Spring 1998 | Watershed residents | #4 |
| Forestry BMP Workshop | DNR, Douglas County Forestry Dept & watershed project staff | Fall 1997 or Spring 1998 | Woodland owners, loggers | #2, #3 |
| Construction Site Erosion Control Workshops | Douglas County Forestry Dept, WI DOT, Douglas County Hwy Dept, NRCS | Summer or Fall 1997 &/or Spring 1998 | Developers, builders, construction workers, local govt officials | #2, #3, #6 |
| Corresponding Objectives are listed below | | | | |

Objective #1 To develop an information exchange between all partners in the watershed project - citizens, government agencies, organizations, local government and legislators - for making decisions for water quality protection.

Objective #2 To inform watershed residents about the goals and activities of the watershed project through promoting and demonstrating best management practices (BMPs) for the protection of water resources.

Objective #3 To teach residents (especially riparian landowners) how to minimize phosphorus, sediment and other polluting inputs from entering the watershed from their property and septic systems.

Objective #4 To recognize watershed residents for their participation in the watershed program.

Objective #5 To inform watershed visitors about how their use of the resources and their personal actions can affect the watershed.

Objective #6 To encourage local government officials to adopt minimum standards that guide future growth and development on riparian lands throughout the watershed.

Objective #7 To teach youth about the importance of protecting the surface and groundwater resources in the watershed, how their personal actions can affect water quality and how they can help to protect water quality.

Objective #8 To involve students in water quality monitoring activities and information gathering to be shared with local decision makers.

Objective #9 To provide informational and educational activities for youth that instil an environmental ethic and respect for the outdoors.

Objective #10 To organize watershed residents to protect the resource from the destructive impacts of exotic aquatic and plant species.

# Education Budget

The budget outlined in Table 5-3 is based on two staff positions, water education equipment, supplies, printing, signs, postage and materials. The staff positions are as follows: 50% time Project Manager and 100% time Seasonal Watershed Educator.

**Table 5-3 Information and Education Activity Budget for the Upper St. Croix - Eau Claire Rivers watershed project (1997-2004).**

| Educational Activity | Staff Hours Years 1-3 | Staff Hours Years 4-8 | Educational Supplies & Equipment | Total Costs |
|---|---|---|---|---|
| Brochures | 60 | 90 | $750.00 | $3,448.00 |
| Building Partnerships | 750 | 1,250 | $1,500.00 | $37,476.00 |
| Demonstrations | 450 | 750 | $4,000.00 | $25,585.00 |
| Direct Mail | 120 | 200 | $4,800.00 | $10,556.00 |
| Evaluation/Landowners | 30 | 90 | $500.00 | $2,659.00 |
| Exhibit | 60 | 60 | $1,000.00 | $3,156.00 |
| Fact Sheets | 180 | 400 | $1,000.00 | $11,433.00 |
| Feature Stories | 210 | 350 | $0.00 | $10,073.00 |
| Field Days | 40 | 80 | $450.00 | $2,606.00 |
| Information Packets | 450 | 450 | $5,000.00 | $21,189.00 |
| Lake Fair/Tour | 450 | 750 | $4,000.00 | $25,585.00 |
| Media Coverage | 300 | 500 | $0.00 | $14,390.00 |
| Newsletter | 270 | 450 | $15,000.00 | $27,951.00 |
| One-on-One Contact | 300 | 500 | $0.00 | $14,390.00 |
| Peer Learning | 30 | 150 | $0.00 | $3,238.00 |
| Photography | 120 | 200 | $8,000.00 | $13,756.00 |
| Project Wet Workshops | 100 | 100 | $1,000.00 | $4,598.00 |

| Educational Activity | Staff Hours Years 1-3 | Staff Hours Years 4-8 | Educational Supplies & Equipment | Total Costs |
|---|---|---|---|---|
| Quarterly Phone Calls | 60 | 100 | $0.00 | $2,878.00 |
| Recognition Program | 150 | 300 | $2,500.00 | $10,594.00 |
| School Programs | 210 | 400 | $7,500.00 | $18,472.00 |
| Sediment Core Study | 60 | 80 | $1,000.00 | $3,518.00 |
| Signs | 120 | 250 | $20,000.00 | $26,655.00 |
| Slide Presentations | 210 | 350 | $0.00 | $10,073.00 |
| Videos | 40 | 100 | $500.00 | $3,018.00 |
| Water Quality Monitoring | 150 | 250 | $1,500.00 | $8,695.00 |
| TOTALS | 4920 | 8200 | | |
| Costs | $80,400 | $155,600 | $80,000.00 | $316,000.00 |

# Evaluation

There will be two types of evaluation during the 8-year implementation period of the watershed project. Type I evaluation focuses on the effectiveness of each educational activity, while Type II will be an evaluation near the end of each year and at the end of the project that summarizes the overall effectiveness of the education plan.

**TYPE I - Educational Activity Evaluation**

Type I evaluations will be conducted throughout the project and serve as benchmarks or yardsticks for the education plan (are the learners improving/progressing towards the stated objectives?) They will also be used to refine learning objectives, change/modify educational activities, and to drop ineffective activities.

Type I evaluations will be used to:

1. Determine whether the activity obtained the stated learning objectives.
2. Assess the value of the learning activity.
3. Identify the proper audience for future activities of this type.
4. Identify areas that need improvement (locations, instructors, content, etc.)

**Type II - Education Plan Effectiveness Evaluation**

Type II evaluations occur at the end of each year and at the end of the project. The goal of Type II evaluations are to determine if the educational objectives for the project have been achieved (i.e. are riparian landowners using less fertilizer and pesticides?, etc).

Type II evaluation will be used to:

1. Modify the educational plan for the ensuing year.
2. Determine the applicability of the education plan for future protection based watershed projects.
3. Determine the effectiveness of the Partnership Agreement Model.
4. Identify effective learning activities that bring about the desired outcomes.

# CHAPTER SIX
# Integrated Resource Management Program

## Introduction

Local governments recognize that improperly located or mismanaged development can have a devastating impact on not only the image of the local area, but the natural resources of the area, as well. Riparian development without consideration of proper setbacks or shoreline protection; industrial developments and commercial developments constructed without precaution to erosion or storm water runoff; and agricultural uses and road construction and maintenance activities can all have negative impacts on water quality.

A land management planning effort based on a current inventory and analysis of land use is an important first step in the long term protection of a local areas' natural resources. As a result of a well thought out and developed management plan, protection efforts can be accomplished through storm water management ordinances, revising zoning ordinances, preservation of natural sites or corridors, construction site runoff and erosion control plans, shoreline or stream bank erosion control practices and use of best management practices available through this project. However, if there is no well thought out community-wide land management plan, the cumulative positive effects of the various tools to protect the local natural resources will not be achieved.

In this chapter, existing state, federal and local resource management programs which can provide benefits for water quality and/or fish and wildlife resources in the Upper St. Croix - Eau Claire Rivers watershed are identified. Watershed staff will work to coordinate the

efforts of these programs to provide the best possible management of land and water resources in the watershed. However, achieving the broad based protection goal of this project will require the efforts of residents, educators, and all levels of government. Formation of the Partnership Group is a first step in coordinating the efforts that will be needed to protect the resources of the Upper St. Croix - Eau Claire Rivers Watershed.

# Fisheries and Wildlife Management

Watershed best management practices (BMPs), such as streambank protection, shoreline protection and restoration, shoreline habitat restoration (interim BMP) and easements, should be implemented in a manner that preserves and enhances the projects goals. Specifically, all streambank protection BMPs should be installed using large diameter-sized rock below the water line. If rock riprap is to be used, it should be installed and sized so that the placement and size of rock will positively benefit fish habitat. Vegetative shoreline erosion control using emergent aquatic vegetation for habitat enhancement should be used where applicable. Restoration of shoreline habitat through the use of the streambank and shoreline protection management practice and the shoreline habitat restoration IBMP will enhance wildlife habitat as well as improve shallow water habitat for fish, amphibians, reptiles and aquatic insects by providing shade, cover and overhanging vegetation. Wildlife habitat components should also be incorporated into vegetative filter strips along streams or in upland areas.

Shoreline erosion control measures will be installed in a manner beneficial to fisheries and wildlife habitat. DNR Fish Management and Wildlife Management personnel will be consulted for input in the design of streambank and shoreline protection BMPs to maximize benefits to the fish and wildlife communities. In cooperation with counties, DNR staff will review placement of agricultural sediment basins. They will also provide technical assistance focusing on minimizing the impact on wildlife habitat when the installation of BMPs requires the removal of obstructions or existing habitat. DNR staff will also assist in resolving questions concerning the effects of agricultural nonpoint source BMPs on wetlands throughout the watershed.

# Wetland Restoration

Restorable wetlands have not been identified as part of the watershed inventory. The general guidelines for wetland restoration, easement acquisition and shoreline buffers to protect existing wetlands should be followed. Wetlands that are important wildlife habitats will be identified in consultation with DNR Wildlife Management and Water Management personnel. Shoreline buffer easements may be acquired adjacent to these wetlands to offer better protection from sedimentation and other nonpoint source pollution.

# Groundwater Management

Wells provide a direct conduit for pollutants to reach groundwater resources. Preventing well contamination and sealing abandoned wells are important steps for protecting these resources. If not properly sealed, abandoned wells can directly channel contaminated surface water or shallow groundwater into deeper drinking water aquifers, bypassing the normal purifying action that takes place as surface water slowly percolates downward.

Douglas County will encourage all landowners to properly seal abandoned wells. Information on the proper abandonment procedures will be provided to landowners when abandoned wells are located.

**Well Abandonment**

The Agricultural Conservation Program (ACP), which is administered by the Consolidated Farm Services Agency (CFSA), provides cost-share assistance to farm operators to properly seal abandoned wells to protect groundwater resources. Well abandonment is also an eligible cost-share practice under NR 120.

**Wisconsin Well Compensation Grants**

Wisconsin's Well Compensation grant program provides financial assistance to replace or treat private wells contaminated with heavy metals, pesticides, solvents or gasoline. Wells must exceed state or federal drinking water standards. Replacement of wells contaminated with bacteria or nitrate are not eligible for cost-sharing, with the exception of livestock wells contaminated with more than 40 ppm of nitrate. DNR regional water supply personnel should be consulted for more information concerning income limits and other eligibility requirements.

# Riparian Zones

Cattle access to streams and lakes has not been identified as a widespread problem in the watershed, however, some problem sites do exist. Any sites impacted by cattle access that are identified during the implementation phase of the project should be protected with BMPs. Sensitive riparian areas can be acquired through easements so they receive lasting protection.

# Forestry Programs

Private forest lands, which account for over 33,298 acres within the Upper St. Croix Lake - Eau Claire Rivers watershed, are important producers of forest products in Douglas County. Private forest lands also contribute to the quality of water resources and fish and wildlife resources in the watershed. Financial assistance is available for forest management and soil and water resource protection through the Stewardship Incentive Program (SIP), the Managed Forest Law Program (MFL) and other forest stewardship programs. Additional information can be found in DNR publication FR-093-95, Wisconsin Forestry Best Management Practices For Water Quality, developed by DNR Bureau of Forestry.

### Stewardship Incentive Program

The Stewardship Incentive Program (SIP) was developed to stimulate enhanced management of forest lands by cost-sharing approved management practices. SIP provides cost share funding of up to 75% for practices that provide soil and water protection. The SIP program applies to nonindustrial private forest land of 10 acres or more on forested or forest related (i.e., prairie, wetlands) lands. Practices that are cost-shared by SIP include: development of a landowner forest stewardship plan; site preparation and tree planting; timber stand improvement; windbreak and hedgerow establishment; soil and water protection and improvement; riparian and wetland protection and improvement; fisheries habitat enhancement; wildlife habitat enhancement; and forest recreation enhancement.

