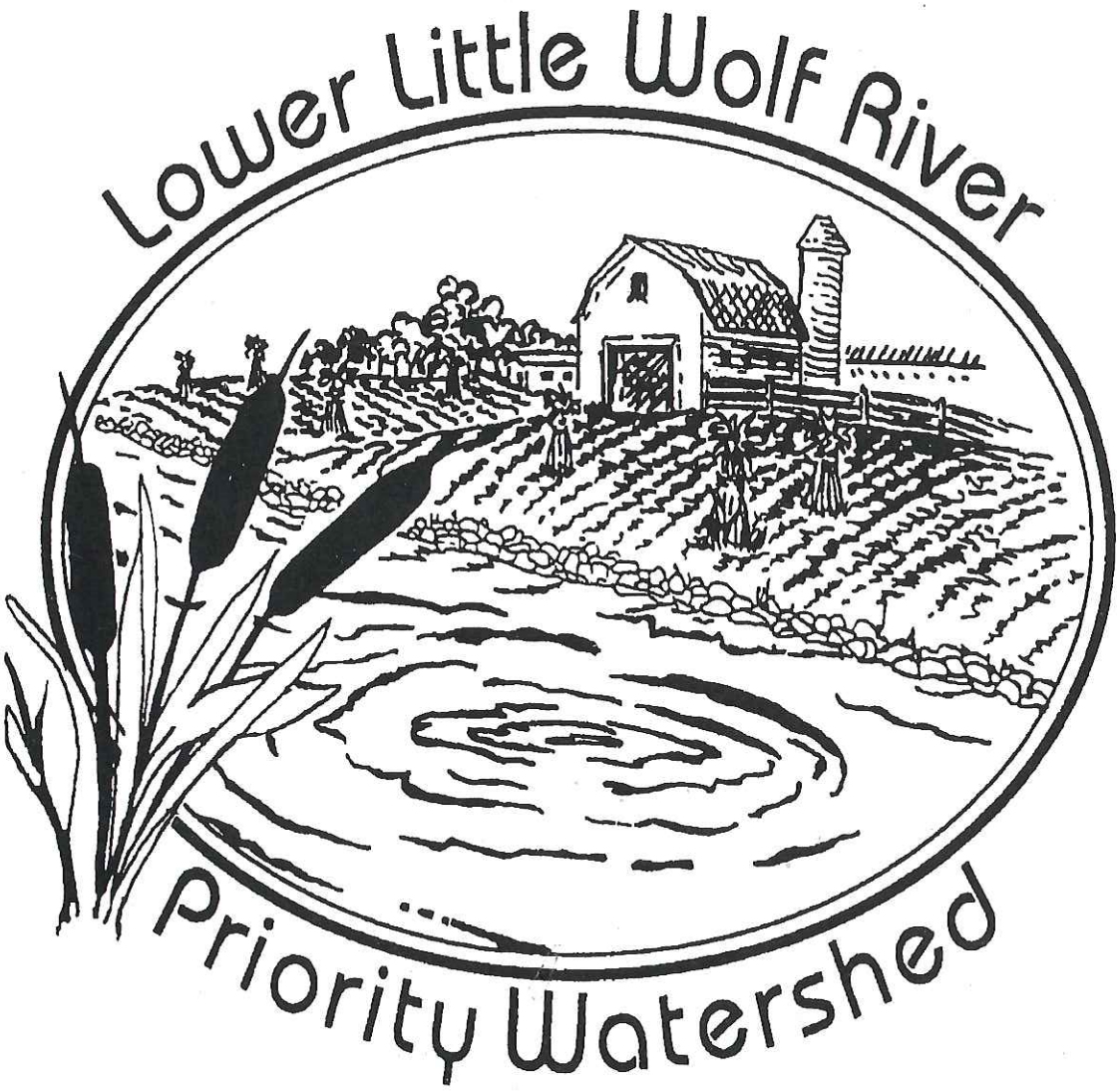
Nonpoint Source Control Plan for the Lower Little Wolf River

Priority Watershed Project



This plan was prepared under the provisions of the Wisconsin Nonpoint Source Pollution Abatement Program by the Wisconsin Department of Natural Resources, the Department of Agriculture, Trade and Consumer Protection, and the Waupaca County Land & Water Conservation Department.

Watershed Plan Organization Information

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Rebecca Wallace Acknowledgment

This Lower Little Wolf Priority Watershed Plan is dedicated to Becky Wallace. During her tenure as Chief of the Runoff Management Practices Section of the Department of Natural Resources, the Priority Watershed Program made great strides in addressing nonpoint pollution. She accepted the challenge of managing a nationally recognized program through turbulent times. She believed firmly in protecting the natural resources of Wisconsin while remaining sensitive to the needs of the agricultural community, DNR staff and land conservationists. Her standards of excellence will be a guide for those who follow. She had the ability to secure and maintain the respect of everyone she was associated with, regardless of their position on an issue.

Rebecca Wallace's life will have a positive impact on the natural resources and people of the State of Wisconsin.

Nonpoint Source Control Plan for the Lower Little Wolf River Priority Watershed Project

The Wisconsin Nonpoint Source Water Pollution Abatement Program

June 1997

This Plan Was Cooperatively Prepared By:

The Wisconsin Department of Natural Resources
Wisconsin Department of Agriculture, Trade and Consumer Protection
and
Waupaca Co. Land & Water Conservation Department

Publication PUBL-WT-491-97

For copies of this document please contact:

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June 3, 1997

Ms. Eunice Lawrence, Chair
Waupaca County Land and Water Conservation Committee
811 Harding
Waupaca, WI 54981

Eunice

Dear Ms. Lawrence:

I am pleased to approve the Lower Little Wolf River 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 Wolf River Basin Areawide Water Quality Management Plan.

I would like to express the Department's appreciation to the Waupaca County staff that participated in preparing the plan. We look forward to assisting Waupaca County and other units of government in the watershed in implementing the plan.

Sincerely,

George

George E. Meyer
Secretary

Good luck on your project.

cc: Bruce Bushweiler - Waupaca County LCD
Len Olson - DATCP
John Young - NER
Cindy Hoffland - CA/8
Karen Rahmeier - WT/2

RESOLUTION 5 (1997)

ADOPTING THE LOWER LITTLE WOLF RIVER NONPOINT SOURCE PRIORITY WATERSHED PLAN

TO THE WAUPACA COUNTY BOARD OF SUPERVISORS:

WHEREAS, the Lower Little Wolf River Watershed was designated a priority watershed by the Department of Natural Resources in 1995 under the Wisconsin Nonpoint Source Water Pollution Abatement Program Natural Resource Law 120, and

WHEREAS, this project is a continuation of the Waupaca Co. Water Quality Program and complements the goals of improved water quality of that program, and

WHEREAS, the County Land & Water Conservation Department 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 1996 and 1997, and

WHEREAS, this inventory resulted in the development of a detailed nonpoint source control plan for the watershed, and

WHEREAS, an official public hearing was conducted on April 29, 1997, and

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

WHEREAS, to receive cost sharing grants for landowners in the watershed, Waupaca County Board of Supervisors must first adopt the Lower Little Wolf River Watershed Plan.

NOW, THEREFORE BE IT RESOLVED, by the Board of Supervisors of the County of Waupaca, that the Lower Little Wolf River Watershed Nonpoint Source Priority Watershed Plan be adopted and the implementation of the plan begin immediately upon the approval by the Wisconsin Land & Water Conservation Board.

FISCAL IMPACT: Costs to the County for implementation of this watershed plan are reimbursed 95% by the State.

Passed this 20 day of May 1997

23 ayes 0 nayes

ATTEST:

Mary A. Robbins

Mary A. Robbins

Approved As to For:

Jeff Siewert
Corporation Counsel

Recommended for Introduction by:
WAUPACA CO. LAND & WATER CONSERVATION COMMITTEE

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List of Acronyms

ACP	Agricultural Conservation Program
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
EQIP	Environmental Quality Incentive Program
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
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.

Lower Little Wolf River Priority Watershed

Project Summary

Introduction

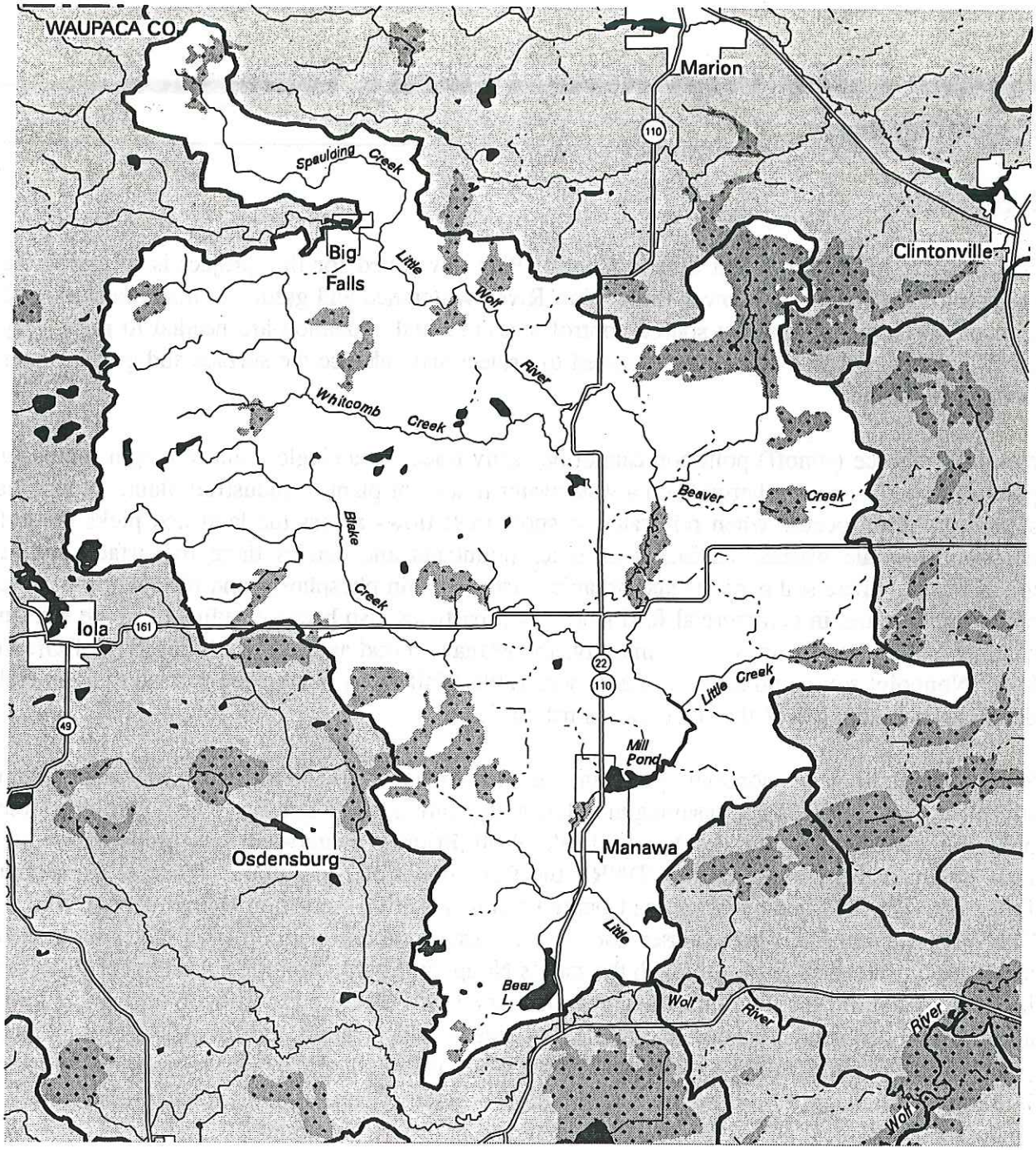
The purpose of the Nonpoint Source Control Plan developed for this project is to assess the nonpoint pollutants in the Lower Little Wolf River Watershed and guide the implementation of control measures. Nonpoint source control measures and education are needed to meet very specific water resource objectives designed to protect and enhance the surface and groundwater in the watershed.

Nonpoint source (runoff) pollution cannot be easily traced to a single point of origin such as a point source effluent discharge from a wastewater treatment plant or industrial plant. Nonpoint source pollution occurs when rainwater or snow melt flows across the land and picks up soil particles, organic wastes, fertilizers or other pollutants and carries them to surface and/or groundwater. These soil particles and organic wastes contain phosphorus and nitrogen, the same compounds found in commercial fertilizers. Soil particles also become sediment in the stream channel and the receiving water -- initially, the Manawa Pond and ultimately the Bay of Green Bay. Nonpoint source pollution in the Lower Little Wolf River Watershed has led to a general decrease in the quality of the river and its tributaries.

Secondary sources of nonpoint pollutants in the Lower Little Wolf River originate from streambank and gully erosion resulting in sediment deposition in the stream. The nonpoint source pollution control plan for the Lower Little Wolf Priority Watershed was prepared by the Department of Natural Resources (DNR), the Department of Agriculture, Trade & Consumer Protection (DATCP) and the Waupaca County Land & Water Conservation Department (LWCD). The Wisconsin Land & Water Conservation Board selected the Lower Little Wolf River watershed as a priority watershed project through the state's Nonpoint Source Pollution Abatement Program in 1995. Planning for the project began in January 1996. The Lower Little Wolf project joins approximately 86 similar watershed projects statewide in which runoff control measures are being planned and implemented. The Nonpoint Source Water Pollution Abatement Program was created in 1978 by the state Legislature. The program provides financial and technical assistance to landowners and local governments to reduce nonpoint source pollution.

The project is administered at the state level by the DNR and DATCP. The Waupaca County LWCD will administer the project at the local level with assistance from the University of Wisconsin-Extension and the Natural Resources Conservation Service (U.S. Department of Agriculture). This plan is primarily used by and written for the County LWCDs, DNR, DATCP, other local units of government, legislators, external program evaluators and interested citizens.

Lower Little Wolf Priority Watershed



Study Area

LEGEND

- Watershed Boundary
- Major Highway
- Perennial Stream
- Intermittent Stream
- County Boundary
- Wetland
- Open Water
- Municipal Area

0 1 2 3 4 Miles

0 1 2 3 4 5 6 Kilometers

Scale 1:185,830

Wisconsin Department of Natural Resources
Watershed Management
May 1997

General Characteristics

The Lower Little Wolf River Watershed is a 152-square mile drainage basin located approximately 15 miles north of Waupaca in Central Wisconsin. See Map S-1. The watershed is situated in the terminal moraine area of the last glacial period. Steep-sided moraines interspersed with large wetlands dominate the landscape. Soils are predominantly sandy loam supporting extensive animal-based agriculture. The Lower Little Wolf River Watershed is within the Wolf River Basin. The lower portion of the Little Wolf River begins at the hydroelectric dam in the Village of Big Falls and continues for approximately 27 miles to the confluence of the South Branch of the Little Wolf River. There are a total of 149.6 miles of named and unnamed streams along with 21 lakes in the watershed.

Surface water in the Lower Little Wolf River Watershed is being adversely affected by land use activities. Sediment is severely degrading stream habitat by silting in riffles, pools and spawning areas. Lack of habitat and habitat degradation have played a major role in limiting the aquatic life in the streams of this watershed.

Water chemistry samples collected during 1996 showed elevated levels of suspended solids and to some degree total phosphorus, ortho phosphorus, bacteria, and nitrates particularly following a 50 year rain event. Many of the streams in the watershed show evidence of extreme flashiness. In some cases, debris was 4 feet above normal water levels.

The watershed is divided into six (6) subwatersheds. The subwatersheds are distinctly different with three having relatively good water quality with predominantly cold Class I trout fisheries and the other three having relatively degraded water quality and supporting either warmwater sport fish or forage fish base.

Three of the 21 lakes in the watershed are severely degraded due to nonpoint pollution. The Manawa Pond is a reflection of the land management problems in the watershed. The Pond is actually an impoundment on the Lower Little Wolf River with a drainage area of approximately 301 square miles. Sedimentation and nutrient loading has rendered this water body virtually unusable for any recreation during the summer months.

Groundwater is stored in pore spaces and cracks within the soil and rock layers. Principle aquifers within the watershed are glacially deposited sand and gravel. Localized groundwater problems are occurring. Samples analyzed for nitrate (NO_3) and nitrate (NO_2) showed concentrations ranging from no detect to 41.2 ppm or milligrams per liter. From limited sampling, it appears that farmstead wells have much higher nitrate concentrations than rural nonfarm drinking water wells.

Animal-based agriculture is vital to the economy of this region. Approximately 52% or 51,000 acres in this watershed is being farmed. Dairy farming is the primary enterprise, with the average farm being 197 acres. Waupaca County ranks 21st statewide in milk production. The Lower Little Wolf River Watershed population is estimated at about 5,049. Population growth rates in

the watershed are declining slightly. Regional trends suggest that the watersheds population will stabilize.

Table 1 Summary of Land Uses in the Lower Little Wolf River Watershed

Land Uses	Acres	Percent
Agricultural	50,308	52
Pasture	467	<1
Woodland	21,459	22
Wetland[1]	14,648	15
Developed	4,626	4
Grassland	5,772	6
Total	**97,280**	**100**

[1]These are estimates of wetland acres based on WINHUSLE inventory data. The estimates are of actual wetland acres, not cropped wet fields. See wetland section in this chapter for a more comprehensive estimate of wetland acreage.

Source: DNR and Waupaca County Land & Water Conservation Department

Sources Of Nonpoint Pollution

The Waupaca County LWCD collected data on agricultural lands, barnyards and streambanks in the watershed. This data was used to estimate the pollution potential of these nonpoint sources. The following is a summary of the inventory results:

Barnyard Runoff Inventory

- 211 barnyards and animal lots were inventoried utilizing the BARNY model.
- An estimated 5,485 pounds of phosphorus are delivered to the streams and lakes each year.

Nutrient Management Inventory

- All farms having more than 20 animal units were inventoried for acres needed for proper manure spreading practices.

*** FPI Inventory Data**

Nutrients	UW-Ext. Rec. (lbs/acre)	Current Rate* (lbs/acre)	Surplus (lbs)
Nitrogen	160	201	41 lbs.
Phosphorous	40	141	101 lbs.
Potassium	25	342	317 lbs.

*Rate includes commercial fertilizer applications as well as legume and manure nutrient credits.

Streambank Erosion Inventory

- Approximately 86 miles of streambank were evaluated. More than 10 miles of streambank had significant erosion (12%).

- An estimated 1,918 tons of sediment are being delivered to the stream. This is 9% of the total sediment load to the river system each year.

- A total of 1,570 feet of livestock-trampled sites were identified.

Upland Sediment Inventory

- Soil erosion and Sediment delivery rates were calculated using the WINHUSLE model (FOCS Database). At the time of plan approval, 35% of the cropfields have been inventoried. Data for this document was extrapolated from the 35% sample. The remainder of the cropfields will be inventoried within 3 years.

- An estimated 16,700 tons of soil are being delivered by croplands to surface water each year. This is 91% of the total sediment delivery.

Gully Erosion Inventory

- No formal gully inventory was undertaken. The LWCD staff has worked extensively in this watershed so their expertise and historical data were utilized to estimate soil loss, goals and objectives.

Wetlands Inventory

- No formal wetlands inventory was undertaken. United States Department of Agriculture, Natural Resource Conservation Service records indicate that approximately 40% of the historical wetlands in this watershed have been manipulated.

- Goals and objectives were extrapolated utilizing LWCD historical data. Waupaca County has had an active wetland restoration program with almost 100 sites restored in the past 6 years.

Groundwater Inventory

- To date, 117 well water samples have been analyzed. More than 90% of these were from rural nonfarm residences during UWEX "Water Wise" programs since 1993.

Thirty-two percent of the samples had nitrates greater than 2 PPM and 6% of those were above 10 PPM. Farmstead samples that were collected by watershed staff showed a much different trend. Approximately 28% were greater than 10 PPM. This would indicate that overall groundwater quality is fair. However, in the vicinity of livestock holding areas, the quality is quite poor.

Urban Inventory

- Less than 5% of the watershed is considered in the "developed" category. This includes the City of Manawa (population 1,025) and the Village of Big Falls (population 75). population in the watershed is 5,049 and is projected to remain stable. Data from other communities of similar size and growth rates indicate pollutant loadings are not significant enough to warrant a management strategy at this time. The Information and Education component of the implementation plan will incorporate a number of activities to address stormwater and urban runoff.

Project Goals

The goal of the Lower Little Wolf River Priority Watershed Project is to protect, enhance and restore the surface and groundwater in the identified watershed area. Water quality improvement in this watershed will ultimately improve natural resources in the entire Fox-Wolf Basin.

Sediment Objective

To reduce overall sediment delivered to the system by 32%, the following will need to be achieved:

- Reduce sediment delivered to the stream from agricultural uplands by 35% or 8,500 tons (Cropland 6,000 tons; gully 2,500 tons).

- Reduce sediment delivered to the stream from streambank erosion by 25% or 500 tons and a 25% overall repair of streambank habitat.

- Reduce sediment delivered to lakes by shoreline erosion by 25%.

Phosphorus Objective

To reduce overall the phosphorus load to the stream by 25%, the following will need to be achieved:

- Reduce phosphorus delivery from barnyards by 25% or 1,300 lbs.

- A general reduction in phosphorus from landspread manure. Farm Practices Inventory (FPI) indicate that less than 10% of landowners are properly crediting manure nutrients.

- Reduce phosphorus delivery to the stream from sediment by 25%.

- Reduce current cropland phosphorus application rates by 50% (currently 141 lbs/acre based on FPI results. UWEX recommended rate is 40 lbs/acre.)

Groundwater Objective

To protect and enhance the groundwater resource in the Lower Little Wolf River Watershed, the following will need to be achieved:

- Reduce overall cropland nitrogen rates by 25% to 160 lbs/acre through the implementation of 10,000 acres of nutrient management plans.

- Proper abandonment of unused wells as per NR 120 and NR812.

Hydrology Restoration Objective
To improve aquatic and terrestrial habitat and stabilize stream flow, the following will need to be achieved:

- Restore 30 previously converted wetlands to their original hydrology.
- Create and maintain woodland and grassland corridors along waterways through buffers, wildlife habitat plantings and conservation easement.
- Promote cropland best management practices such as conservation tillage which will increase infiltration.

Community Education and Action Objective
To develop community action that fosters positive change promoting sustained long-term improvement and protection of the Lower Little Wolf River Watershed area, the following will need to be achieved:

- Train watershed technical staff in fundamentals of the educational process.
- Implement the identified (I & E Plan) education program to move the watershed community from awareness to action.
- Facilitate the continued enthusiasm of the Citizens Advisory Committee to provide direction for the staff and promote awareness of the watershed.

Critical Sites

Nonpoint source pollutant load reduction in the Lower Little Wolf River Priority 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 pollutant load to an acceptable level. Pollutant 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. Landowners interested in receiving cost-share assistance for installing best management practices will need to sign a cost-share agreement with the Waupaca County Land & Water Conservation Department.

Notification of landowners with critical sites will begin when Waupaca County LWCD staff have identified all individual fields for specific management categories on the FOCS/WINHUSLE database or through the BARNY computer model for barnyard sites. The highest ranked sites will be notified first until all landowners or land operators with critical sites are notified. The notification will include the following information:

The 36-month period in which landowners are eligible for the full level of state cost-sharing after which the cost-share rate decreases by 50 percent.

- The potential consequences of either Wisconsin Administrative Code Chapter NR 243 for animal waste, or s. 144.025(2)(u), (v), or (w), for sediment delivery and groundwater protection, that landowners may face if no action if taken. Some of these include a notice of discharge, requiring of a WPDES permit, or issuing a notice of intent.

- The right to appeal the critical site designation through written request to the county Land & Water Conservation Committee (LWCC) within 60 days of receiving the notification letter. The LWCC shall limit its appeal consideration to whether the critical site designation is consistent with critical site criteria established in the nonpoint source control plan.

Impact and Scope of Critical Sites

- Of the 211 barnyards inventoried, 2 were designated critical sites for control which will result in a minimum reduction of 25 percent of the barnyard phosphorus objective.