### Managed Forest Law

The goal of the Managed Forest Law (MFL) program is to encourage long-term sound forest management. MFL is a tax incentive program for industrial and nonindustrial private woodland owners who manage their woodlands for forest products while also managing for water quality protection, wildlife habitat and public recreation. In return for following an approved management plan, property taxes are set at a lower rate than normal. At a later time when the landowner receives an income from a timber harvest, some of the deferred tax is collected in the form of a yield tax. Management plans are based on the landowners objectives. These plans may address harvesting, planting, thinning, release and soil erosion on a mandatory basis while addressing other practices such as wildlife and aesthetic activities on a voluntary basis.

### Other Stewardship Programs

Some other forest stewardship programs available to watershed landowners include the Forest Improvement Program (FIP) and ACP. These programs provide funding for the establishment of timber stands.

Douglas County staff and DNR Foresters will encourage eligible forest landowners in the Upper St. Claire - Eau Claire Rivers watershed project to participate in Forest Stewardship Programs to benefit water resources and forest habitat. Protection of soil and water

resources should be addressed in all Stewardship Improvement Program and Managed Forest Lands plans where applicable.

# Wisconsin Lakes Management Program

The Wisconsin Lakes Management Program is a cooperative program between the Wisconsin DNR, UW-Extension, the Wisconsin Association of Lakes (WAL) and lake organizations, to assist local governments and inland lake management organizations in the long-term management and protection of our lakes. The Wisconsin Lakes Management Program provides technical assistance, information and education to lake groups and lake residents, and planning, protection, and implementation grants to qualified lake organizations and local units of government.

Lake groups range from informal groups of concerned property owners to lake districts which have the power to levy taxes against property owners for the operation of lake management programs. Most of the DNR grant programs designed to help lake residents become better lake stewards require that lake organizations meet certain minimum standards relating to membership, dues, and by-laws. At a minimum, a lake group must be a legal lake association incorporated under Chapter 181 Wisconsin Statutes.

The residents of the Gordon Flowage have formed a lake association as have the residents of Upper St. Croix Lake. In addition to the ability to apply for lake assistance grants, qualified lake organizations have much to offer lake residents. A unified lake association or lake district can lobby towns for changes in zoning laws and lake use restrictions and may join the Wisconsin Association of Lakes. Among other actions, WAL lobbies at the state-level for lake stewardship, cooperatively with the DNR, to bring much needed funding to local groups. WAL also provides a forum for members to express their concerns and the opportunity to educate residents about proper lake stewardship. Many Wisconsin counties have formed county lake associations to further assist in these efforts.

## Self Help Monitoring Program

The goal of the Self Help Monitoring Program is to educate lake property owners about lake ecology and water quality while building a long-term information base on a large number of Wisconsin lakes. The Self Help Monitoring Team consists of volunteers who collect lake water quality data on a regular basis to track lake health and guide Wisconsin's Lake Management Program.

## Lake Management Planning Grant Program

The Wisconsin Lake Management Planning Grant Program was developed to provide financial assistance to qualified lake organizations or local governments to collect and analyze data concerning the physical, chemical and biological health of our lakes. Grant money is available for use in the investigation of watershed conditions, review of ordinances and to conduct social surveys to gauge local concerns and perceptions as they relate to lake use and water quality. The end product of most lake management planning grants is a comprehensive lake management plan which addresses local concerns and analyzes alternatives for lake and watershed management. The DNR pays 75% of the cost of the planning project, not to exceed $10,000 during each two year state budget period. The remaining 25% of the project cost is paid by the grant recipient.

## Lake Protection Grant Program

Through the Lake Protection Grant Program qualified lake organizations can apply for funds to carry out a variety of lake protection projects. The state-share is 75%. Eligible projects include the purchase of lands critical to a lake ecosystem, restoration of important wetlands and the development of regulations and ordinances designed to protect and enhance lake water quality. Funding is limited to $200,000 per grant.

# Coordinating Regulations, Permits, and Zoning

Best management practices that address shoreline erosion such as riprap or vegetative shoreline stabilization will require permits from the DNR. Any BMP which effects wetland form or function may require permits form the DNR, Douglas County Zoning office and the US Army Corps of Engineers.

Douglas County will work closely with the DNR Water Regulation and Zoning staff, the Douglas County Zoning Department and the US Army Corps of Engineers to assure that necessary permits are received prior to the installation of shoreline stabilization practices.

In an attempt to protect the use, enjoyment and water quality of our lakes and streams the state, federal and local government regulates some activities on riparian properties. Activities that disturb or remove the natural vegetation surrounding our lakes and streams reduces the buffering capacity of the area and often drastically increases erosion, sedimentation and nutrient runoff. Many lakefront property owners, particularly those who are purchasing waterfront property for the first time, are not aware of these regulations or the need for them.

# Coordination With State and Federal Conservation Compliance Programs

The Upper St. Croix Lake - Eau Claire Rivers Watershed Project will be coordinated with the conservation compliance features of the Wisconsin Farmland Preservation Program (FPP) administered by DATCP, and the Federal Food Security Act (FSA) administered by the Natural Resource Conservation Service. DATCP will assist the LCD and the NRCS offices to identify landowners within the watershed that are subject to the compliance provisions of FPP and FSA. Conservation Farm Plans were completed for all landowners in FSA by December 31, 1989.

Implementation and amendment of these conservation plans will be necessary during the implementation phase of the watershed project. Watershed project staff will inform FPP and NRCS staff of changes in plans resulting from management decisions and the installation of needed BMPs for nonpoint source pollution abatement.

# Archaeological Sites: Coordination with State and Federal Historic Preservation Laws

Projects using state and federal funding, assistance, licenses and permits are required by law to consider the effects of their actions on archaeological and historical sites and historical structures. The watershed project is a joint cooperative effort between federal, state, and county agencies as well as the private landowners who volunteer to participate in the program. As a result, the federal Historic Preservation Act of 1966, as amended, and the state historic preservation statute, s. 44.40, Wis. Stats., have been blended to produce a cultural resource management program which is both compatible to preserving cultural sites and implementing the watershed project.

There are quite a number of known archaeological sites within the Upper St. Croix - Eau Claire Rivers Watershed. The sites are located along the banks of the Upper St. Croix River, along other streams, and near the Village of Solon Springs. These areas will need special consideration when structural best management practices are being considered. Settling basins, manure storage structures, and streambank or shoreline shaping and riprapping are likely practices that may impact archaeological sites. As discussed above, state and federal laws require preservation of archaeological resources within the framework of the NPS Program.

Before finalizing the cost-share agreement with the landowner, project staff should review the maps showing known archaeological and historic sites. If a known site occurs in the vicinity of a proposed BMP, this does not necessarily mean the BMP needs to be moved or altered. In some cases, the specific location of the BMP will not actually be near enough to the location of the known site to warrant further review. Project staff should visit the area and

conduct a "pre-review" to ensure that the *specific* location of the proposed BMP will not disturb the known archaeologic or historic site. Instructions and Cultural Resource Site Review Documentation forms are available in the Implementation Manual.

If it is too difficult to determine through a pre-review, or if it appears that the known site would indeed be disturbed, contact DNR's Historic Preservation staff person (in the Bureau of Facilities and Lands) to set up a formal Archaeological or Historic Site Review of the area. Any costs incurred as part of a site review *will not be passed on to the landowner.* The DNR's Nonpoint Source Pollution Abatement Program will pick up the costs of professional historic and/or archaeological site reviews. In some cases, a representative from the U.S. Natural Resources Conservation Service (NRCS) may conduct the review.

*Practices of concern*

Archaeological Sites

- Field Diversions
- Terraces
- Grade Stabilization Structures
- Agricultural Sediment Basins
- Streambank and Shoreline Stabilization
- Sediment Retention, Erosion or Water Control Structures
- Structural Urban Practices
- Wetland Restoration

Buildings

- Barnyard Runoff Management Systems
- Animal Lot Relocation
- Manure Storage Facilities
- Roofs for Barnyard/Manure Storage Facilities

*Practices - No Concern Needed for Cultural Sites*

- Contour Farming
- Contour Strip-cropping
- Field Strip-cropping
- Reduced Tillage

No-till Systems
Permanent Vegetative Cover
Cropland Protective Cover
Critical Area Stabilization
Nutrient Management
Pesticide Management
Shoreline Buffers
Livestock Exclusion from Woodlots
Grass Waterways

# Endangered and Threatened Resources

Information on threatened and endangered resources was obtained from the Bureau of Endangered Resources of the DNR. Endangered resources include rare species and natural communities. It should be noted that comprehensive endangered resource surveys have not been completed for the entire Upper St. Croix - Eau Claire Rivers Priority Watershed. The lack of additional occurrence records does not preclude the possibility that other endangered resources are present in the watershed. In addition, the DNR's endangered resource files are continuously updated from ongoing field work. There may be other records of rare species and natural communities which are in the process of being added to the database and so are not listed in this document.

## Rare Species

Rare species are tracked by Wisconsin's Natural Heritage Inventory of the Bureau of Endangered Resources. Species tracked by the inventory include those that are listed by the U.S. Fish and Wildlife Service or by the state of Wisconsin.

## Wisconsin Endangered Species

An endangered species is one whose continued existence as a viable component of this state's wild animals or wild plants is determined by the DNR to be in jeopardy on the basis of scientific evidence. Wisconsin endangered species within the watershed are:

*Lynx Canadensis*, Lynx;
*Vaccinium vitis-idaea ssp minus*, Mountain cranberry;

## Wisconsin Threatened Species

A threatened species is one which, if not protected, has a strong probability or becoming endangered. Wisconsin threatened species within the watershed are:

*Clemmys insculpta*, Wood turtle;
*Emydoidea blandingii*, Blanding's turtle;
*Haliaeetus leucocephalus*, Bald eagle[5];
*Pandion haliaetus*, Osprey;
*Calypso Bulbosa*, Calypso orchid;
*Percina Evides*, Gilt darter;
*Moxostoma Valenciennesi*, Greater redhorse;
*Parnassia Palustris*, Marsh grass-of-parnassus
*Cirsium Hillii*, Prairie thistle;
*Petasites Sagittatus*, Sweet coltsfoot

[5]This species is also on the Federal Endangered Species list as Endangered. A federally Endangered species is any species or subspecies which is in danger of extinction throughout all or a significant portion of its range.

## Wisconsin Special Concern Species

A special concern species is one for which some problem of abundance or distribution is suspected in Wisconsin, but not yet proven. The purpose of this category is to focus attention on certain species **before** they become endangered or threatened. Wisconsin special concern species within the watershed are:

*Ophioglossum vulgatum var pseudopod*, Adder's-Tongue;
*Hemileuca maia*, Buck moth;
*Arethusa bulbosa*, Dragon's mouth;
*Platanthera hookeri*, Hooker's orchid;
*Pompeius verna*, Little glassy wing;
*Equisetum palustre*, Marsh horsetail;
*Littorella americana*, Plantain shoreweed;
*Artemesia fridiga*, Prairie sagewort;
*Platanthera orbiculata*, Round-leaved orchid;
*Carex vaginata*, Sheathed sedge;
*Utricularia resupinata*, Small purple bladderwort;
*Silene nivea*, Snowy campion;
*Carex tenuiflora*, Sparse-flowered sedge;
*Botrychium rugulosum*, Ternate grape fern
*Callitriche hermaphroditica*, Water starwort;
*Platanthera dilatata*, White bog orchid;
*Stylurus scudderi*, Zebra clubtail;
*Atrytonopsis hianna*, Dusted skipper

## Natural Areas

Natural areas are sites that contain high quality examples of natural communities. There is just one officially designated natural area in the Upper St. Croix - Eau Claire Rivers Priority Watershed. The Solon Springs Sharptail Barrens Natural Area, which is a pine barrens community, is located within the watershed boundaries. There are many other natural areas in the watershed, but none that have been officially designated at "Natural Areas".

If specific locational or other information is needed about this natural area, contact the Bureau of Endangered Resources, DNR. **Please note** that the specific location of endangered resources is sensitive information. Exact locations **should not** be released or reproduced in any publicly disseminated documents.

# CHAPTER SEVEN
# Project Evaluation

## Introduction

This chapter briefly summarizes the plan for monitoring the progress and evaluating the effectiveness of the Upper St. Croix - Eau Claire Rivers Priority Watershed Project. The evaluation strategy for the project involves collecting, analyzing and reporting information to track progress in these areas:

1. **Partnership Agreement:** The capacity of the Partnership Agreement Model to be executed throughout the 8-year implementation period of the project will be the most important evaluation consideration in this watershed. The use of the Partnership Agreement Model can be considered successful when the citizens and groups who commit to the project as Partners remain involved in the protection of the watershed well into the future. At the first meeting of the Partnership Steering Committee, more specific evaluation criteria will be developed. These will be based on measuring the effectiveness of the project's information and education activities to affect real change in each landowner's lifestyle choices and in larger, local land use decisions that effect the entire region.

2. **Administrative:** This category includes the progress in providing technical and financial assistance to eligible landowners, and carrying out education activities identified in the plan. The Douglas County Forestry Department will track the progress in this area and report to the DNR and DATCP on a regular basis.

3. **Pollutant Reduction Levels:** This evaluation will be based on a pre- and post- survey of watershed residents regarding changes in land use practices. Repeated observations of relative size and number of sites impacting water quality will also be monitored.

4. **Water Resources:** The DNR will monitor changes in water quality, habitat, and water resources characteristics periodically during the project and at the end of the project.

# Evaluation Overview

The use of the Partnership Agreement Model can be considered successful when the citizens and groups who commit to the project as Partners remain involved in the protection of the watershed well into the future. Therefore, the evaluation of the first component will be the most important measure of this project's success. At the first meeting of the Partnership Steering Committee, more specific evaluation criteria will be developed. These will be based on measuring the effectiveness of the project's information and education activities to affect real change in each landowner's lifestyle choices and in larger, local land use decisions that effect the entire region.

Information on the second and third components will be collected by the Douglas County Forestry Department and reported on a regular basis to the DNR and the DATCP. Additional information on the numbers and types of practices on cost share agreements, funds encumbered on cost share agreements, and funds expended will be provided by the DNR's Bureau of Community Financial Assistance.

The fourth component, water resource evaluation monitoring, follows guidance established by DNR's Bureau of Watershed Management to select and monitor resource quality changes at specific sites within the watershed. The monitoring will be conducted by DNR Water Quality Biologists. Monitoring will be conducted to demonstrate the effectiveness of the project implementation, and changes in water quality and/or habitat conditions resulting from

the installation of BMPs. Signs of Success (SOS) monitoring at specific sites will follow guidelines established by DNR's Bureau of Watershed Management.

A final report will be prepared for the Upper St. Croix - Eau Claire Rivers Priority Watershed Project within 18 months of the end of the grant period. This report will include information on landowner participation, effectiveness and accomplishments of the Partnership Agreement Model and the partnership Steering Committee, project management, grant management, technical assistance, and any Signs of Success sites completed within the watershed, among other topics. The report will evaluate progress, provide documentation on attainment of water quality protection and shoreline protection objectives, evaluate BMP effectiveness, and provide recommendations on which target key areas need improvement in the NPS program. The DNR, with the assistance of the Douglas County Forestry Department, will prepare the final report.

# Administrative Review

Project administration will be reviewed annually as county project managers will report a variety of information to the DNR and DATCP. The administrative review will focus on the progress of Douglas County and other units of government in implementing the project. The project will be evaluated with respect to accomplishments, financial expenditures, and staff time spent on project activities, as well as landowner participation and progress toward achieving the water quality, aquatic habitat, and educational objectives of the watershed project.

The information listed above is described in more detail in the following sections and will be analyzed and discussed at an annual review meeting. During the annual review meeting, project goals, landowner contact strategy modifications, progress with critical sites, and work planning needs will be jointly developed for each subsequent year. Each year the county project manager, DNR, and other participating units of government, will compare actual performance to the annual goals. Local assistance grant recommendations and awards will, in part, be determined by annual project progress evaluations.

## Accomplishment Reporting

The following data will be included within the annual accomplishment report:

* Activities and accomplishments of the Partnership Steering Committee
* Planned and completed BMPs
* Planned and completed conservation systems
* Information and education activities completed
* Progress toward contacting landowners

Details of the reporting requirements are contained within the jointly published evaluation plan for Soil and Water Resources Management Program and the Nonpoint Source Water Pollution Abatement Program (DNR Publication WR-223-94). The publication is reviewed every two years by the DATCP and the DNR and revised as necessary.

Additional evaluation data provided by Douglas County for the annual watershed review include:

- Pollutant load reductions (described below)
- Status of grants and related financial activities
- Evaluation of landowner participation
- Status of project administration including data management, staff training, and BMP monitoring
- Status of nutrient management planning, and easement acquisition and development
- Evaluation of changes needed and/or implemented in ordinances to meet project goals and objectives
- Information and education activities

Douglas County will be required to maintain a data management system to track accomplishments for the project. Data collected for administrative accomplishments will be provided to the DNR for program evaluation.

## Financial Expenditures

Douglas County and other participating units of government will provide the following financial data to the DNR and the DATCP on a annual basis, unless otherwise directed:

- Number of landowner cost-share agreements signed
- Amount of money encumbered in cost-share agreements
- Number of landowner reimbursement payments made for the installation of best management practices (BMPs), and the amount of money paid
- Staff travel expenditures
- Information and education expenditures
- Expenditures for equipment, materials, and supplies
- Expenditures for professional services and staff support costs
- Total project expenditures for the project staff
- Amount of money paid for installation of BMPs, and money encumbered in cost-share agreements
- Staff training expenditures
- Interest money earned and expended
- Total budget and expenditures on the project

## Time Spent On Project Activities

The Douglas County Forestry Department and other participating governmental units with local assistance grants will provide time summaries to both departments for the following activities on an annual basis:

- Project and fiscal management
- Clerical assistance
- Pre-design and conservation planning activities
- Technical assistance: practice design, installation, cost-share agreement status review and monitoring
- Educational activities
- Training activities

- Leave Time

# Protection and Pollution Reduction Evaluation

The purpose of the second evaluation component, is to evaluate the progress being made toward achieving the water quality and habitat goals of the project. Key areas were identified in the project inventory, for targeting reductions in pollutant loads that reach surface waters in the Upper St. Croix - Eau Claire Rivers Watershed. The key areas include road maintenance and construction practices, shoreline development, and agricultural practices. Specific implementation strategies for targeting each of these sources are described in Chapter Three of this plan.

## Road Maintenance and Construction

The progress toward decreasing the impacts on water quality from road maintenance and construction practices in the project will be evaluated. At the time of the initial land use inventory for the project, forestry BMPs for the protection of water quality were being well implemented on most roads throughout the watershed. Forest roads where timber cutting and other forestry practices are taking place will be regularly monitored and reevaluated to assure the continued implementation of forestry BMPs.

## Shoreline Development

Douglas County staff will estimate changes in shoreline sediment erosion. A tally will be kept of landowners contacted, the amount of shoreline sediment (in tons) being generated at the time of contact, and changes in erosion levels estimated after installing BMPs. The amount of shoreline habitat restoration will also be tracked and evaluated on an annual basis.

A survey will be designed and conducted early in the project to assess the practices being utilized by riparian landowners. This survey will be repeated near the end of the project to assess and study changes due to the implementation of shoreline BMPs. The survey will include shoreline habitat restoration, shoreline erosion control and run-off management, as

well as fertilizer and pesticide use. UW-Extension will assist in the design and implementation of the survey.

Lastly, a shoreline inventory, as described in Chapter 2, will be repeated near the end of the project. This inventory will track changes in shoreline erosion and habitat that has been restored.

### Agricultural Practices

Three areas of focus in the agricultural land use of this project were identified as agricultural shoreland management, nutrient and pest management, and proper manure handling, application and storage.

The total length of trampled streambank that has been repaired will be tracked by Douglas County and reported to the DNR on an annual basis. Acres of land that have had farm plans, nutrient management and/or pest management plans developed within the project will also be reported.

## Water Resource Evaluation Monitoring

### Signs of Success

Signs of Success (SOS) is short-term monitoring designed to provide some early evidence that better land management does make a difference. One site is being sought for each watershed project. Signs of Success will focus on one practice such as barnyard runoff controls, manure storage, or streambank stabilization that is expected to have an early effect on the adjacent stream.

Monitoring will take place over a two-year period--the year before and the year after a practice is installed. Expected positive improvements will be on those sites where degraded habitat has occurred. Habitat sampling and photographs will be used to indicate the benefit of the practice. Limited chemical monitoring and fish sampling will be done at some sites.

SOS sites for the Upper St. Croix - Eau Claire Rivers project are still being identified and will be established shortly after the implementation phase of the project begins.

# Appendix A

# The Partnership Steering Committee and the Partnership Agreement Document

<u>The Current Partnership Steering Committee - Partners who are Official Signatories of the Partnership Agreement (as of 5/97)</u>

1. Ashland, Barron, Douglas & Iron Counties Land Conservation Department
   Fran Barrett, Chair; Harold Brown, Board Member; Sandy Schultz, Conservationist

2. Upper St. Croix Lake Association
   Polly Edmunds, President; Jim Heim, Treasurer

3. Douglas County Forestry Department
   Dave Epperly, Administrator; Stephen Hanson, Chair, Forest, Parks and Recreation Committee; Jean Longnecker, Forestry Committee

4. Etienne's Resort
   Pat & George Graven, Resort Owners

5. Douglas County Zoning Department
   Harold Olson, Zoning Administrator

6. Town of Gordon
   Roger Postl, Supervisor

7. Tuverson's Resort
   Ron Tuverson, Resort Owner

Partnership Steering Committee (continued)

8. St. Croix/Gordon Flowage Association
   Kelly Barnes, President

9. Northland Cranberries, Inc., Allen O'Leary

10. St. Croix School District

11. Douglas County U-W Extension, Geof Wendorf

12. Village of Solon Springs, Todd Gilbert

13. Town of Solon Springs, Douglas McCuskey, Town Chair

14. Town of Wascott, Robert Lawler

15. Douglas County Highway Department, George Palo

# Partnership Agreement

## Upper St. Croix - Eau Claire Rivers Priority Watershed Project

This document serves as a partnership agreement between various units of government, private sector organizations, and education, business, economic development, and special interest groups that are interested in the future of the Upper St. Croix - Eau Claire Rivers Priority Watershed. The parties associated with this partnership are united through a mutual concern for the environmental integrity of the watershed. These partners recognize the importance of protecting water quality within the watershed for continued use by future generations. The region's quality of life and economic health are dependent on the maintenance and sustainability of the watershed's natural resources.