- Of the estimated 50,308 acres of cropland in the watershed, 1,483 acres (approximately 73 landowners) have been designated as critical for sediment control which will result in 25 percent of the pollution reduction objective for sediment.

Management Actions

The Waupaca County LWCD staff will contact all landowners who are eligible to receive cost sharing during the project's 10-year implementation. Management classifications are determined based on the level of pollution control needed to achieve water quality objectives in the watershed. Specific sites or areas within the watershed project are designated either "critical", "eligible" or "ineligible". Designation as a critical site indicates that controlling that specific source is necessary if the pollutant reduction goals for the project are to be met. Nonpoint sources which are eligible, but not critical, contribute less of the pollutant land, but are included in cost sharing eligibility to further insure that water quality objectives are met. Landowners with eligible sites need not control every eligible source to receive cost-share assistance.

The Waupaca County LWCD will assist landowners in applying BMPs. Practices range from alterations in farm management (such as clean water diversions, sediment basins and manure storage facilities), and are tailored to specific landowner situations. Waupaca County LWCD staff will also examine the need for wellhead protection areas for municipal drinking water supplies.

Landowner Eligibility

Barnyard Runoff

To maintain cost effectiveness, only those landowners with barnyard sites delivering more than 60 pounds of phosphorus to surface water on an annual basis will be eligible for a complete barnyard runoff management system (26 yards). Landowners with barnyards delivering between 40 pounds and 60 pounds of phosphorus annually will be eligible to receive clean water management systems (17) yards). Landowners with yards delivering more than 10 lbs. of phosphorus to lakes will be eligible for complete barnyard runoff management systems (15 yards).

Table 2 Barnyard Runoff Pollution Reduction Objective: 25% (1,300 lbs. of P)

Category	No. of Sites	Lbs. Reduced	% Reduction (Goal)	% Reduction (Total)
Critical Sites	2	300	25%	6%
Eligible Sites	56	1,000	75%	19%
Ineligible Site	153	----	----	----
Total	**211**	**1,300**	**100%**	**25%**

Cropland Erosion

In appraising the condition of the streams in the Lower Little Wolf River system, sediment loading from eroding cropfields was found to be a major pollutant inhibiting the quality of the watershed ecosystem. Approximately 25% of the pollutant reduction objective for sediment will be achieved through critical sites designation and the subsequent installation of BMPs on cropland. All fields eroding at rates greater than "T" and delivering sediment to surface waters at rates greater than 1.4 tons/acre/year will be designated as critical. Those fields not designated as critical and delivering sediment to surface waters at rates greater than or equal to 0.2 tons/acre/year will be eligible for cost-sharing practices.

Table 3 Cropland Sediment Pollution Reduction Objective: 25% Sediment Reduction

Management Category	USLE/Sediment Delivery (tons/acre/year)	Acres	Tons of Sediment Reduced	Percent of Reduction Objective
Critical	>T and >1.4	1,483	1,543	25%
Eligible	>0.2 to 1.4	37,613	4,500	75%
Not Eligible	<0.2	11,212	---	0%
Total	---	**50,308**	**6,043**	**100%**

*35% of upland inventory is complete. The remaining 65% was extrapolated through WINHUSLE.

Gully Erosion

Although gully erosion has been determined to be a significant nonpoint source in the Lower Little Wolf River Watershed, critical site designation will not be a component of control for these areas. All active gullies (see definition in Plan) will be eligible to receive cost-share assistance to abate the runoff of sediment into intermittent or continuous streams.

Table 4 **Gully Erosion Pollution Reduction Objective: 25% Sediment Reduction**

Management Category	Description	Target Reduction
Eligible	Actively Eroding Gullies	25% Reduction goal or 2,500 tons
Not Eligible	Inactive Gullies	N/A

Streambank Erosion

Streambank erosion contributes 9 percent of the total sediment to surface waters in the Lower Little Wolf River Watershed. Approximately 43 miles of streams (86 miles streambank) were evaluated. Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 10 miles of streambank. An estimated 1,918 tons of sediment are eroding into streams annually. See table 5 for streambank inventory results.

Table 5 Streambank Erosion Eligibility Criteria

Management Category	# Sites	Sediment Delivery	Target Reduction	% of Load Reduction	% of Goal
Critical Sites	3	> 95/Tons/Site/Yr	340 Tons	17%	66%
Eligible-Warm Water fisheries	15	> 15 Tons/Site/Yr	150 Tons	7%	29%
Eligible-Cold Water Fisheries	15	>1 Ton/Site/Yr	25 Tons	1%	5%
Not Eligible - Warm Water Fisheries	NA	< 15 Tons/Site/Yr or where BMP would not be cost effective	NA	NA	NA
Not Eligible - Cold Water Fisheries	NA	< 1 Ton/Site/Yr or where BMP would not be cost effective	NA	NA	NA

Trampled Streambanks

Approximately 1570 ft. of streambank are degraded by cattle access and trampling. All sites will be eligible for treatment.

Table 6 Trampled Streambanks Eligibility Criteria

Management Category	Description	Objective
Eligible	Trampled/Degraded/ Livestock Access	Maintain Vegetated Cover
Not Eligible	Vegetated/No Current Access	N/A

Table 7 Lake Shoreline Eligibility Criteria

Management Category	Description	Objective
Eligible	Bank Height > 2.5 ft. and a lateral recession rate = o r > 0.1 ft/yr or a sediment delivery rate of > 1 ton/yr/site	25 percent reduction in sediment from eroding sites
Not Eligible	All other sites	N/A

Project Implementation

Project implementation is scheduled to begin in June 1997 and continue for a period of 10 years. Implementation will consist of continuous educational programming for watershed residents, individual farm conservation planning, the signing of cost-share agreements and practice installation.

Table 8 State Share of Total Project Costs at 75 percent Landowner Participation

Item	Costs
Cost-share Funds: Practices	$4,083,264
Cost-share Funds: Easements	$100,000
Local Assistance Staff Support	$1,092,000
Information and Education Direct	$50,000
Other Direct (travel, supplies, etc.)	$80,000
Engineering Assistance	$15,000
Total	$5,420,264

Source: DNR, DATCP and Waupaca County Land & Water Conservation Department

Information and Education

The Waupaca County Land & Water Conservation Department takes lead responsibility for the implementation of the information and education strategy. The University of Wisconsin Cooperative Extension (UWEX), the Department of Natural Resources (DNR) and the Department of Agriculture, Trade & Consumer Protection (DATCP) will provide supporting assistance. The Waupaca County Land & Water Conservation Department will work with and seek support from local units of government and organizations such as lake rehabilitation districts, villages, lake associations and other community groups and businesses.

The framework for the I & E Plan is taken from the Farm Practices Inventory (FPI) survey that was conducted during the watershed inventory. The FPI survey was the tool used to provide baseline information on the needs, attitudes, behavior and practices of agricultural landowners in relation to nutrient and pest management. This assessment identifies potential obstacles for adopting Best Management Practices (BMPs) which helps watershed staff target educational programs and technical assistance to overcome these obstacles. The FPI tool that was utilized in this watershed involved only livestock producers.

The University of Wisconsin Extension (UWEX) Environmental Resources Center supplied the FPI survey and data analysis in addition to providing technical guidance during survey distribution. UWEX worked very closely with watershed staff to make the surveys a success.

The goal of the I &E Program is to improve water quality by maximizing landowner participation in the Lower Little Wolf River Priority Watershed Project.

The primary objectives of the education plan are to:

- Increase awareness of nutrient and pesticide plan implementation.
- Educate landowners on the economic and financial benefits of legume and manure crediting.
- Increase the utilization of conservation tillage techniques from approximately 10% currently to 50% at the end of the project.
- To have the City of Manawa develop and implement a wellhead protection plan.
- To have the City of Manawa develop a stormwater land management plan.
- Establish a lake district for the Manawa Pond.
- In general, to foster a stewardship ethic among watershed residents by providing the understanding, knowledge and skills necessary to implement solutions to local water quality resource problems.

Conservation Planning and Contracting
Conservation planning and cost-share agreements may be signed throughout the implementation phase. Voluntary participation will be emphasized throughout the project. Sites determined as critical will be a priority. Other sites will be targeted for pollution control using ongoing inventory information. All practices listed on agreements must be installed before the project is scheduled to end. Landowners must maintain practices for at least 10 years from the installation of the final practice listed on the cost-share agreement.

Cost-share agreements are recorded with the register of deeds, and in the event of property being sold, the new landowner will be required to install and maintain the remaining best management practices. Practices can be installed as soon as a landowner signs a cost-share agreement with the Waupaca County Land & Water Conservation Department.

Project Implementation Costs

The DNR will award grants to Waupaca County for the cost sharing of BMPs, staff support and educational activities. Table 8 includes estimates of the financial assistance needed to implement nonpoint source controls in the Lower Little Wolf River Watershed, assuming a 75 percent participation rate of eligible landowners and a 100 percent participation rate on critical sites.

Project Evaluation and Monitoring

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

1. *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 Waupaca County LWCD will track progress in this area and report to the DNR and DATCP annually.

2. *Pollutant Reduction Levels:* The Waupaca Co. LWCD will calculate the reductions in the nonpoint source pollutant loadings resulting from changes in land use practices and report to the DNR and DATCP during the annual review meeting.

3. *Water Resources:* The DNR may monitor changes in water quality, habitat and water resource characteristics periodically during the project and at the end of the project period.

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 152-square-mile Lower Little Wolf Watershed, located in Waupaca county, was designated a "priority watershed" in 1996. The primary objective of this project is to reduce nonpoint source pollution loads and to enhance and protect the water quality of the streams groundwater and lakes in the Lower Little Wolf Watershed. The Lower Little Wolf is part of the Wolf River Basin.

Nonpoint sources of pollution in the watershed include: eroding agricultural lands, eroding streambanks and roadside, runoff from livestock wastes, agricultural practices, erosion from developing areas, and runoff from established urban areas. 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 a high degree of water quality impairment from nonpoint sources of pollution become eligible for consideration as a priority watershed project. Currently, there are 130 eligible watersheds. Twenty-two project are completed and eighty-six are underway. 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 local units of government, with input from a local citizen's advisory committee. 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 is achieved through mandatory and voluntary implementation of nonpoint source controls (BMPs) and the adoption of 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 ten-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 Lower Little Wolf Priority Watershed Plan was prepared under the authority of the Wisconsin Nonpoint Source Water Pollution Abatement Program described in Section 144.25 of the Wisconsin Statutes and Chapter NR 120 of the Wisconsin Administrative Code. It was prepared through the cooperative efforts of the DNR, DATCP, Waupaca Co. Land & Water Conservation Department, the village of Big Falls, the City of Manawa and Lower Little Wolf Watershed Advisory Subcommittee.

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 147 and 144 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 Waupaca 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 Watershed 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 120.10 (1)(g) — 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 Lower Little Wolf project began in 1996. The following information gathering and evaluation activities were completed during this stage::

- Determine the conditions and uses of groundwater, streams, and lakes.
- Inventory types of land uses and severity of nonpoint sources affecting groundwater, streams and lakes.
- Evaluate the types and severity of other factors which may be affecting water quality. Examples include discharges from municipal wastewater treatment plants and natural or

endemic stream conditions. (This has been completed through the ongoing integrated resource management planning efforts in the Wolf River Basin.)

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

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

Implementation Phase

The implementation phase of the Lower Little Wolf 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 Waupaca County. Public review during plan development occurred primarily through the efforts of the Lower Little Wolf 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 Waupaca LWCD contact 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.