### Background

The Upper St. Croix - Eau Claire Rivers watershed is an area of scenic beauty and exists in a relatively unpolluted condition. It is an area of sandy outwash deposits from the last glacial period and is dominated by managed forests and significant wetland complexes used by waterfowl. The two dominant water bodies in the watershed are the 850.5-acre Upper St. Croix Lake and the 1,912-acre St. Croix Flowage. Both are important natural and recreational resources. The lake has received the designation of "Outstanding Resource Water" and the flowage has one of the highest water quality rankings in the state. Linkages between the watershed's resource base and the economic health and quality of life in the region is pervasive. Forestry, tourism and outdoor recreation are the leading activities that bring revenue to the area, and are fundamentally dependent on high quality water resources. This protection based project will serve as a "model" for future watershed projects.

### Shared Vision

> To enhance water quality by strengthening education and voluntary action, thus maintaining the biological integrity and natural character of the Upper St. Croix - Eau Claire Rivers watershed.

**Action**

We, the undersigned, considering the best interests of the water, natural resources and future growth of the region, mutually agree to remain involved with and informed about the Upper St. Croix - Eau Claire Rivers Watershed project. Coordination, planning, implementation and outreach are to be accomplished through the Partnership Steering Committee, composed of members who sign this Partnership Agreement. A watershed citizen advisory committee will review, advise and promote the activities of the Partnership Steering Committee.

Organization _____

Name & Title _____

Date _____

# Appendix B

# Unnamed lakes

**Table B-1 Unnamed Lakes in the Upper St. Croix - Eau Claire Rivers Watershed**

| Location | Size (acres) | Max. Depth (feet) | Watershed Drainage (sq miles) | Shoreline (miles) |
|---|---|---|---|---|
| 43-11-1 | 3.6 | 7 | 0.22 | 0.69 |
| 43-11-4 | 14.2 | 5 | 0.17 | 0.56 |
| 43-11-4 | 1.4 | 6 | 0.03 | 0.19 |
| 43-11-5 | 5.2 | 3 | 0.09 | 0.63 |
| 43-11-7 | 13 | 10 | 0.18 | 0.69 |
| 43-11-8 | 7.8 | 4 | 0.38 | 0.75 |
| 44-10-5 | 13.8 | 7 | 0.01 | 0.12 |
| 44-10-5 | 0.2 | 3 | 0.08 | 0.3 |
| 44-10-7 | 0.3 | 6 | 0.03 | 0.12 |
| 44-10-7 | 0.5 | 5 | 0.04 | 0.15 |
| 44-10-7 | 10.1 | 7 | 0.16 | 0.45 |
| 44-10-8 | 1.4 | 3 | 1.59 | 0.4 |
| 44-10-8 | 0.4 | 3 | 1.75 | 0.1 |
| 44-10-17 | 2.2 | 6 | 0.07 | 0.56 |
| 44-10-34 | 0.8 | 2 | 0.05 | 0.28 |
| 44-11-1 | 5.7 | 18 | 0.08 | 0.44 |
| 44-11-2/3 | No Data | | | |

| Location | Size (acres) | Max. Depth (feet) | Watershed Drainage (sq miles) | Shoreline (miles) |
|---|---|---|---|---|
| 44-11-3 | No Data | | | |
| 44-11-4 | 1.1 | 6 | 0.04 | 0.19 |
| 44-11-5 | 14.1 | 7 | 0.32 | 0.99 |
| 44-11-6 | 6 | 18 | 0.05 | 0.38 |
| 44-11-18 | 1.8 | 4 | 0.02 | 0.62 |
| 44-11-20 | 4 | 4 | 0.6 | 0.82 |
| 44-11-20 | 1.2 | 4 | 0.71 | 0.4 |
| 44-11-23 | 3.5 | 21 | 0.15 | 0.28 |
| 44-11-24 | 2.5 | 5 | 0.07 | 0.29 |
| 44-11-24 | 3.8 | 5 | 0.12 | 0.38 |
| 44-12-2 | No Data | | | |
| 44 [illegible]-10 | 17.3 | 3 | 0.3 | 1.06 |
| 44-12-14 | 1.5 | 5 | 0.36 | 0.28 |
| 44-12-14 | 3 | 7 | 0.28 | 0.36 |
| 44-12-14 | 2.4 | 8 | 0.1 | 0.38 |
| 44-12-14 | 0.7 | 7 | 0.07 | 0.13 |
| 44-12-15 | 3 | 6 | 0.25 | 0.38 |
| 44-12-22 | 2.3 | 6 | 0.1 | 0.27 |
| 44-12-22 | 14.6 | 7 | 0.39 | 0.63 |
| 44-12-23 | No Data | | | |
| 44-12-23 | No Data | | | |
| 44-12-23 | No Data | | | |
| 44-12-23 | No Data | | | |
| 45-10-21 | 10.5 | 3 | 0.1 | 0.56 |

| Location | Size (acres) | Max. Depth (feet) | Watershed Drainage (sq miles) | Shoreline (miles) |
|---|---|---|---|---|
| 45-10-21 | 6.1 | 3 | 0.06 | 0.55 |
| 45-10-22 | No Data | | | |
| 45-10-23 | 3.4 | 10 | 0.03 | 0.26 |
| 45-10-23 | 14.4 | 6 | 0.26 | 1.12 |
| 45-10-25 | 5 | 6 | 0.18 | 0.36 |
| 45-10-27 | 3.1 | 4 | 0.06 | 0.52 |
| 45-10-29 | 2.2 | 5 | 0.89 | 0.63 |
| 45-10-31 | No Data | | | |
| 45-10-32 | No Data | | | |
| 45-10-33 | No Data | | | |
| 45-11-28 | 1.2 | 3 | 0.07 | 0.17 |
| 45-11-29 | 6.5 | 9 | 0.09 | 0.4 |
| 45-11-29 | 0.7 | 5 | 0.07 | 0.13 |
| 45-11-30 | 1.8 | 4 | 0.2 | 0.2 |
| 45-11-31 | 2.3 | 4 | 0.02 | 0.22 |
| 45-11-31 | 1.6 | 4 | 0.12 | 0.19 |
| 45-11-32 | 0.4 | 3 | 1.3 | 0.09 |
| 45-12-12 | 0.2 | 4 | 0.02 | 0.07 |
| 45-12-22 | No Data | | | |
| 45-12-23 | 0.4 | 7 | 0.01 | 0.1 |
| 45-12-26 | 0.5 | 4 | 0.05 | 0.17 |
| 45-12-26 | 1.2 | 3 | 0.03 | 0.18 |
| 45-12-34 | 3.5 | 5 | 0.08 | 0.32 |
| 45-12-34 | 0.3 | 5 | 1.42 | 0.08 |

| Location | Size (acres) | Max. Depth (feet) | Watershed Drainage (sq miles) | Shoreline (miles) |
|---|---|---|---|---|
| 46-12-36 | No Data | | | |

# Appendix C

# Education Team and Integrated Resource Management Team

## Education and Promotion Team

Kelly Barnes, President, Gordon Flowage Association
Jim Heim or Polly Edmunds, Upper St. Croix Lake Association
Jim Upthegrove, U.S. Coast Guard
Geof Wendorf, CNRD Agent, UW-Extension
Bill Swenson, UW-Superior
Terry O'Hallaron, Naturalist, National Park Service, St. Croix Scenic Riverway
Sue O'Hallaron, Waterwatch, UW-Superior
Don Hinnman, UW-Extension

## Integrated Resource Management Team

John Gozdzialski, DNR, St. Croix Basin Leader
Jane Malischke, DNR, NPS Implementation
Craig Roesler, DNR, Water Resource Specialist
Frank Koshere, DNR, Water Quality Biologist
Brad Johnson, DNR, Forestry
Dennis Scholl, DNR, Fisheries
Greg Kessler, DNR, Wildlife Manager
Amy Mizia, DNR, Water Regulation Specialist
Randy Gilbertson, NRCS
Keith Sengbush, NRCS
Paul Johnson, NRCS
Sandy Schultz, Conservationist, ABDI- LCD Office, Ashland
Dave Epperly, Administrator, Douglas County Forestry, Solon Springs

# Appendix D

# Issues Identified by the Partnership Steering Committee as Important to the Future of the Watershed

1. What do you feel are the threats to the *QUALITY OF THE WATER RESOURCE* in the Upper St. Croix - Eau Claire Rivers Watershed??

The issues in italicized and bold text were identified as priority issues.

A.
1) Control of water level -Business
2) Watercraft - introduction of exotic species - Business
3) Weeds - Lake Association
4) ***Future Development - DNR***
5) Agricultural runoff - DNR
6) ***Road Construction, maintenance, and erosion - NRCS***
7) Private forest land activities - LCD
8) Train rail derailment in Solon Springs - Village of Solon Springs
9) ***Lack of education regarding threats to the resource, and BMP's to deal with them*** - Business, Coast Guard
10) Airborne pollutants - Douglas County
11) Lawncare practices, fertilizers - DOT
12) Lack of using resources to address threats - Business
13) Road care contaminants (road salt) - Local Govt.
14) Groundwater contamination and usage - Douglas County Forestry
15) Loss of shoreline habitat - DNR water quality
16) Lack of Policing at boat landings - Douglas County Board
17) Protection of biological resources (exotics) - UW-Superior
18) Increased aquatic vegetation and its effect on fish communities - DNR fisheries
19) Road proliferation or lack of abandonment - DNR forestry
20) Nutrient loading from road erosion - USC technician
21) Elimination of funding for water resource management programs - DNR planning

22) Septic Systems - Business

23) Outside oppressive government intervention - Lake Association

24) ***Loss of opportunity to plan for water resource protection*** - Upper St. Croix watershed project manager

25) Urban and residential runoff - DNR

26) Stream bank and shoreline buffers - DNR

27) Automotive contaminants, boats, and RV's - Business

28) Lack of education for elected govt. officials regarding importance of zoning and planning - LCD

29) Lack of zoning enforcement - Douglas County Forestry

30) Overuse of resource - DOT

31) Heating Oil - Douglas County

32) Lack of information transfer between agencies - Douglas County Forestry

33) Lack of consistent priorities and inconsistent information - Douglas County Board

34) Development and use driven by fiscal forces - UW-Superior

35) Logging practices near streams - DNR fisheries

36) Clearcuts (extent of) contributing to runoff - DNR forestry

37) Lack of commitment for proactive management programs - DNR planning

38) Lack of Information & Education - Business

39) Deterioration of fisheries - Lake Association

40) Shoreline erosion - Lake Association

41) Jetski use - Lake Association

42) Lack of dedicated and committed staff, and tools to commit to project - DNR water quality

# Appendix E

# Shoreline Habitat Restoration Interim Best Management Practice

Description

Shoreline habitat restoration is the establishment of vegetation consisting of a mixture of native trees, shrubs, grasses or wetland species on a strip or area of land along the shoreline of a lake or stream.

**Purpose**

Shoreline habitat restoration will:

-reduce the intensity and impact of human activities in the near shore area,

-enhance littoral zone (shallow water) habitat function for a broad range of vertebrate and invertebrate species, including fish, amphibians, reptiles and aquatic insects by providing shade and cover with overhanging vegetation, and woody and vegetative debris contributions to the littoral zone structure,

-provide habitat and overwintering cover for aquatic fauna dependent upon nearshore terrestrial habitat for a portion of their life cycle.

Additional benefits include reduced shoreline erosion, decreased use of fertilizers and pesticides, increased runoff infiltration, and attenuation of some sediments and nutrients carried in runoff. Along streams, additional benefits may also include dissipation of stream flow energy under high flow conditions, and improvement in stream channel contours.

**Conditions Where Practice Applies**

Cost-sharing for shoreline habitat restoration will be approved when:

-This practice is consistent with the watershed plan.

-Existing shoreline vegetation lacks the structure or complexity to support the habitat functions described above for littoral and riparian areas.

-Landowner will maintain the practice with zero phosphorus and minimum herbicide applications. Phosphorus fertilizer may be applied only where soil tests indicate it is needed, and herbicides may be applied only where this is the best available method of controlling invasive undesirable species.

**Planning Considerations**

The following factors should be considered when planning shoreline habitat restoration for developed areas.

-Erosion control measures must be in place.

-Runoff from lands that drain to this practice should be maintained in sheet flow to the greatest extent possible.

-Runoff from impervious areas and roof gutter downspouts should be directed to maximize infiltration.

-Land uses within the shoreland zone should be in compliance with county shoreland zoning regulations.

-Vegetation may be planted to enhance shoreline stability, but rip rap or bioengineering will be used only where the need to control shoreline erosion has been identified. Where feasible, bioengineering will be the first choice for controlling shoreline erosion because of the vegetative support this measure can provide.

-Native plant species appropriate for conditions should be used where ever possible, and all species should be selected to minimize the need for fertilizer, pesticides, water and maintenance.

-Landowner goals for habitat restoration design may include providing access to the water body, enhancing desirable views, screening of unwanted views and enhancing privacy. These goals may be incorporated into the design as long as they do not conflict with the purpose and design criteria for this practice.

-Contiguous stretches of uninterrupted vegetative habitat should be encouraged.

-Where stairways are needed for access, they should be located and constructed to minimize erosion. Stairs constructed on elevated posts are recommended, rather than those excavated into steep slopes, to minimize erosion. Alternate methods may be approved on a case by case basis.

**Design Criteria**

- Plantings shall provide a dense complete and vigorous cover of vegetation consisting of trees, shrubs, prairie grasses, forbs and/or wetland species, and shall be selected to provide adequate diversity and structural complexity along at least 70% of the shoreline. Any cleared areas shall not exceed 30 feet of lake frontage per lot.
-Vegetation should be adapted to the local soils, climate and the surrounding vegetation. Refer to UW Extension Publication GWQ014, *Shoreline Plants and Landscaping*, or similar publication for choosing plant material. Watershed staff must approve plants chosen. Native species are preferred, and certain invasive species such as reed canary grass and purple loostrife are prohibited. For areas where prairie establishment is planned, refer to DNR Publication PUBL-WM-228, *Home on the Range - Restoring and Maintaining Grasslands for Wildlife.*
- Restoration strips shall be a minimum of 15 feet in width, with wider strips encouraged. Wider strips will provide greater habitat benefits for a wider variety of species. Wider strips may be required by project staff on an individual basis, where there are depressions, drainage ways, steeply sloping areas or other conditions making wider strips necessary to provide adequate function.
-Access openings and trails maintained through the buffer should not channel runoff to the lake, and should be located to avoid areas of high runoff or erodible soils. Grass or other cover that will hold the soil is recommended for trails.
-Disturbance of sod cover and exposure of soil should be the minimum required to shape the slope and install the practice. All exposed soil will be mulched and any other necessary measures taken to prevent erosion. Refer to Chapter 3, Wisconsin Construction Site Best Management Practice Handbook for erosion control guidelines.
-Heavy equipment use must be minimized to prevent soil compaction.
-Initial start-up fertilization of phosphorus is allowed only if a soil test indicates a deficiency of phosphorus.
-Herbicide use is allowed for establishment, but not for maintenance.
-Burning may not be used for clearing or maintaining buffers unless approved by staff. Burning releases nutrients that could be washed to the lake or stream.

**Operation and Maintenance**

- Vehicles or all terrain vehicles are to be excluded from the buffer to prevent disturbance and ground compaction.
- Herbicides and fertilizers are not allowed for maintaining buffers except as noted earlier under "Conditions Where Practice Applies".
-Development of multi-story canopy layers created by a mixture of tree and shrub species is desirable, and maintenance activities should be done in a manner that promotes this development.
-Cutting of trees or shrubs may be done only to prevent safety hazards. Where possible dead or windblown trees should be left in place, as they provide an important habitat component. Removal of undesirable competitive species is allowed if it does not compromise the function of the buffer.
-The forest floor duff layer and leaf litter must remain intact to provide a continuous ground cover and meet habitat functions of this practice.
-In established prairie buffer areas, mowing is allowed to a minimum height of ten inches, and only as needed to reduce competition from weeds and woody vegetation. Mowing should be done between August 1 and September 1 to avoid disturbance of nesting birds and allow regrowth before winter. Mowing is generally not needed more than once every several years.

**Cost Share Conditions and Rates**

The watershed pays 70% of the eligible costs which include:

-Design costs
-Plants and seed
-Labor and equipment for installation
-Necessary erosion control measures to prevent erosion during installation

Costs not covered:

-Material for stairs, walkways or other access structures
-Rip rap or bioengineering unless the area has been identified as having an erosion problem that is eligible for shoreline protection measures
-Plants not approved by the watershed staff

# Appendix F

# Upper St. Croix - Eau Claire Rivers Watershed Questionnaire and Results

1. How many years have you lived or visited the Solon Springs/Gordon/Wascott area?

2. Do you own lakeshore or riverside property? Yes No

3. How often do you use the lakes, streams and wetlands in the watershed?

   Never 1-3 times/yr 4-10 times/yr > 10 times/yr

4. Please rank the following activities in order of importance to you (1=highest, 6=lowest)

_____ Hunting/fishing _____ Entertaining

_____ Swimming _____ Peace & Quiet

_____ Boating _____ Natural beauty/wildlife observation

5. Over time have you observed changes to the water quality? Yes No

   a) Are the changes for the better or the worse?

   b) Please describe those changes and what you think might be the cause.

6. Please rank order what you feel are the greatest threats to water quality in the St. Croix - Eau Claire Rivers Watershed (1= highest; 6=lowest)

_____ Jetskis & waterskiing _____ Septic Systems

_____ Loss of shoreline habitat _____ Exotic Species (milfoil, rusty crayfish)

_____ Boating activities _____ Development (roads, homes, buildings)

7. Please leave your name, address and phone number if you wish to be included in the following:

* Mailing list for receiving periodic fact sheets on protecting water quality.

* Are you interested in becoming a "partner" and working to protect water quality in the watershed?

Name

_____

Address

_____

Phone _____

# Results

## Introduction

It is evident from the survey responses that people are passionate about the Upper St. Croix - Eau Claire Rivers region. The region has a distinctive character that inspires affection; clean water, extensive forests, access to land, natural beauty and abundant fish and wildlife.

The watershed is also a place of change and mounting threats from the same expansion seen throughout the country -- increased development (shoreline), intensified resource extraction, and the infrastructure to support it - (i.e. the widening of Hwy #53). Many citizens surveyed voiced concerns about increased aquatic macrophytes (weeds), boat traffic and shoreline development. A challenge for the local community is to balance economic growth with ecological integrity.

What follows is a summary report of the 286 completed questionnaires (19% return rate). The purpose of the questionnaire was to provide a vehicle for watershed residents to share their perceptions of water quality issues facing the area. The questionnaire was not sophisticated or statistically sound enough to be used as a tool for setting goals for the watershed project, though it will assist in providing insight for the development of educational programs.

## Summary

Question: How many years have you lived or visited the Gordon/Wascott/Solon Springs area?

Interpretation: With more than 80% of all respondents living in the area for more than a decade, the questionnaire results provide a historical perspective of changes that have occurred in the area over time. It also speaks loudly of the concern and passion people have for this area.

Table 1. Years Lived in the Watershed

| 0-9 Years | 10-19 Years | 20-29 Years | 30-39 Years | 40+ Years |
|---|---|---|---|---|
| 18% | 14% | 18% | 24% | 26% |

Question: Do you own lakeshore or riverfront property?

Interpretation: A greater response to the questionnaire came from individuals living on water (lakes or rivers). However, residents who don't live on the water, still have a deep concern for the water resources in the area, and want to protect the watershed's surface waters. It is these common waters that galvanize people to organize together to protect their quality of life.

Table 2. Lakeshore/Riverfront Property Owners

| Yes I own waterfront property. | No I do not own waterfront property. |
|---|---|
| 62% | 38% |

Question: How often do you use the streams, lakes and wetlands within the watershed?

Interpretation: More than 90% of all individuals spend some time near water annually, and more than 50% spend large amounts of time surrounded by water. These results speak volumes about our natural connection and draw to water. It also clearly shows that these water resources will come upon increased pressure as new and continued uses are placed upon them. This provides a clear rationale for the need to manage these resources.

Table 3. Annual Frequency of Water Use

| Never | 1-3 times/yr | 4-10 times/yr | > 10 time/yr |
|---|---|---|---|
| 6% | 17% | 22% | 55% |

Question: Please rank order the following activities in order. Which activities do you participate in more within the watershed? (1=high use; 4=moderate use; 8=low use).

Interpretation: Shoreline residents ranked peace and quiet, natural beauty and hunting/fishing as their top three watershed uses. Non-shore residents also ranked these three as their top uses, with hunting/fishing as their top use. The fact that more than 8 of every 10 respondents value these activities depicts the need to protect them.

Table 4. Water Uses

| | Shoreline Residents | Non-Shore Residents | Total Respondents |
|---|---|---|---|
| Peace & Quiet | 85% | 76% | 83% |
| Swimming | 41% | 33% | 40% |
| Natural Beauty/ Wildlife Observation | 84% | 78% | 82% |
| Hunting/Fishing | 73% | 88% | 75% |
| Boating | 44% | 38% | 42% |
| Entertaining | 22% | 39% | 26% |
| Making a Living | 13% | 27% | 17% |
| Other: Canoeing, walking, snowmobiling | 8% | 5% | 7% |

**All percentages reflect how often respondents the activity between 1-3. The percentages are not intended to equal 100%.*

Question: 5a) Over time, have you noticed changes in water quality in the watershed?

5b) Are the changes for the better or for the worse?

Interpretation: A third of the respondents felt that no significant changes have occurred, almost half felt that conditions were getting worse and a small minority felt that water quality was improving. Contributing factors to people's responses were length of time residing in watershed and the specific conditions of the lake they live on or visit.

Table 5a. Changes in Water Quality

| Yes I've noticed changes. | No I haven't noticed any changes. |
|---|---|
| 64% | 36% |

Table 5b.

| Changes are for the better. | Changes are for the worse. |
|---|---|
| 34% | 66% |

Question: Please jot down a few of the changes you've noticed.

Comments: "The St. Croix lake is cleaner. Now you can see down into the water to the bottom in places, watching fish swim."

"Sewer on Lake St. Croix has clearly improved quality of lake."

"Fewer weeds now that sewer is in place."

"There are more weeds in St. Croix Lake and in St. Croix River downstream from the lake."

"Surface algae may be increasing later in the season."

"Fishing success has declined."

Table 6. Changes You've Observed?

| Ranked in order of Importance | Changes for the better. | Changes for the Worse. |
|---|---|---|
| #1 | Increased water clarity. | Increased aquatic vegetation. |
| #2 | Improved lake quality. | Increased algae blooms. |
| #3 | Decreased aquatic vegetation. | Overharvesting of fish. |

Question: Please rank what you believe are the greatest threats to water quality within the watershed.

Interpretation: Shoreline residents clearly witness development, increasing weeds and exotic species as problems. It is rather surprising that septic systems are a major concern, considering that St. Croix Lake has mostly been sewered. Non-shoreline residents are even more concerned with failing septic systems, but may not be aware that St. Croix Lake is sewered. This is not to say that other lakes in the watershed are not affected by failing septic systems. Overall, septic systems, development and exotic plant species were the top three concerns identified by all watershed residents.