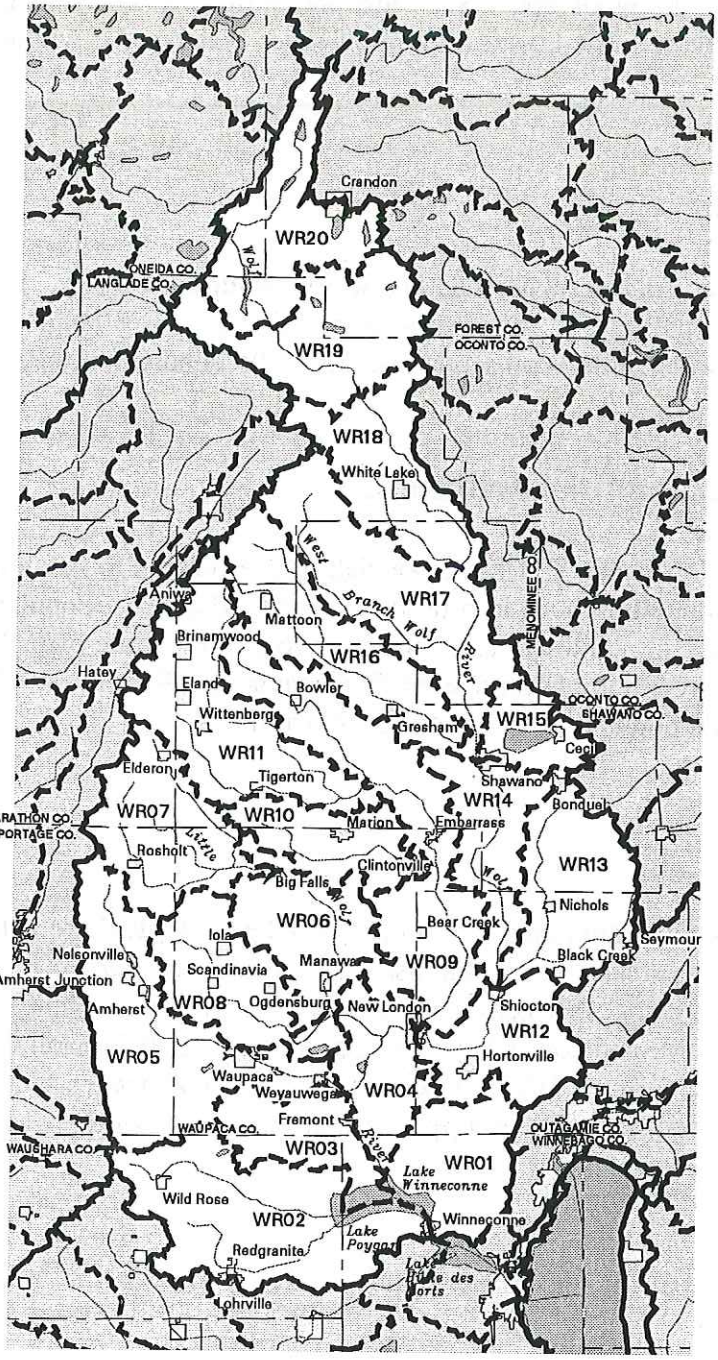
- In rural areas, the landowner signs a cost-share agreement with the county that outlines the practices, costs, cost-share amounts and a schedule for installation of management practices. Practices are scheduled for installation after an agreement is signed. Practices must be maintained for at least 10 years. Easements must be for a period of at least 20 years, and will be 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 local units of government and their private landowners.

Location and Community Information

The Lower Little Wolf River Watershed is a 152-square-mile drainage basin located approximately 15 miles north of Waupaca in Central Wisconsin. The watershed is located in the

Wolf River Basin



Study Area

Mapscale 1:1208701

LEGEND

- Management Unit Boundary
- Watershed Boundary
- River
- County Boundary
- Open Water
- Municipal Area

Watershed Codes and Names

UC01 = Holcombe Flowage
UC02 = Lower Jump River
UC03 = Middle Jump River
UC04 = Upper South Fork Jump River
UC05 = Main Creek
UC06 = Deer Tail Creek
UC07 = Lower Flambeau River
UC08 = Lower South Fork Flambeau River
UC09 = Elk River
UC10 = Upper South Fork Flambeau River
UC11 = Lower North Fork Flambeau River
UC12 = Butternut Creek
UC13 = Upper North Fork Flambeau River
UC14 = Flambeau Flowage
UC15 = Bear River
UC16 = Manitowish River
UC17 = Soft Maple and Hay Creeks
UC18 = Thornapple River
UC19 = Weirgor Creek and Brunet River
UC20 = Couderay River
UC21 = East Fork Chippewa River
UC22 = Lake Chippewa
UC23 = West Fork Chippewa River

Wisconsin Department
of Natural Resources
BEITA - GEO Services Section
May, 1997

terminal moraine area of the last glacial period. Steep-sided moraines interspersed with large wetlands dominate the landscape. Soils are predominantly sandy loam supporting extensive animal-based agriculture. The Lower Little Wolf River Watershed is within the Wolf River Basin. See Map 1-1.

Civil Divisions

The Lower Little Wolf River Watershed lies within Waupaca County. Incorporated areas in the watershed include the city of Manawa and the village of Big Falls. Public land within the watershed includes the Little Wolf River and Big Falls Pond County Parks.

Population Size and Distribution

The Lower Little Wolf River Watershed population is estimated to be about 5,049 people. Most of the watershed population lives in rural unincorporated areas . Population growth rates in the watershed are declining. All towns and villages have a growth rate over the past decade of -0.5 percent, with the exception of Little Wolf & Helvetia 1.3% increase. Regional trends suggest that the watershed's population will continue to stabilize.

Land Uses

Animal-based agriculture predominates in the watershed. Agriculture is the most important land use, comprising 52 percent of the land use. Dairy farming is the primary enterprise, with the average farm size being 197 acres. Waupaca County ranks twenty-first statewide in milk production, hay, corn, and corn silage (Waupaca County Soil Erosion Control Plan, 1988, Soil Survey of Waupaca County, WI, 1983). Woodlands are abundant and cover 22 percent of the land area. Developed land uses occupy less than 4.5 percent of the watershed (table 1-1).

Table 1-1. Summary of Land Uses in the Lower Little Wolf River Watershed

Land Uses	Acres	Percent
Agricultural (cropped)	50,308	52
Pasture	467	<1
Woodland	21,459	22
Wetland[1]	14,648	15
Developed	4,626	4
Grassland	5,772	6
Total	97,280	100

[1] These are estimates of wetland acres based on WINHUSLE inventory data. The estimates are of actual wetland acres, not cropped wet fields. See wetland section in this chapter for a more comprehensive estimate of wetland acreage.

Source: DNR & Waupaca County LWCD

CHAPTER TWO
Watershed Conditions and Nonpoint Sources of Pollution

This chapter discusses the physical characteristics, existing conditions, nonpoint sources, objectives and management categories for the water resources in the Lower Little Wolf River priority watershed. See Map 2-1. Information is presented for each subwatershed and by pollution source.

Physical Setting

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 Lower Little Wolf 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 33 inches of rain and melted snow; the majority falls in the form of thunderstorms during the growing season (May-September). Most runoff occurs in February, March, and April when the land surface is frozen and soil moisture is highest.

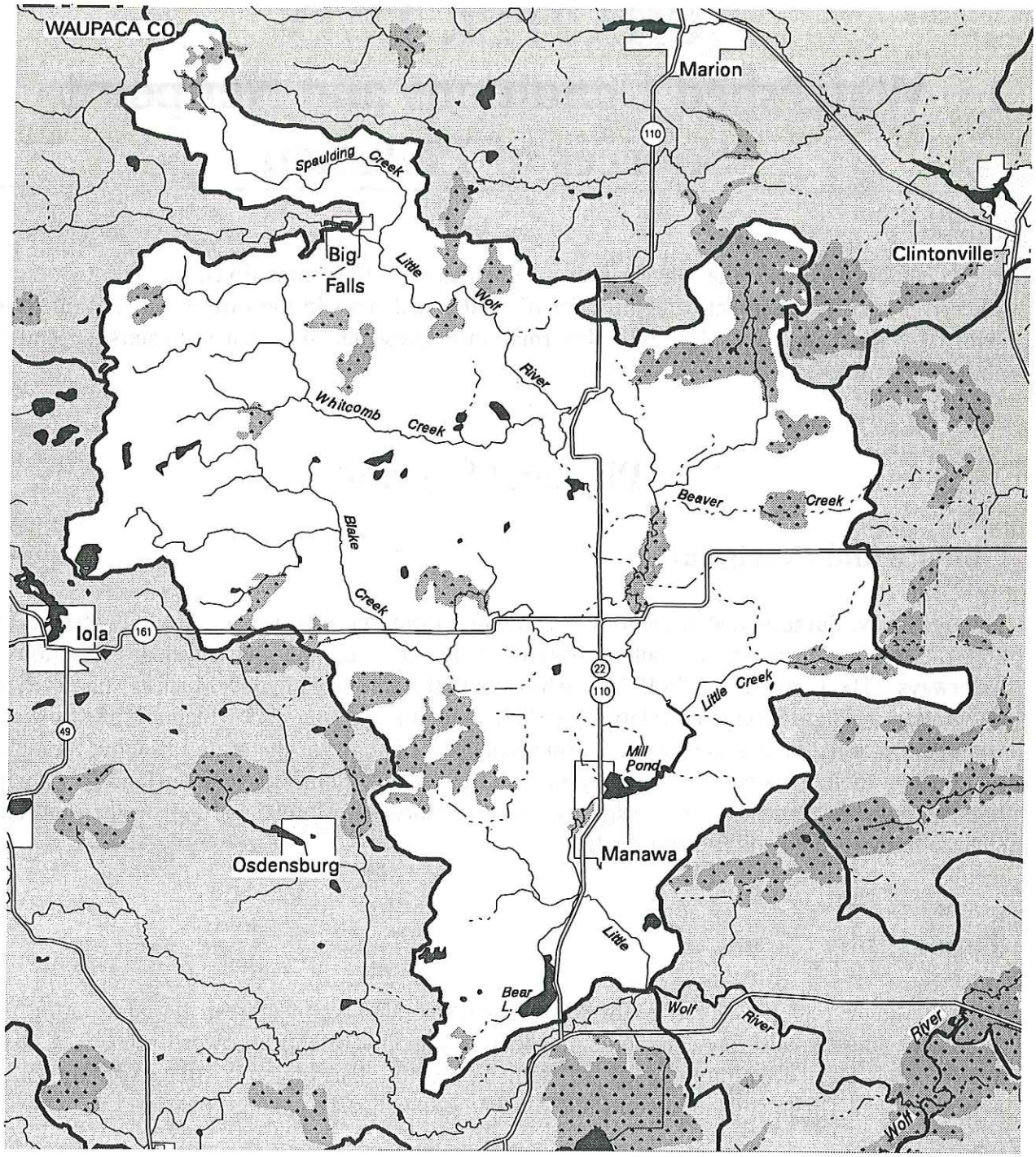
Topography

The relief in the region is largely controlled by glacial moraine-type features. Large drumlins and moraines with steep sides are common throughout the region. The entire Lower Little Wolf River Watershed is located within the northern highland region. This region is a flat to gently rolling area with sandy loam soils and constitute the county's major agricultural district.

Geology

The geology of the Lower Little Wolf Watershed consists of Pleistocene materials covering Cambrian sandstone and Precambrian crystalline rock. The Cambrian sandstone consists of an outlier covering perhaps 2-3 square miles about 2 miles northeast of Manawa. The Precambrian rock is frequently a pink to gray granite, but also includes schist, gneiss and quartzite. The bedrock topography slopes generally to the southeast.

Lower Little Wolf Priority Watershed



Study Area

LEGEND

- Watershed Boundary
- Major Highway
- Perennial Stream
- Intermittent Stream
- County Boundary
- Wetland
- Open Water
- Municipal Area

0 1 2 3 4 Miles

0 1 2 3 4 5 6 Kilometers

Scale 1:185,830

Wisconsin Department of Natural Resources
Watershed Management
May 1997

Pleistocene-aged materials were deposited by Green Bay lobe ice moving from the east across crystalline rock, sandstone, dolostone and limestone. These source materials largely determine the mineralogic composition of the Pleistocene materials. The thickness of Pleistocene materials in the watershed isn't known definitively. It is absent in a few small locations where Precambrian rock crops out. The maximum thickness observed in Waupaca County is 270 feet. A typical thickness of the Pleistocene unit in the watershed is probably less than 80 feet.