Table 7. Threats to Water Quality

| | Shoreline Residents | Non-shoreline residents | Total Respondents |
|---|---|---|---|
| Jetskis/waterskis | 45% | 46% | 45% |
| Development | 56% | 57% | 56% |
| Exotic plant species | 56% | 46% | 53% |
| Failing septic systems | 54% | 74% | 61% |
| Loss of shoreline | 44% | 59% | 49% |
| Boating | 23% | 37% | 27% |
| Aquatic plants & weeds | 53% | 33% | 48% |
| Other | 17% | 12% | 16% |

** All percentages reflect how often respondents ranked the threat between 1-3. The percentages are not intended to equal 100%.*

# Appendix G

Douglas County Shoreland Zoning Ordinance Summary

The Douglas County Shoreland Zoning Ordinance was initially adopted in 1971 and later revised under state mandate in October 1985. In early 1995, as a result of concern that current zoning ordinances were not adequate in controlling development on lands susceptible to environmental degradation, a special ordinance review committee was appointed to review all existing Douglas County Zoning Ordinances. The special committee chose the shoreland zoning ordinance as the first, most important ordinance to review.

The purpose of the shoreland zoning ordinance is to maintain safe and healthful conditions, to prevent water pollution, to protect fish spawning grounds and wildlife habitat, to preserve shore cover and natural beauty and to control development on shorelands whenever possible. The ordinance regulates human activities on shorelands in the unincorporated areas of Douglas County that are within one thousand feet (1,000) of the ordinary high water mark of navigable lakes, ponds or flowages, and three hundred feet (300) of the ordinary high water mark of navigable rivers or streams, or the landward side of the floodplain, whichever distance is greater. In order to meet the stated goal, the ordinance includes extensive language in the following sections:

* Land division review and sanitary regulations
* Dimensions of building sites
* Setback from the water
* Removal of shoreline cover
* Filling, grading, lagooning, dredging, ditching and excavating
* Shoreland-Wetland districts
* Non-conforming uses and structures
* Enforcement and penalties

One of the main provisions of the ordinance is a series of dimensional requirements for building sites as related to underlying zoning district (i.e., RR-1, etc...). There are greater setback restrictions for lots on the St. Croix, Eau Claire and Brule Rivers due to their pristine nature. Vegetative removal is consistent for all underlying zoning districts. No more than 30 feet in any 100 feet, as measured along the ordinary high water mark, may be

clear cut to the depth of 35 feet from the shoreline. The natural vegetation shall be preserved as far as is practicable, and where removed, it shall be replaced with other vegetation that is equally effective in retarding runoff, preventing erosion and preserving natural beauty.

A principal consideration for the 1995 ordinance review team was to investigate the implementation of a lake classification system. The system would customize standards to the ability of each waterbody to support development. In addition, the team worked to update and revise protective language in the ordinance to reflect contemporary lakeshore development patterns. After a series of revisions and public hearings on proposed changes to the ordinance, Douglas County successfully amended the ordinance in July 1996.

The ordinance amendment changes the title of the Shoreland-Wetland Districts to Shoreland Overlay Districts with a special overlay for Wild Lake Overlay Districts. The Wild Lakes Overlay District includes all lakes in the unincorporated areas of the county which do not have a habitable residence within 300 feet of the ordinary high water mark. The district regulations are intended to provide a high level of protection for shoreland waters which are the most environmentally sensitive, have a very limited natural carrying capacity and which have no existing development. Minimum lot size is 10-acres with a 175 foot minimum setback and a 300 foot minimum shoreline length. In addition to these larger building site restrictions, vegetative removal is restricted to 30 feet in 300 feet of shoreline and to a maximum of within 50 feet of the shoreline.

# Douglas County Zoning Requirements

ZONING SCHEDULE - DIMENSIONAL REQUIREMENTS[1]

| | R-1 | R-2 | RR-1 | A-1 | C-1 | I-1 | F-1 |
|---|---|---|---|---|---|---|---|
| Building Height Limit | 35 | 35 | 35 | 35 | 35 | 60 | 35 |
| Required Lot Area (Acres or Sq. Ft.) | | | | | | | |
| With Public Sewer | 10,000[2] | 5 acres | 10,000[2] | 5 acres | 10,000[2] | 1 acre | 10 acres |
| Without Public Sewer | | | | | | | |
| (a) Within Shorelands | 20,000[3] | 5 acres | 20,000[3] | 5 acres | 20,000[3] | 1 acre | 10 acres |
| (b) Outside Shorelands | 15,000 | 5 acres | 20,000[3] | 5 acres | 20,000[3] | 1 acre | 10 acres |
| (c) Shoreline Lots | | | | | | | |
| 1. Unclassified Shorelines | | | 30,000[3] | | | | |
| 2. Minimum Protection Classified | | | 30,000[3] | | | | |
| 3. Moderate Protection Classified | | | 40,000[3] | | | | |
| 4. Maximum Protection Classified | | | 80,000[3] | | | | |
| Minimum Lot Width[4] | | | | | | | |
| With Public Sewer | 75 | 300 | 150 | 300 | 75 | 200 | 300 |
| Without Public Sewer | 100 | 300 | 150 | 300 | 100 | 200 | 300 |
| Classified Shorelines | | | | | | | |
| 1. Minimum Protection | | | 150 | | | | |
| 2. Moderate Protection | | | 175 | | | | |
| 3. Maximum Protection | | | 200 | | | | |
| Setbacks from Shorelines | | | | | | | |
| 1. Unclassified & Minimum Protection Classified | | | 75 | | | | |
| 2. Moderate Protection Classified | | | 100 | | | | |
| 3. Maximum Protection Classified | | | 125 | | | | |
| Yards Required | | | | | | | |
| Front | 30 | 50 | 30 | 50 | 10 | 50 | 30 |
| Side | | | | | | | |
| Principle Building | 10 | 20 | 10 | 20 | 10 | 20 | 10 |
| Accessory Building | 5 | 10 | 5 | 10 | 5 | 10 | 5 |
| Rear | 40 | 50 | 40 | 50 | 20 | 50 | 40 |
| Floor Area, Residences (Square Feet) | | | | | | | |
| 3 or more bedrooms | 1,000 | 1,000 | 700 | 1,000 | 700 | 700 | 700 |
| 2 bedrooms | 900 | 900 | 600 | 900 | 600 | 600 | 600 |
| 1 bedroom | 800 | 800 | 500 | 800 | 500 | 500 | 500 |
| Floor Area, Mobile Home (Square Feet) | | | | | | | |
| 3 or more bedrooms | 800 | 800 | 700 | 800 | 800 | | |
| 2 bedrooms | 700 | 700 | 600 | 700 | 700 | | |
| 1 bedroom | 600 | 600 | 500 | 600 | 600 | | |

[1] Unless specified elsewhere in this ordinance or on the Official Zoning Map, the dimensional requirements of this schedule shall apply to the respective listed districts. Requirements for the W-1: Resource Conservation, SP-1: Shoreland Protection, and PUD: Planned Unit Development are contained on the Official Zoning Map.

[2] Minimum for one-family dwellings: add 5,000 sq. ft. for each additional unit over one (1).

[3] Plus any additional area required by the Wisconsin Administrative Code, Section 65.03.

[4] No lot shall be created with a length to width ratio greater than three (3) to one (1).

SETBACK REQUIREMENTS ON HIGHWAYS AND ROADS, as stated in Section 4.2 of the Douglas County Zoning Ordinance. The distance that is greater (measured from the centerline and from the right-of-way line), shall apply.

(a) ALL STATE AND U.S. NUMBERED HIGHWAYS - 130 ft. from the centerline or 66 ft. from the right-of-way line.
(b) ALL COUNTY TRUNK HIGHWAYS - 75 ft. from the centerline or 42 ft. from the right-of-way line.
(c) ALL TOWN ROADS - 63 ft. from the centerline or 30 ft. from the right-of-way line.

SETBACK REQUIREMENTS FROM RIVERS AND STREAMS:
75 ft. from the highwater mark, except for the St. Croix, Brule and Eau Claire Rivers, which is 200 ft.

(R. 5-89)

# Glossary

AGRICULTURAL CONSERVATION PROGRAM (ACP):

A federal cost-sharing program to help landowners install measures to conserve soil and water resources. ACP is administered by the USDA ASCS through county ACP committees.

ALGAE:

A group of microscopic, photosynthetic water plants. Algae give off oxygen during the day as a product of photosynthesis and consume oxygen during the night as a result of respiration. Therefore, algae effect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:

A form of nitrogen ($NH_3$) found in human and manures. Ammonia can be toxic to aquatic life.

ANAEROBIC:

Without oxygen.

AREAWIDE WATER QUALITY MANAGEMENT PLANS (208 PLANS):

A plan to document water quality conditions in a drainage basin and make recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

ANTIDEGRADATION:

A policy stating that water quality will not be lowered below background levels unless justified by economic and social development considerations. Wisconsin's antidegradation policy is currently being revised to make it more specific and meet EPA guidelines.

BARNY:

The Wisconsin Barnyard runoff model, a computer model used to assess the water quality impacts of barnyards or feedlots. It was developed by DNR with assistance from NRCS and DATCP.

BENTHIC ORGANISMS (BENTHOS):

Organisms living in or on the bottom of a lake or stream.

BEST MANAGEMENT PRACTICE (BMP):

The most effective, practical measures to control nonpoint sources of pollutants that runoff from land surfaces.

BIOACCUMULATION:

The uptake and retention of substances by an organism from its surrounding medium and food. As chemicals move through the food chain, they tend to increase in concentration in organisms at the upper end of the food chain such as predator fish, or in people or birds that eat these fish.

BIOCHEMICAL OXYGEN DEMAND (BOD):

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. $BOD_5$ is the biochemical oxygen demand measured in a five day test. The greater the degree of pollution, the higher the $BOD_5$.

BUFFER STRIPS:

Strips of grass or other erosion-resisting vegetation between disturbed areas and a stream or lake.

CHLORORGANIC COMPOUNDS (CHLORORGANICS):

A class of chemicals that contain chlorine, carbon and hydrocarbon. This generally refers to pesticides and herbicides that can be toxic. Examples include PCB's and pesticides such as DDT and dieldrin.

CLEAN WATER ACT: ("Public Law 92-500")

The federal law that sets national policy for improving and protecting the quality of the nation's waters. The law set a timetable for the cleanup of the nation's waters and stated that they are to be fishable and swimmable. This also required all dischargers of pollutants to obtain a permit and meet the conditions of the permit. To accomplish this pollution cleanup, billions of dollars have been made available to help communities pay the cost of building sewage treatment facilities. Amendments in the Clean Water Act were made in 1977 by passage of Public Law 95-217, and in 1987.

CLIMAX FOREST:

A community of trees at or near biological maturity. Climax forests are generally characterized by a multi-layered, uneven age and class structure;typically characterized by longer life species as the major component with a significant lack of pioneer or intolerant species. Climax forests exhibit the functions and processes of undisturbed forest ecosystems in equilibrium.

CONSERVATION TILLAGE:

Planting row crops while only slightly disturbing the soil. In this way a protective layer of plant residue stays on the surface. Erosion rates decrease.

CONVENTIONAL POLLUTANT:

Refers to suspended solids, fecal coliforms, biochemical oxygen demand, and pH, as opposed to toxic pollutants

COST-EFFECTIVE:

A level of treatment or management with the greatest incremental benefit for the money spent.

DENDRITIC DRAINAGE:

Branch-like drainage patterns often found in delta regions of rivers.