Pleistocene materials in the watershed are mainly tills and glaciofluvial deposits. Tills consist of clay, silt, sand, gravel and boulders. Any single constituent may be dominant, but mixtures are most common. Tills are usually associated with hillier parts of the landscape such as moraines and drumlins. They tend to have an unpredictable water yield to wells, due to their unsorted nature. Glaciofuluvial deposits are materials that were sorted and stratified by melt water from glaciers. They are predominantly dominantly sand, but may contain gravel or fine-textured materials as well. Glaciofuluvial materials are generally found on flatter parts of the landscape, frequently following the channels and flood plains of modern streams.

Soils

The soils of Waupaca County originate from continental glaciation. The majority of the Lower Little Wolf River Watershed is of the Hortonville-Symco soils. The Hortonville Series consists of well-drained, moderately permeable soil underlain by bedrock. Slopes range from 2-20%. The Symco Series consists of somewhat poorly drained, moderately slowly permeable soil. Slopes range from 0-3 percent.

Water Resource Conditions and Goals

This section describes the general conditions of the surface and groundwater resources in the Lower Little Wolf River Watershed. It describes the classifications used for Wisconsin's waters,then describes the surface water resources in the watershed. Descriptions of subwatersheds are also included and several tables provide summaries of the watershed's resources. Table 2-3 provides a summary of the surface water resources in each subwatershed. 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.

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. 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 Outstanding/Exceptional Resource Waters, Wisconsin Administrative Code NR 102.20 and NR 102.11. 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.

Table 2-3 summarizes the water resource classification and conditions for the Lower Little Wolf Watershed.

Surface Water and Recreational Resources

For the purposes of this project, the Lower Little Wolf River Watershed is subdivided into six individual subwatersheds. Each subwatershed conveys surface water to the Little Wolf River. Major tributaries, associated streams, wetlands, the reservoir and subwatershed divides are shown in map 1-1. See table 2-2 for the general conditions of major water resources in the Little Wolf River Watershed.

Subwatersheds in the Little Wolf River Watershed

Spaulding Creek	(SC)
Whitcomb Creek	(WC)
Blake Creek	(BC)
Upper Main	(UM)
Lower Main	(LM)
Bear Lake	(BL)

Streams

The Lower Little Wolf River Watershed is approximately 152 square miles in size and lies entirely in Waupaca County. The "lower" portion of the Little Wolf River begins at the hydroelectric dam at Big Falls and continues for about 27 miles to the confluence of the South Branch Little Wolf River. There are a total of 149.6 miles of named and unnamed streams in the watershed. Land use in the watershed is primarily agriculture though a significant portion is wooded.

Cold water trout streams in the watershed include the North Fork Blake Creek, South Fork Blake Creek, Spaulding Creek, and Whitcomb Creek. These streams are located in the wooded, northwestern region of the watershed. The Little Wolf River and the near mouth area of Blake Creek are considered to be warm water sport fish communities. All others in the watershed are considered to be either forage fish communities or have insufficient data to characterize them.

Surface water in the Lower Little Wolf River Watershed is being adversely affected by land use activities taking place. Sediment is degrading stream habitat by silting in riffles, pools and spawning areas. Lack of habitat and habitat degradation have played a major role in limiting the aquatic life in the streams.

Meters to continuously monitor daily rain event induced fluctuations in temperature and dissolved oxygen were placed in streams of the watershed for approximately one week at a time. Dissolved oxygen was normally quite good and only one violation of the state dissolved oxygen standard occurred.

Water chemistry runoff samples were collected on June 17th at several places in the watershed. This monitoring coincided with a 1 in 50 year rain event that deposited over 6.8 inches of rain in a 72 hour period (Wisconsin State Climatologist, pers. comm. 1996). Results from the sampling show elevated levels of total phosphorous, ortho phosphorous, bacteria and in some cases, nitrates and suspended solids. Most other water chemistry monitoring conducted before and after this storm indicate fair water quality with results that show low levels of the above parameters. An event like the pre June 17th rainstorm is rare enough that the results will not be used to establish nutrient reduction goals.

Many of the streams in the watershed showed evidence of extreme flashiness. In some cases, debris was 4 feet above normal water levels. Increasing water infiltration or retaining runoff by changing landuse patterns will hopefully reduce the severity and duration of runoff events and increase baseflow to provide more consistent water flow.

Lakes

There are 21 lakes in the watershed. Most are seepage lakes with small basins. Five waterbodies, representing a cross section of the different lake types in the watershed were monitored. The Manawa Millpond is a moderately developed, 192 acre impoundment that drains 131 square miles. School Section Lake is a moderately developed 39 acre spring lake that drains less than two square miles. Cedar Lake is well developed, 45 acre drainage lake that drains less than one square mile of land. Campbell Lake is a moderately developed, 38 acre seepage lake that drains more than

one square mile of land. Bear Lake, The largest lake in the watershed, is a well developed, 194 acre drainage lake that drains less than two square miles of land.

Results indicate the lakes of the watershed are generally in good condition with few problems noted. Exceptions include Manawa Millpond, Bear Lake and School Section Lake which have higher than average nutrient levels.

Currently there are only two Lake Management Organizations (LMO's) in the watershed. They are the Manawa Lake District and the Hatch Lake Lake Association.

Continuing Monitoring will be conducted on School Section Lake as part of the Long Term Trend Lakes Program and on Cedar Lake as part of the Self Help Lakes Monitoring Program.

Wetlands

Wetlands are valuable natural resources. They provide wildlife habitats, fish spawning and rearing areas, recreation, storage of runoff and flood flows and removal of pollutants. Wetlands are found throughout the watershed. Floodplain wetlands support furbearers and waterfowl populations and may provide seasonal habitat for sport fish. There are extensive wetland areas along the riparian corridor of several of the streams.

A general wetland inventory was done to identify existing or modified wetlands for the purpose of protection from degradation and potential for restoration. Approximately 15.2% or 14,848 acres of the watershed is wetland. Much of these are very large tracts located in Whitcomb and Blake Creek subwatersheds. However, there are wetlands located on virtually every farm in the watershed. USDA-NRCS estimates that 40% of the wetlands have been converted or changed in Waupaca County in the past 50 years. The Farmed Wetland (FW) designation is prevalent on NRCS maps. The Angelica, Symco and Mehan soils are somewhat poorly drained and respond well to tile and ditch drainage. They are good agricultural soils when drained so many fields with these soil series have been altered. The Seelyville, Cathro, Markey soils are very poorly drained but many have been converted for agriculture.

Waupaca County currently has a very active Wetland Restoration Program utilizing grants from various organizations. Wetland restoration will be a major component of this project and will be outlined at the end of this chapter.

Recreation

The watershed's streams, wetlands, and reservoirs offer diverse and high-quality recreational opportunities. The most popular activities are fishing and canoeing. Other popular activities are wildlife observation, hiking, hunting, and trapping. Spaulding, Whitcomb and Blake Creeks are Class 1 trout streams offering excellent fishing throughout the season. The various lakes are heavily fished both summer and winter. A number of public campgrounds are located on lakes in the watershed, the largest being Bear Lake Campground. Canoeing and power boating are popular summer activities. Water skiing and jet boating are conducted on Bear Lake. A successful canoe rental business is located on the lower reach of the Little Wolf River. The

Manawa Millpond provides recreational fishing during the winter when as many as 200 ice houses are on the lake. Dense aquatic vegetation limits its use in the summer.

Groundwater Resources

Regional Aquifers

Groundwater is the main source of drinking water in the Lower Little Wolf Watershed. Groundwater is stored underground in pore spaces and cracks within the soil and rock layers. Unconsolidated material and rock layers which will yield groundwater in usable quantities are called aquifers. Aquifers receive and store water and also discharge groundwater to lakes, streams, wetlands and wells.

Since 1936, the State of Wisconsin has required well drillers to document well construction and rock and soil layers encountered during well installation. Information from geologic logs, driller construction reports and Wisconsin Geological and Natural History Survey (WGNHS) reports for Waupaca are included below. Depth to the water table ranges from 0 to about 180 feet, but most frequently it is within 80 feet of the surface. Private wells range from approximately 20 to 480 feet in depth. Well yields may exceed 1000 gallons per minute in a few case, although domestic wells typically yield less than 100 gallons per minute. Principle aquifers within the watershed are glacially deposited sand and gravel.

Direction of Groundwater Flow

Local groundwater flow in the Lower Little Wolf River Watershed roughly mirrors the topography of the land surface and flows "downhill" or down gradient toward the Little Wolf River and its tributaries. Regional groundwater flow in the watershed is southeast. Groundwater inflow from the west likely occurs in the upper part of the watershed where surface water and groundwater divides vary. Due to the complex and interconnected nature of hydrology within the watershed, the wetlands and lakes here are basically extensions of groundwater.

Groundwater Quality

Groundwater quality in the Lower Little Wolf River Watershed is generally considered fair. It is naturally alkaline and ranges from moderately hard to very hard. The natural quality of groundwater resources, however, may be adversely affected by human activities.

Nearly anything that can be spilled or spread on the ground has the potential to leach or seep through the ground and into groundwater. The physical setting of an area and the nature of the contaminant determine how easily groundwater becomes polluted if inadequate waste management or improper land uses occur. Physical setting includes a location's soil type, characteristics of the subsurface unconsolidated material, depth to bedrock, depth to groundwater, topography and hydrologic characteristics. Proximity to the land surface and relatively high permeability of subsurface materials increase the susceptibility of the sand-and-gravel aquifer in this watershed.

Potential point sources of groundwater contamination may include spills, leaking underground storage tanks, pesticide contamination sites, old landfills and unabandoned or improperly abandoned wells. Potential nonpoint sources include fertilizers and pesticides, sludge and septage spreading, livestock waste spreading, irrigation and road salt. The Wolf River Water Quality Management Plan (WDNR PUBL-WR-281-95-REV) ranked the Lower Little Wolf River Watershed as high priority for groundwater protection due to groundwater susceptibility and evidence of contamination.

High nitrate levels in groundwater in parts of Wisconsin have been linked to agricultural practices, septage spreading and faulty septic systems. As part of the *Water Quality Appraisal Report*, private well samples were collected and analyzed for nitrate (NO_3) + nitrite (NO_2). Sample analytical results are summarized in table 2-1. Samples analyzed for nitrate (NO_3) + nitrite (NO_2) showed concentrations ranging from not detected to 41.2 parts per million or milligrams per liter (mg/L). The groundwater enforcement standard (ES) for nitrate is 10 mg/L. Nitrate (NO_3) + nitrite (NO_2) concentrations above 2 mg/L exceed the states preventive action limit (PAL).

Enforcement Standard (ES) Health Advisory Level: The concentration of a substance at which a facility regulated by DILHR, DATCP, DOT or DNR must take action to reduce the concentration of the substance in groundwater.

Preventative Action Limit (PAL): A lower concentration of a contaminant than the Enforcement Standard. The PAL serves to inform DNR of potential groundwater contamination problems, establish the level at which efforts to control the contamination should begin, a provide a basis for design codes and management criteria.

No samples were collected for coliform bacteria or hazardous substances such as volatile organic compounds. Coliform bacteria can be a drinking water problem where septic systems, land spreading of manure or barnyards are located up gradient (generally uphill) from a private well. Bacteria can enter the drinking water supply along the well casing of improperly constructed wells, cracked well casings, improperly capped wells or flow through fractured bedrock. At times, wells with high levels of bacteria can be rehabilitated.

Volatile organic compounds generally enter a well from nearby leaking underground gasoline or other fuel storage tanks and spills. Once these compounds are in the groundwater, they are difficult to remove. In general, the contaminated wells have to be abandoned and a new well constructed.

To date, 117 well water samples have been analyzed. More than 90% of these were from rural non-farm residences during UWEX "Water Wise" programs since 1993. Thirty-two percent of the samples had nitrates greater than 2 PPM and 6% those were above 10 PPM. Farmstead samples that were collected by watershed staff showed a much different trend. Approximately

28% were greater than 10 PPM. This would indicate that overall groundwater quality is fair. However, in the vicinity of livestock holding areas, the quality is quite poor.