DISSOLVED OXYGEN (DO):

Oxygen dissolved in water. Low levels of dissolved oxygen cause bad smelling water and threaten fish survival. Low levels of dissolved oxygen often result from inadequate wastewater treatment. The DNR considers 5 ppm DO necessary for fish and aquatic life.

ECOSYSTEM:

The interacting system of biological community and its nonliving surrounding.

EFFLUENT:

Solid, liquid or gas wastes (byproducts) that are disposed on land, in water or in air. As used in the RAP, effluent generally means wastewater discharges.

EFFLUENT LIMITS:

The DNR issues WPDES permits establishing the maximum amount of pollutant to be discharged to a receiving stream. Limits depend on the pollutant and the water quality standards that apply for the receiving waters.

ENVIRONMENTAL PROTECTION AGENCY (USEPA):

The federal agency responsible for enforcing federal environmental regulations. The Environmental Protection Agency delegates some of its responsibilities for water, air and solid waste pollution control to state agencies.

EROSION:

The wearing away of the land surface by wind or water.

EUTROPHIC:

Refers to a nutrient-rich lake. Large amounts of algae and weeds characterize a eutrophic lake (see also "Oligotrophic" and "Mesotrophic").

EUTROPHICATION:

The process of nutrient enrichment of a lake loading to increased production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

FECAL COLIFORM:

A group of bacteria used to indicate the presence of other bacteria that cause disease. The number of coliform is particularly important when water is used for drinking and swimming.

FISHABLE AND SWIMMABLE:

Refers to the water quality goal set for the nation's surface waters by Congress in the Clean Water Act. All waters were to meet this goal by 1984.

GROUNDWATER:

Underwater-bearing areas generally within the boundaries of a watershed, which fill internal passageways of porous geologic formations (aquifers) with water that flows in response to gravity and pressure. Often used as the source of water for communities and industries.

LAUERTIAN MIXED FOREST:

A northern coniferous and mixed hardwood forest found in Canada and the northern tier of new England and the Upper Midwestern states in the U.S.

LEACHATE:

The contaminated liquid which seeps from a pile or cell of solid materials and which contains water, dissolved and decomposing solids. Leachate may enter the groundwater and contaminate drinking water supplies.

LOAD:

The total amount of materials or pollutants reaching a given local.

MACROINVERTABRATE:

Aquatic invertabrates that are indicators of water quality. They are large enough to be seen with the naked eye.

MACROPHYTE:

A rooted aquatic plant.

MASS BALANCE:

A study that examines all parts of the ecosystem to determine the amount of toxic or other pollutant present, its sources, and the processes by which the chemical moves through the ecosystem.

MESIC SOILS:

Moderately moist soils.

MESOTROPHIC:

Refers to a moderately fertile nutrient level of a lake between the oligotrophic and eutrophic levels. (See also "Eutrophic" and "Oligotrohpic.")

MILLIGRAMS PER LITER (mg/1):

A measure of the concentration of substance in water. For most pollution measurement this is the equivalent of "parts per million".

MITIGATION:

The effort to lessen the damages caused, by modifying a project, providing alternatives, compensating for losses or replacing lost values.

MIXING ZONE:

The portion of a stream or lake where effluent is allowed to mix with the receiving water. The size of the area depends on the volume and flow of the discharge and receiving water. For streams the mixing zone it is one-third of the lowest flow that occurs once every 10 years for a seven day period.

NONPOINT SOURCE POLLUTION (NPS):

Pollution whose sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach water bodies in runoff, which can best be controlled by proper land management.

OLIGOTROPHIC:

Refers to an unproductive and nutrient-poor lake. Such lakes typically have very clear water. (See also "Eutrophic" and "Mesotrophic.")

OUTFALL:

The mouth of a sewer, drain, or pipe where effluent from a wastewater treatment plant is discharged.

OUTSTANDING RESOURCE WATERS:

PELAGIC:

Referring to open water portion of a lake.

PHOSPHORUS:

A nutrient that, when reaching lakes in excess amounts, can lead to overfertile conditions and algae blooms.

PLANKTON:

Tiny plants and animals that live in water.

POINT SOURCES:

Sources of pollution that have discrete discharges, usually from a pipe or outfall.

PRIORITY WATERSHED:

A drainage area about 100,000 acres in size selected to receive Wisconsin Fund money to help pay the cost of controlling nonpoint source pollution. Because money is limited, only watersheds where problems are critical, control is practical, and cooperation is likely are selected for funding.

PUBLIC PARTICIPATION:

The active involvement of interested and affected citizens in governmental decision-making.

RIPARIAN:

Belonging or relating to the bank of a lake, river or stream.

RIPRAP:

Broken rock, cobbles, or boulders placed on the bank of a stream to protect it against erosion.

RUNOFF:

Water from rain, snowmelt, or irrigation that flows over the ground surface and returns to streams. Runoff can collect pollutants from air or land and carry them to receiving waters.

SECONDARY IMPACTS:

The indirect effects that an action can have on the health of the ecosystem or the economy.

SEDIMENT:

Soil particles suspended in and carried by water as a result of erosion.

STORM SEWERS:

A system of sewers that collect and transport rain and snow runoff. In areas that have separated sewers, such stormwater is not mixed with sanitary sewage.

SUSPENDED SOLIDS (SS):

Small particles of solid pollutants suspended in water.

TOP-DOWN MANAGEMENT:

A management theory that uses biomanipulation, specifically the stocking of predator species of fish to improve water quality.

TOTAL MAXIMUM DAILY LOADS:

The maximum amount of a pollutant that can be discharged into a stream without causing a violation of water quality standards.

TROPHIC STATUS:

The level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration.

TURBIDITY:

Lack of water clarity. Turbidity is usually closely related to the amount of suspended solids in water.

UNINTEGRATED (CHAOTIC) DRAINAGE:

Drainage that exhibits no definable pattern and is chaotic in nature.

UNIVERSITY OF WISCONSIN-EXTENSION (UWEX):

A special outreach, education branch of the state university system.

VARIANCE:

Government permission for a delay or exception in the application of a given law, ordinance or regulation. Also, see water quality standard variance.

WASTEWATER:

Water that has become contaminated as a byproduct of some human activity. Wastewater includes sewage, washwater and the water-borne wastes of industrial processes.

WASTEWATER TREATMENT PLANT:

A facility for purifying wastewater. Modern wastewater treatment plants are capable of removing 95% of organic pollutants.

WATER QUALITY LIMITED SEGMENT:

A section of river where water quality standards will not be met if only categorical effluent standards are met.

WATER QUALITY CRITERIA:

A measure of the physical, chemical or biological characteristics of a water body necessary to protect and maintain different water uses (fish and aquatic life, swimming, etc.).

WATER QUALITY STANDARDS:

The legal basis and determination of the use of a water body and the water quality criteria, physical, chemical, or biological characteristics of a water body, that must be met to make it suitable for the specified use.

WATER QUALITY STANDARD VARIANCE:

When natural conditions of a water body preclude meeting all conditions necessary to maintain full fish and aquatic life and swimming, a variance may be granted.

WATERSHED:

The land area that drains into a lake or river.

WETLANDS:

Areas that are inundates or saturated by surface or groundwater at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas.

WINHUSLE:

A computer model for evaluating sediment delivery to surface waters from agricultural lands. It was developed by DNR with assistance from NRCS.

WISCONSIN ADMINISTRATIVE CODE:

The set of rules written and used by state agencies to implement state statutes. Administrative codes are subject to public hearing and have the force of law.

WISCONSIN FUND:

A state program that helps pay the cost of reducing water pollution. Funding for the program comes from general revenues and bonds and is based on a percentage of the state's taxable property value. The Wisconsin Fund includes these programs:

Point Source Water Pollution Abatement Grant Program - Provides grants for 60% of the cost of constructing wastewater treatment facilities. Most of this program's money goes for treatment plant construction, but three percent of this fund is available for repair or replacement of private, on-site sewer systems.

Nonpoint Source Water Pollution Abatement Grant Program - Funds to share the cost of reducing water pollution. Nonspecified sources are available in selected priority watersheds.

Solid Waste Grant Program - Communities planning for solid waste disposal sites are eligible for grant money. $500,000 will be available each year to help with planning costs.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:

A state cost-share program established by the State Legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES):

A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

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# Priority Watershed Projects in Wisconsin: 1996 - 1997

| Year Selected-Map Number | Large-scale Priority Watershed Project | County(ies) |
|---|---|---|
| 79-1 | Galena River ♦ | Grant, Lafayette |
| 79-2 | Elk Creek ♦ | Trempealeau |
| 79-3 | Hay River ♦ | Barron, Dunn |
| 79-4 | Lower Manitowoc River ♦ | Manitowoc, Brown |
| 79-5 | Root River ♦ | Racine, Milwaukee, Waukesha |
| 80-1 | Onion River ♦ | Sheboygan, Ozaukee |
| 80-2 | Sixmile-Pheasant Branch Creek ♦† | Dane |
| 80-3 | Big Green Lake ♦ | Green Lake, Fond du Lac |
| 80-4 | Upper Willow River ♦ | Polk, St. Crox |
| 81-1 | Upper West Branch Pecatonica River ♦ | Iowa, Lafayette |
| 81-2 | Lower Black River ♦ | La Crosse, Trempealeau |
| 82-1 | Kewaunee River ♦ | Kewaunee, Brown |
| 82-2 | Turtle Creek ♦ | Walworth, Rock |
| 83-1 | Oconomowoc River ♦ | Waukesha, Washington, Jefferson |
| 83-2 | Little River ♦ | Oconto, Marinette |
| 83-3 | Crossman Creek/Little Baraboo River ♦ | Sauk, Juneau, Richland |
| 83-4 | Lower Eau Claire River ♦ | Eau Claire |
| 84-1 | Beaver Creek ♦ | Trempealeau, Jackson |
| 84-2 | Upper Big Eau Pleine River | Marathon, Taylor, Clark |
| 84-3 | Sevenmile-Silver Creeks ♦ | Manitowoc, Sheboygan |
| 84-4 | Upper Door Peninsula ♦ | Door |
| 84-5 | East & West Branch Milwaukee River | Fond du Lac, Washington, Sheboygan, Dodge, Ozaukee |
| 84-6 | North Branch Milwaukee River | Sheboygan, Washington, Ozaukee, Fond du Lac |
| 84-7 | Milwaukee River South | Ozaukee, Milwaukee |
| 84-8 | Cedar Creek | Washington, Ozaukee |
| 84-9 | Menomonee River | Milwaukee, Waukesha, Ozaukee, Washington |
| 85-1 | Black Earth Creek | Dane |
| 85-2 | Sheboygan River | Sheboygan, Fond du Lac, Manitowoc, Calumet |
| 85-3 | Waumandee Creek | Buffalo |
| 86-1 | East River | Brown, Calumet |
| 86-2 | Yahara River - Lake Monona | Dane |
| 86-3 | Lower Grant River | Grant |
| 89-1 | Yellow River | Barron |
| 89-2 | Lake Winnebago East | Calumet, Fond du Lac |
| 89-3 | Upper Fox River (Ill.) | Waukesha |
| 89-4 | Narrows Creek - Baraboo River | Sauk |
| 89-5 | Middle Trempealeau River | Trempealeau, Buffalo |
| 89-6 | Middle Kickapoo River | Vernon, Monroe, Richland |
| 89-7 | Lower East Branch Pecatonica River | Green, Lafayette |
| 90-1 | Arrowhead River & Daggets Creek | Winnebago, Outagamie, Waupaca |
| 90-2 | Kinnickinnic River (Milwaukee Basin) | Milwaukee |
| 90-3 | Beaverdam River | Dodge, Columbia, Green Lake |
| 90-4 | Lower Big Eau Pleine River | Marathon |
| 90-5 | Upper Yellow River | Wood, Marathon, Clark |
| 90-6 | Duncan Creek | Chippewa, Eau Claire |
| 91-1 | Upper Trempealeau River | Jackson, Trempealeau |
| 91-2 | Neenah Creek | Adams, Marquette, Columbia |
| 92-1 | Balsam Branch | Polk |
| 92-2 | Red River - Little Sturgeon Bay | Door, Brown, Kewaunee |
| 93-1 | South Fork Hay River | Dunn, Polk, Barron, St. Croix |
| 93-2 | Branch River | Manitowoc, Brown |
| 93-3 | Soft Maple/Hay Creek | Rusk |
| 93-4 | Tomorrow/Waupaca River | Portage, Waupaca, Waushara |
| 94-1 | Duck Creek | Outagamie, Brown |
| 94-2 | Apple/Ashwaubenon Creeks | Outagamie, Brown |
| 94-3 | Dell Creek | Sauk, Juneau |
| 94-4 | Pensaukee River | Shawano, Oconto |
| 94-5 | Spring Brook | Langlade, Marathon |
| 94-6 | Sugar/Honey Creeks | Walworth, Racine |
| 95-1 | Pigeon River | Manitowoc, Sheboygan |
| 95-2 | Middle Peshtigo/Thunder Rivers | Marinette, Oconto |
| 95-3 | Fond du Lac River | Fond du Lac, Winnebago |
| 95-4 | Lower Rib River | Marathon |
| 95-5 | Kinnickinnic River (St. Croix Basin) | St. Croix, Pierce |
| 95-6 | Lower Little Wolf | Waupaca |
| 95-7 | Pine & Willow Rivers | Waushara, Winnebago |