Table 2-1. Well Sampling Results: Rural Non-farming Community

NITRATE						
	Number of Nitrate Samples		Number of Nitrate Samples		Number of Nitrate Samples	
Subwatershed	less than 2.0 mg/l	%	between 2.0 and 10.0 mg/l	%	greater than 10.0 mg/l	%
Uppermain	14	52	12	44	1	4
Lowermain	10	71	4	29	0	0
Whitcomb Creek	37	73	8	16	6	11
Blake Creek	3	38	5	62	0	0
Spaulding Creek	2	100	0	0	0	0
Bear Lake	13	87	2	13	0	0
Totals	79	68	31	26	7	6

Water Supplies

The City of Manawa has the only municipal water supply system in the Watershed. The Cities three wells are located in the sand and gravel aquifer at depths of 70 through 80 feet. Manawa is currently attempting to site a new well due to chloride contamination in existing aquifer. All private water supply systems utilize groundwater. The watershed project will coordinate with the city of Manawa to develop a wellhead protection for the wells. Chapter NR 811 Wis. Adm. Code requires that a well head protection program be prepared and submitted by the municipality along with the proposed plans and specifications for any new municipal well in Wisconsin which is to be put into service after April 1, 1992. Chapter NR 811 also encourages all other voluntary wellhead protection efforts.

Potential Groundwater Quality Problems

The WDNR Publication SW-504-95(REV), *The Wisconsin Remedial Response Site Evaluation Report* (October 1995), lists superfund sites, sites which may cause or threaten to cause environmental pollution, leaking underground storage tank (LUST) sites, and reported hazardous

substance spill sites. These sites are not necessarily currently causing groundwater pollution, but are the types of problems which have caused groundwater contamination elsewhere. This information is periodically updated and subject to change. Potential pollution associated with nonpoint sources is described in various sections throughout the remainder of this chapter.

Water Quality Goals and Project Objectives

DNR staff with assistance from the Waupaca Co LWCD and the DATCP developed water quality goals and project objectives. Objectives for each subwatershed are included in the next section. Details can be found in the Lower Little Wolf River Project Appraisal Report (Brad Johnson, 1997) available through DNR's Northeastern Regional Office.
Following are the overall goals for water resources:

- **Protection:** Protection refers to maintaining the present biological and recreational uses supported by a stream or the reservoir. For example, if a stream supports a healthy cold water fishery and is used for full-body contact recreational activities, the goal seeks to maintain those uses.

- **Enhancement**: Enhancement refers to a change in the overall condition of a stream or lake within its given biological and recreational use category. For example, if a stream supports a warmwater fishery whose diversity could be enhanced, the goal focuses on changing those water quality conditions which keep it from achieving its full biological potential.

- **Restoration**: Restoration refers to upgrading the existing capability of the resource to support a higher category of biological use. An example would be a stream which historically supported healthy populations of warmwater game fish, but no longer does. This goal seeks to improve conditions allowing viable populations of forage and warmwater game fish species to become reestablished.

The water quality conditions needed to support the goals for streams and lakes are the basis for determining the type and level of nonpoint source control to be implemented under the priority watershed project.

Project objectives are identified and listed for each subwatershed and for rural and urban nonpoint sources of pollution throughout this chapter.

Table 2-2. Monitoring Summary for the Lower Little Wolf River Watershed

SUBWATERSHED	STREAM NAME	WATER CHEMISTRY STREAM SITES	HABITAT RATING (LOCATION)	EPT (%)	HBI RATING (DATE)	CONTINUOUS D.O. AND TEMPERATURE MONITORING, DATES AND LOCATION
Spaulding Creek	Spaulding Creek	CTH G	106-Good (Blw. CTH G) 108-Good (Abv. Spaulding Rd.) 117-Good (Blw. CTH E)			
Whitcomb Creek	Whitcomb Creek	CTH E	185-Fair (Abv. CTH OO) 89-Good (Abv. CTH E) 104-Good (Abv. Carper Rd.) 117-Good (Abv. CTH G)	 42.1 29.7	 3.26-Excellent (10/95) 3.47-Excellent (5/96)	CTH OO, 8/15-822 CTH E, 8/15-8/22
Blake Creek	Blake Creek N. Fork Blake Creek S. Fork Blake Creek	STH 22	115-Good (Blw. HWY 161) 195-Fair (Abv. STH 22) 201-Poor (Abv. CTH K) 171-Fair (Blw. CTH E) 108-Good (Abv. CTH E)	 53.8 60.0 52.3 71.5	 4.08-Very Good (10/95) 4.80-Good (5/96) 3.36-Excellent (10/95) 3.31-Excellent (5/96)	STH 22, 8/08-8/15 STH 161, 8/08-8/15

Table 2-2. Monitoring Summary for the Lower Little Wolf River Watershed

SUBWATERSHED	STREAM NAME	WATER CHEMISTRY STREAM SITES	HABITAT RATING (LOCATION)	EPT (%)	HBI RATING (DATE)	CONTINUOUS D.O. AND TEMPERATURE, LOCATION AND DATES MONITORED
Upper Main	Little Wolf River	Bridge Road CTH C (Bacteria Only)	190-Fair (Blw. Bridge Rd.) 95-Good (Blw. Little Falls) 107-Good (Blw. STH 161) 166-Fair (Abv. Kretchner Rd.)	41.5 58.3 54.7 59.9	3.02-Excellent (10/95) 3.13-Excellent (5/96) 3.23-Excellent (10/95) 2.96-Excellent (5/96)	Bridge Road, 9/10-9/19 Little Falls, 9/10-9/18
	Little River	CTH O (Bacteria Only)	208-Poor (Blw. CTH O)			Cleveland Ln, 8/22-9/02
	Shaw Creek	CTH O	231-Poor (Abv. CTH O)			CTH O, 8/22-9/10
Lower Main	Thiel Creek	Little Wolf Cemetery Road	209-Poor (Blw. Swan Rd.)	7.6 0.8	4.36-Very Good (10/95) 5.17-Good (5/96)	Little Wolf Cemetery Rd, 8/01-8/08
	Little Wolf River		150-Fair (Blw. CTH BB) 178-Fair (Abv. Little Wolf Cemetery Road)	62.7 70.5	3.21-Excellent (10/95) 3.01-Excellent (5/96)	
Bear Lake	Spiegelberg Creek	Little Wolf Cemetery Road	124-Good (Blw. Bear Lake Rd.) 193-Fair (Abv. Hwy 110 Wayside)	37.2 37.9	5.29-Good (10/95) 5.95-Fair (5/96)	

Subwatershed Discussions

This section describes the physical and water quality conditions for each subwatershed in the Lower Little Wolf River Priority Project. Discussions for each subwatershed are broken into four parts: a general description, water quality conditions, the nonpoint source pollutants impairing the subwatershed, and objectives for the subwatershed. Table 2-2 summarizes the monitoring conducted, the sites and the results. For a discussion of the methods employed refer to Lower Little Lower Wolf Priority Watershed Appraisal Report (Johnson, 1997). See Map 2-1 for subwateshed boundaries.

Spaulding Creek Subwatershed (SC)

Description

The Spaulding Creek subwatershed consists of the 10 miles of Spaulding Creek from its headwaters near the Shawano County line to its mouth just below Big Falls. Spaulding Creek is a perennial stream that drains approximately 9.8 square miles of land. The first two miles (measured from the mouth upstream) are considered Cold Class II trout water. The upper eight miles are considered Cold Class I trout water. The entire stream is considered an Outstanding Resource Water (ORW) (NR 102) (Wolf River Water Quality Management Plan, 1996).

Spaulding Creek is the least impacted subwatershed in the entire project. It is mostly forested with a fair number of rural-residences. Small areas of agriculture exist north of the stream on CTH E and east of the stream off of CTH G. Land use in the subwatershed is comprised of 18% agriculture, 51% woodland, 29% wetland, and 2 % urban or developed.

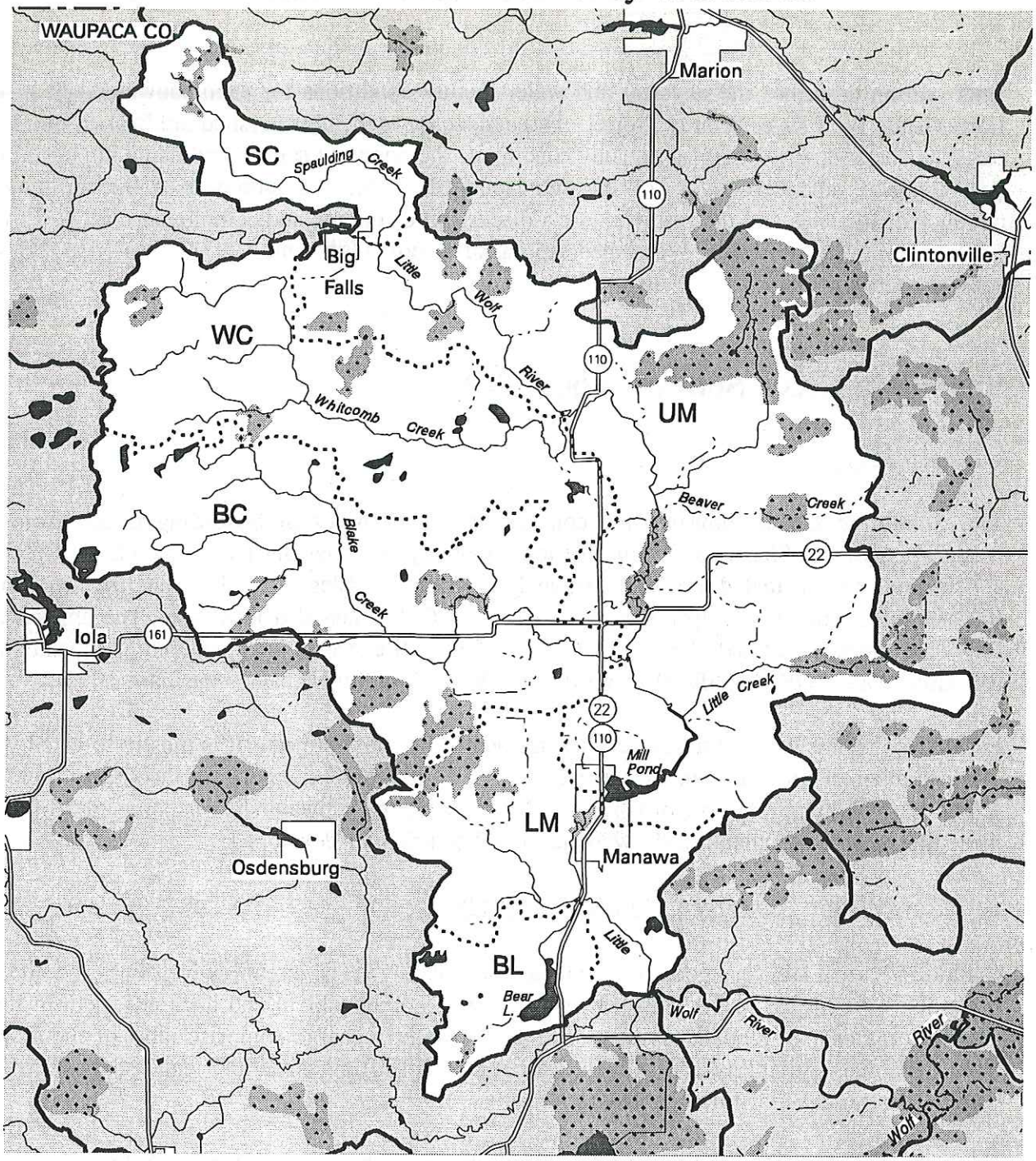
Surface Water Resource Conditions (SC)

Spaulding Creek has very good to excellent water quality. The stream is well buffered and no livestock have access to the stream. Streamflow is not a problem and does not seem to limit aquatic organisms. Wetland drainage and groundwater recharge comprise most of the annual flow. Habitat availability is less than desired due to shifting sands and some shallow stream depths. Extreme water fluctuations are rare.

Habitat evaluations conducted in the subwatershed to assess the suitability of the habitat to aquatic life were taken at three sites (Ball, 1982). All the habitat evaluations ranked the stream reaches as "good". Any habitat limitations observed were due to shallow stream depths and some soft sediments. Macroinvertebrate sampling was not conducted in this subwatershed.

Coldwater Index of Biotic Integrity (IBI) (Lyons, 1996) scores for Spaulding Creek ranged from 40 to 70 indicating "fair" to "good" fish community integrity (Niebur, Hitchcock-Esch, 1997). The most common fish species present include brook trout, creek chub, mottled sculpin, pearl dace and blacknose dace.

Subwatersheds of the Lower Little Wolf Priority Watershed



Study Area

Subwatershed Codes and Names

UM = Upper Main
BL = Bear Lake
SC = Spaulding Creek
LM = Lower Main
BC = Blake Creek
WC = Whitcomb Creek

0 1 2 3 4 Miles

0 1 2 3 4 5 6 Kilometers

Scale 1:185,830

LEGEND

- Watershed Boundary
- Subwatershed Boundary
- Major Highway
- Perennial Stream
- Intermittent Stream
- County Boundary
- Wetland
- Open Water
- Municipal Area

Wisconsin Department of Natural Resources
Watershed Management
June 1997

Water chemistry samples were taken at Spaulding Creek at CTH G approximately 2 miles up stream from the mouth. Samples were collected after four runoff events of differing severity. The values of the parameters monitored are indicative of a relatively unimpacted stream.

Dissolved oxygen and temperature were not monitored continuously due to time and meter usage conflicts. The parameters were monitored during each event water chemistry sample and habitat evaluation. Each reading was well above the 6 mg/l state standard for cold water streams (NR 102).

Streambanks are generally well buffered with few agricultural activities directly impacting the stream. Substrate is primarily composed of shifting sand, causing the bottom to be in a constant state of change. Habitat is limited to undercut banks, a few riffles, and a lot of woody debris. Trout habitat improvements have been conducted and several fishing easements purchased on this stream. Flora present include *Sparganium sp., Potamogeton sp.,* and aquatic moss.

The water quality of Spaulding Creek is excellent. Aquatic life habitat is good but could be enhanced with habitat improvement structures. Forestry best management practices and construction site erosion control practices would protect this excellent resource.

Nonpoint Source Pollutants (SC)

- Spaulding Creek subwatershed contains 2 animal lots which contribute 36 pounds of phosphorus annually. This represents 0.7 percent of the phosphorus for the entire watershed.
- The upland sediment delivery in the Spaulding Creek Subwatershed is 34 tons annually or 0.2 percent of the entire watershed load.
- Little streambank erosion occurs in the Spaulding Creek Subwatershed

Water Resource Goals and Objectives (SC)

The following goals and objectives are recommended for the surface water resources of the Spaulding Creek Subwatershed:

1. Protect and enhance aquatic life habitat by:
   A. reducing the amount of sediment reaching the stream.
   B. maintaining buffers that filter sediments and pollutants, provide shading and stabilize streambanks.
   C. controlling construction site erosion by using best management practices.
   D. promoting the use of forestry best management practices.
   E. supporting habitat improvement projects

Whitcomb Creek Subwatershed (WC)

Description

The Whitcomb Creek Subwatershed consists of the North Branch, South Branch and mainstem Whitcomb Creek, two unnamed tributaries to Whitcomb Creek, Blue Mountain Lake, Campbell Lake, Cedar Lake, Price Lake, School Section Lake, and North and South Twin Lakes. In total there are 23 miles of named streams and 3 miles of unnamed streams. The streams are all perennial and drain a total of 27.6 square miles of land. Five miles of the South Fork Whitcomb Creek is considered Cold Class I trout water and an Exceptional Resource Water (ERW). All 18 miles of Whitcomb Creek are considered to be Cold Class I trout water and an ORW (NR 102) (Wolf River Water Quality Management Plan, 1996). In general, the stream reaches west of CTH E are trout waters, and the reaches east of CTH E support forage minnows.

The western part of this subwatershed is mostly forested with little agricultural land use activities occurring. In the eastern part, land use is dominated by agricultural activities. Large wetlands exist and presumably provide some baseflow. Land use in the subwatershed is comprised of 43% agriculture, 32% woodland, 20% wetland, and 5% urban or developed.

Surface Water Resource Conditions (WC)

The surface water resources of the Whitcomb Creek subwatershed are in good condition. Water quality is significantly better in the western half of the subwatershed where woodland and wetland land use predominate, than in the eastern half of the subwatershed where agricultural land use predominates. The streams are well buffered in the headwaters and mid-reaches and become more poorly buffered closer to the mouth. Numerous wetlands cause the stream to become shallower and wider than desired, limiting aquatic life habitat to woody debris and a few riffles.

The lakes in this subwatershed are fairly small and relatively deep with small (generally less than one square mile) drainage basins. Developed lake lots vary from none at North Twin Lake to 28 at Blue Mountain Lake. Marl deposits predominate the sediments of these hardwater lakes. Marl precipitates phosphorus out of the water column resulting in lower algae production and better water clarity. TSI values for the lakes monitored indicate they are moderately fertile to fertile with School Section Lake having the highest values (DNR Long Term Trend Lake Monitoring Data, 1996).

Habitat evaluations conducted to assess the suitability of the habitat to aquatic life were taken at numerous sites in the subwatershed. The stream segments ranked from "good" to "fair". Most of the habitat limitations stem from shallow stream depths and abundant soft sediments. Rock, cobble, and gravel habitat is very limited, woody debris is abundant. Hilsenhoff Biotic Indices (HBI) (Hilsenhoff, 1982) samples collected downstream of the CTH OO bridge in October, 1995 and again in May, 1996 indicate "excellent" water quality (Table 2-[ ]). This rating indicates that there is little organic loading to this stream segment.

The headwaters of Whitcomb Creek had coldwater IBI (Lyons, 1996) scores of 90-100 indicating "excellent" fish community structure. Lower reaches had IBI scores from 50-60 indicating "fair" to "good" fish community integrity. The upper reaches were dominated by intolerant brook trout

and northern brook lampreys. Fish species in the lower reaches were dominated by brook trout and the more tolerant creek chubs, common shiners, and white suckers (Niebur and Hitchcock-Esch, 1997).

Water chemistry data was collected three times at Whitcomb Creek at CTH E. Most of the data indicates very good to excellent water quality.

Continuous dissolved oxygen and temperature monitoring was conducted at Whitcomb Creek at both CTH OO and at CTH E from August 15 - August 22, 1996. In that time, dissolved oxygen never fell below 9 mg/l. It is unlikely that this stream has a problem with low dissolved oxygen levels.

The substrate of the streams of this subwatershed are composed primarily of sand. Wetland drainage and groundwater recharge provide the primary stream baseflow. Due to sandy soil conditions, runoff occurs during the most severe precipitation events. Macrophytes, including *Potamogeton spp., Ranunculus sp.,* and *Sparganium sp.,* were scarce to abundant. An antiquated dam structure is located above CTH E. It does not pond any water or negatively impact the water quality of the stream.

The surface waters of the Whitcomb Creek Subwatershed will benefit from the adoption of forestry (west) and agricultural (east) best management practices (BMP's). BMP's will decrease sediment delivery to the streams and increase aquatic life habitat. Habitat would improve if stream widths decreased and stream depths increased. The installation of habitat improvement structures and the purchase of conservation easements along the margins of the streams and lakes will benefit fish as well as other aquatic life.

Nonpoint Source Pollutants (WC)

- Whitcomb Creek subwatershed contains 29 animal lots which delivers 663 pounds of phosphorus annually. This represents 12.1 percent of the annual phosphorus for the entire watershed.

- Sediment delivery to Whitcomb Creek Subwatershed is 886 tons per year or 5.7 percent of the annual load for the year.

- Streambanks in this subwatershed represent a small fraction of the watershed load.

Water Resource Goals and Objectives (WC)

The following goals and objectives are recommended for the surface water resources of the Whitcomb Creek Subwatershed:

1. Maintain and improve aquatic life habitat by:
   A. reducing sediment delivered by 18%
   B. installing habitat improvement structures.
   C. creating, preserving, and enhancing stream buffers that filter sediments, provide shading, and stabilize streambanks.

D. expanding the Whitcomb Creek DNR Fee Aquisition Project and including portions for stewardship easements.
E. controlling construction site erosion.

2. Maintain and improve water quality by:
   A. controlling nutrients.
   B. promoting agricultural best management practices.
   C. promoting the adoption of forestry best management practices.

3. Reduce duration and intensity of high flow events by:
   A. promoting agricultural practices that foster the infiltration of runoff.
   B. discouraging the use of drainage ditching and field tiling.
   C. create, enhance, and maintain wetlands for runoff attenuation.

Blake Creek Subwatershed (BC)

Description

The surface water in the Blake Creek Subwatershed consists of the North Fork, South Fork, and mainstem Blake Creek, Chapin Lake, Goodhal Lake, Gregerson Lake, Lutz Lake, Roland Lake and Storm Lake. There are 28 miles of named streams in the subwatershed that drain 33.2 square miles of land. One mile of stream has an existing use as Cold Class I, 22 miles are considered Cold Class II, and five miles of stream are considered Warm Water Sport Fish. All Cold Class I and Cold Class II portions are ERW streams as designated in NR 102 (Wolf River Water Quality Management Plan, 1996).

The western half of the subwatershed is mostly forested with a few agriculture operations and rural residences. The east part of the subwatershed is agricultural with little forested acreage. Large wetland complexes exist in the watershed and provide some baseflow. Land use in the subwatershed is 43% agriculture, 29% woodland, 24% wetland, and 4% urban or developed.

Surface Water Resource Conditions (BC)

The surface water resources of the Blake Creek Subwatershed are generally in good condition. The streams are well buffered west of CTH E and more poorly buffered east of CTH E. A significant portion of the streams flow through wetlands, causing the streams to be wider and shallower than desired. Habitat is often limited to woody debris and small pools and riffles. The streams have good water clarity but are often stained tannin-brown due to wetland drainage.

The lakes of this subwatershed are small, mostly seepage with little development. They are mostly private with no public access except by town roads. None of the lakes in this subwatershed were monitored in 1997.

Habitat evaluations conducted in the subwatershed ranked the streams from "good" to "poor". Due to the large amounts of soft sediments, these habitats ranked less than anticipated. In general, reaches farther upstream had better habitat rankings. HBI macroinvertebrate samples from Blake

Creek at CTH K rated this stream segment as "very good" in October of 1995 and "good" in April of 1996 Table 2-2. These results indicate that some organic pollution is impacting the stream segment. The HBI sampling from the South Branch Blake Creek at CTH E rated the water quality as "excellent" in October of 1995 and April 1996. A rating of excellent indicates that organic pollution, if present, is not impacting the stream segment (Hilsenhoff 1982).

The headwaters of Blake Creek had coldwater IBI (Lyons, 1996) scores of between 60-80 indicating "good" fish community structure. Lower reaches had IBI scores from 40-50 indicating "fair" fish community integrity. The upper reaches were dominated by intolerant brook trout while fish species in the lower reaches were dominated by more tolerant creek chubs, common shiners, and burbot. Fisheries data suggests that water quality degrades rapidly below the first crossing of State Highway 161 (Niebur and Hitchcock-Esch, 1997).

Water chemistry samples were collected four times after runoff events at Blake Creek at STH 22/110. The results indicate Blake Creek is in fair condition. A triazine sample taken at Blake Creek at STH 22/110 on September 9, 1996 showed no detection.

Dissolved oxygen and temperature were monitored near the mouth of Blake Creek at STH 22/110 and upstream at STH 161 (crossing nearest to CTH E) from August 8 - August 15. Both monitoring runs showed classic dissolved oxygen and temperature swings indicating that some primary production was taking place. The lowest D.O. level recorded was about 8.0 mg/l, well above the state standard.

The aquatic life habitat and water quality of the Blake Creek Subwatershed are impacted by eroded soil. This soil causes increased sedimentation of riffles and pools. Water quality remains good and dissolved oxygen does not limit the aquatic fauna present. Macrophytes present include *Sparganium sp., Sagittaria sp., Potamogeton richardsonii, and Potamogeton zosteriformes.*

The streams of the Blake Creek Subwatershed would benefit from reduced sedimentation. Streambank stabilization in wetland areas would decrease stream width and increase stream depth. With appropriate agricultural BMP's aquatic life habitat could improve enough to support more diverse communities of flora and fauna.