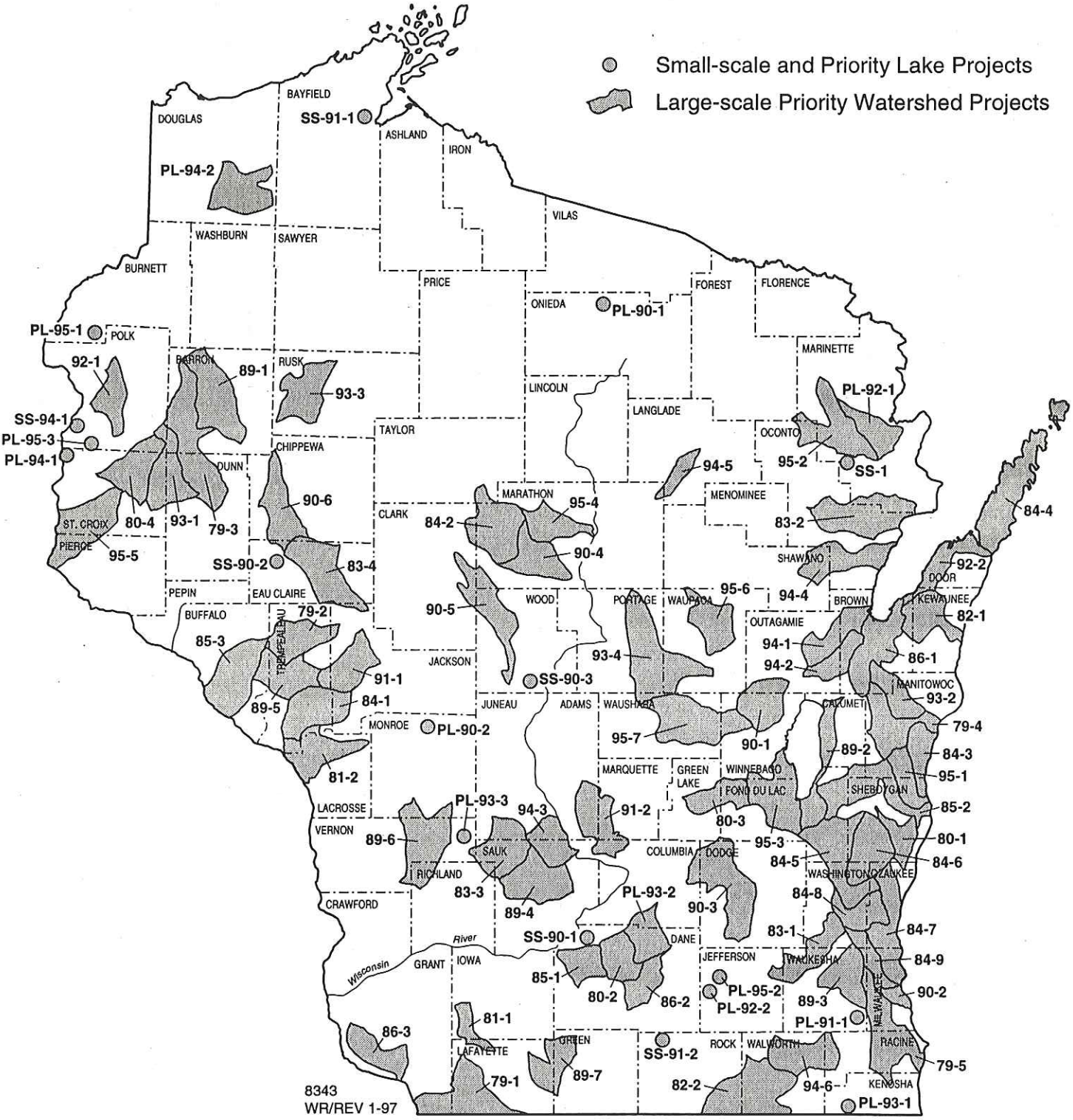
| Year Selected-Map Number | Small-scale Priority Watershed Project | County(ies) |
|---|---|---|
| SS-1 | Bass Lake ♦ | Marinette |
| SS-90-1 | Dunlap Creek | Dane |
| SS-90-2 | Lowes Creek | Eau Claire |
| SS-90-3 | Port Edwards - Groundwater Prototype | Wood |
| SS-91-1 | Whittlesey Creek | Bayfield |
| SS-91-2 | Spring Creek | Rock |
| SS-94-1 | Osceola Creek | Polk |

| Year Selected-Map Number | Priority Lake Project | County(ies) |
|---|---|---|
| PL-90-1 | Minocqua Lake | Oneida |
| PL-90-2 | Lake Tomah | Monroe |
| PL-91-1 | Little Muskego, Big Muskego, Wind Lakes | Waukesha, Racine, Milwaukee |
| PL-92-1 | Lake Noquebay | Marinette |
| PL-92-2 | Lake Ripley | Jefferson |
| PL-93-1 | Camp/Center Lakes | Kenosha |
| PL-93-2 | Lake Mendota | Dane, Columbia |
| PL-93-3 | Hillsboro | Vernon |
| PL-94-1 | St. Croix County Lakes Cluster | St. Croix |
| PL-94-2 | Upper St. Croix/Eau Claire River | Douglas |
| PL-95-1 | Big Wood Lake | Burnett, Polk |
| PL-95-2 | Rock Lake | Jefferson |
| PL-95-3 | Horse Creek | Polk, St. Croix |

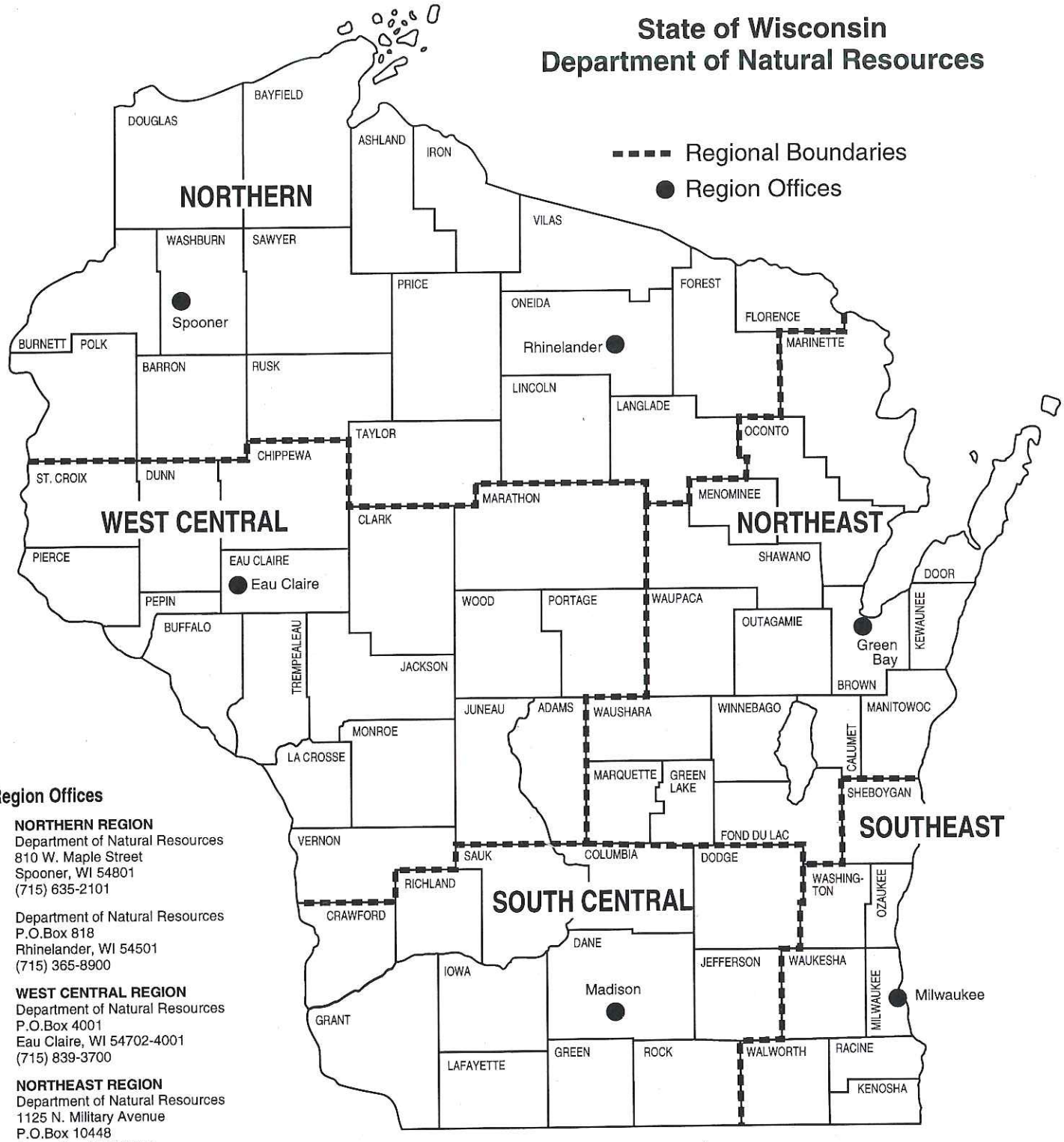
*♦ Project completed*

*† Sixmile-Pheasant Branch is being redone as part of the Lake Mendota project (PL-93-2).*

# Priority Watershed Projects in Wisconsin
## 1996-1997



# State of Wisconsin
# Department of Natural Resources

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REV 7-97

# Our Mission:

To protect and enhance our Natural Resources—
our air, land and water;
our wildlife, fish and forests.

To provide a clean environment
and a full range of outdoor opportunities.

To insure the right of all Wisconsin citizens
to use and enjoy these resources in
their work and leisure.

And in cooperation with all our citizens
to consider the future
and those who will follow us.

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