Nonpoint Source Pollutants (BC)

- Blake Creek Subwatershed contains 37 animal lots which contribute 916 pounds of phosphorus annually. This represents 16.7 percent of the phosphorus for the entire watershed.

- The upland sediment delivery to the Blake Creek Subwatershed is 1,894 tons per year. This represents 12.2 percent of the load for the entire watershed.

- Streambanks in this subwatershed contribute only a fraction of the sediment load in the watershed.

Water Resource Goals and Objectives (BC)

The following goals and objectives are recommended for the surface water resources of the Blake Creek Subwatershed:

1. Maintain and improve aquatic life habitat by:
   A. reducing sediment delivered by 25%.
   B. creating, preserving, and enhancing stream buffers that filter sediments, provide shading, and stabilize streambanks.
   C. controlling construction (home and road) site erosion.
   D. installing habitat improvement structures.
   E. expanding Blake Creek DNR Fee Aquisition Project.
   F. including lower watershed in stewardship program for streambank easements.

2. Maintain and improve water quality by:
   A. controlling nutrients by a low level.
   B. promoting agricultural best management practices.
   C. encouraging good land use planning.

3. Reduce duration and intensity of high flow events by:
   A. promoting agricultural practices that foster the infiltration of runoff.
   B. discouraging the use of drainage ditching and field tiling.
   C. create, enhance, and maintain wetlands for runoff attenuation.

Upper Main Subwatershed (UM)

Description

The surface water resources in the Upper Main Subwatershed consist of the Little Wolf River from the dam at Big Falls to the dam at Manawa, Beaver Creek, Shaw Creek, Little Creek, Driscol Lake, Mud Lake and the Manawa Millpond. There are 37.6 miles of named streams in this subwatershed that drain 58.3 square miles of land. Shaw Creek and Little Creek are considered Warm Water Forage Fish communities. The Little Wolf River is classified as a Warm Water Sport Fish community. (Wolf River Water Quality Management Plan, 1996).

The land use in this subwatershed is primarily agriculture with a few large wetlands. Most of the northern and western portions of the Village of Manawa are in this subwatershed. Land use in the subwatershed is 61% agriculture, 29% woodland, 6% wetland, and 4 % urban or developed.

Surface Water Resource Conditions (UM)

The surface waters of the Upper Main Subwatershed can be broken down into two segments, the Little Wolf River proper and the tributaries that feed it. The Little Wolf River has excellent water quality and good habitat. The streambanks are well buffered though areas of livestock access do exist. Shaw Creek and Little Creek have poor water quality and are significantly degraded by sediment. The streams are poorly buffered and the streambeds are mostly comprised of soft

sediments. Little Creek suffers increased water temperatures and sedimentation rates due to intensive agricultural ditching that has occurred in the upper reaches. Shaw Creek has poor aquatic life habitat due to high amounts of shifting sand substrate. Beaver Creek is an extensively ditched intermittent stream that has little flow most of the year.

Manawa Millpond is an impoundment that drains 131 square miles. The millpond traditionally supports dense summer growths of aquatic plants as well as nuisance levels of algae. Fair TSI values support the assertion that the millpond is somewhat fertile and mesotrophic. The property owners around the Millpond have begun to organize into a lake district. The other lakes in the watershed are undeveloped and relatively unimpacted by the land use around them.

Habitat evaluations conducted on the Little Wolf River ranked the stream from "good" to "fair". Habitats from Little Creek and Shaw Creek both ranked out as "poor" (Hilsenhoff, 1982). Silt and shifting sand substrate combined to bring these rankings down. Little Creek and Shaw Creek have very little stable habitat aside from woody debris. The Little Wolf River has some excellent habitat and riffle areas separated by stretches of sand and slack water. HBI insect data was collected on the Little Wolf River at Kretchner Road and at CTH B. The samples were taken in October, 1995 and again in May, 1996. Sample results indicate "excellent" water quality and limited organic pollution (Hilsenhoff, 1982).

The warmwater IBI (Lyons, 1992) scores from the Little Wolf River ranged from 77-90 indicating "excellent" water quality. Shaw Creek had warmwater IBI scores of 47 (fair) and 0 (very poor). Little Creek had a warmwater IBI score of 0 (very poor). The "very poor" IBI ratings occurred because not enough fish species were collected to calculate a score. The most common fish species present in the Little Wolf River include Blackside darters, white suckers, northern hog suckers, burbot, and common shiners. Common fish species at the IBI site at Shaw Creek included johnny darters and burbot (Niebur and Hitchcock-Esch, 1997).

Water chemistry samples were collected three times at Bridge Road on the Little Wolf River. Most of the water chemistry results indicate good water quality. One additional bacteria sample was collected from the Little Wolf River at CTH C and indicated no problems.

One water chemistry sample and one bacteria sample were taken at Shaw Creek at CTH O. The high total and ortho phosphorus results indicate some organic loading to the stream. The ortho or soluble phosphorus value is quite high. A bacteria sample taken from Little Creek at CTH O did not indicate any problems with bacteria contamination. Triazine samples were collected from Shaw Creek at CTH O and from Little Creek at CTH O. Triazines were not detected in the Shaw Creek sample, but were detected at 0.3 parts per billion at Little Creek. This level is one tenth of the preventative action limit for triazine.

Dissolved oxygen and temperature were continuously monitored in one week intervals at two sites at the Little Wolf River, one at Shaw Creek and one at Little Creek. The Little Wolf River was monitored at Bridge Road and at Peterson Road, near Little Falls, from September 10th - September 18th. Shaw Creek was monitored at CTH O from September 22nd - September 2nd. Little Creek was monitored at CTH O from August 22nd - September 10th. All streams had classic diel dissolved oxygen swings, yet no dissolved oxygen standards violations occurred.

The aquatic life habitat and water quality of the streams of the Upper Main Subwatershed are severely impacted by large amounts of sediment. Sedimentation of pools and riffles limits aquatic life habitat to aquatic vegetation and woody debris. Shaw Creek and Little Creek are particularly degraded, while the Little Wolf River is in fairly good condition. Macrophytes present include *Sparganium sp., Ranunculus sp., Potamogeton spp., and Sagittaria sp.*

With a high level of sediment control, Little Creek and Shaw Creek could support more diverse populations of invertebrates, fish and other aquatic fauna. Reductions of phosphorus and sediment in the above tributary streams should also translate into reductions for the receiving water, the Little Wolf River. Habitat needs are critical in this subwatershed. The restoration of wetland areas are also a critical need.

Nonpoint Source Pollutants (UM)

- The Upper Main Subwatershed contains 113 animal lots which contribute 3,184 pounds of phosphorus annually. This represents 58.0 percent of the phosphorus for the entire watershed.

- The upland sediment delivery in the Upper Main Subwatershed is 9,485 tons per year. This represents 61.1 percent of the sediment from the entire watershed.

- Streambanks in the Upper Main Subwatershed deliver 232 tons of sediment per year.

Water Resources Goals and Objectives (UM)

1. Maintain and improve aquatic life habitat by:
   A. reducing sediment delivered by 27%.
   B. creating, preserving, and enhancing stream buffers that filter sediments, provide shading, and stabilize streambanks.
   C. installing habitat improvement structures.
   D. controlling construction site erosion through the use of best management practices.
   E. purchasing stewardship easements for the Lower Little Wolf River.

2. Maintain and improve water quality by:
   A. controlling nutrients by a **medium level.**

3. Reduce duration and intensity of high flow events by:
   A. promoting agricultural practices that foster the infiltration of runoff.
   B. discouraging the use of drainage ditching and field tiling.
   C. create, enhance, and maintain wetlands for runoff attenuation.

Lower Main Subwatershed (LM)

Description

The surface water resources of the Lower Main Subwatershed consist of the Little Wolf River from the dam in Manawa to the confluents with the South Branch Little Wolf River, Thiel Creek, and Mountain Lake. There are nine miles of stream in this subwatershed that drain 16 square miles of land. The Little Wolf River is classified as a Warm Water Sport Fish community from its mouth to the dam at Manawa and is designated as an ERW in NR 102. Thiel Creek is considered a Warm Water Forage Fish community for its entire length (Wolf River Water Quality Management Plan, 1996).

The Manawa wastewater treatment plant discharges to the Little Wolf River. Most of the Village of Manawa lies within this subwatershed. Land use in the subwatershed is 65% agriculture, 12% woodland, 14% wetland, and 9% urban or developed.

Surface Water Quality Conditions

The surface waters of Thiel Creek are significantly degraded by heavy sedimentation and the lack of aquatic life habitat. Buffering is limited to riparian wetland areas that are unsuitable for agriculture. Substrate is almost entirely comprised of soft sediments and sand. Mud and sludge-like deposits are also in evidence. The Little Wolf River has much better water quality and habitat than Thiel Creek, though habitat is still less than desirable.

Mountain Lake is only lake in the Lower Main Subwatershed. It is relatively shallow and is unimpacted by lake development.

Habitat evaluations ranked Thiel Creek from "poor" to "fair", and Little Wolf River as "good" (Ball, 1982). Soft sediments combine to severely limit the habitat available for aquatic fauna. HBI macroinvertebrate data collected at Thiel Creek at Swan Road ranked the stream segment "very good" in October, 1995 and "good" in April, 1996. The results from the Little Wolf River, sampled in October, 1995 and May, 1996, ranked the stream segment "excellent" (Hilsenhoff, 1982).

A warmwater IBI (Lyons, 1992) was conducted on Thiel Creek upstream of Swan Road. The score of 60 indicates "good" water quality. The most common fish species present include common shiners, creek chubs, johnny darters and central mudminnows (Niebur and Hitchcock Esch, 1997).

Water Chemistry samples were taken at Thiel Creek at Little Wolf Cemetery Road after 2 rain events. Triazines were monitored at Thiel Creek at Little Wolf Cemetery Road and at Little Wolf River at CTH BB. There were no detects from Thiel Creek, but triazines were found at 0.1 parts per billion at the Little Wolf River.

Dissolved oxygen and temperature were monitored continuously from August 1st - August 8th at Thiel Creek at Little Wolf Cemetery Road. Results indicate few dissolved oxygen problems.

Even the lowest dissolved oxygen (7 mg/l) was still well above the state standard for warm water streams (5 mg/l). The Little Wolf River was not monitored due to meter use conflicts.

Thiel Creek carries a significant sediment and nutrient load. *Habitat is severely degraded by soft sediments and deposited organic matter.* There are few riffle areas and habitat is mostly comprised of woody debris. Streambanks are generally low and overbank flows are common. Major agricultural drainage ditching in the upper reaches of the subwatershed (north of CTH B) combine to increase water temperatures and stream flashiness. Evidence of this flashiness was found over five feet above natural or average flow. Macrophytes present include *Sagittaria sp., Lemna sp., Callitriche sp.,* and purple loosestrife.

The Manawa wastewater treatment plant discharges to the Little Wolf River. A facility upgrade was completed in Fall, 1996 (DNR Wastewater Files, 1997). Streamflows of the Little Wolf River vary with the discharge from the Manawa Millpond. During periods of low flow, many riffle areas become too shallow for adequate fish habitat. *Vallisneria americana* is abundant.

The streams of the Lower Main Subwatershed would benefit from the reduction of sediment and to a limited extent, nutrients. With a decrease in sedimentation, habitat for aquatic fauna would increase thereby increasing the diversity of the aquatic life present. Alternatives to ditching and tiling and the creation of wetlands would attenuate high flows and reduce the flashiness of the streams. Thiel Creek may have the potential to be a good northern pike spawning and nursery area.

Nonpoint Source Pollutants (LM)

- The Lower Main Subwatershed contains 28 animal lots which contribute 623 pounds of phosphorus annually. This represents 11.4 percent of the phosphorus for the entire watershed.

- The upland sediment delivery in the Lower Main Subwatershed is 2,872 pounds per year. This represents 18.5 percent of the entire watershed load.

- Streambanks in the Lower Main Subwatershed deliver 758 tons of sediment to the watershed per year.

Water Resource Goals and Objectives (LM)

1. Reduce the occurrence and severity of high flow conditions by:
   A. promoting agricultural practices that allow for increased infiltration of precipitation and runoff into the soil.
   B. encouraging alternatives to ditching and drain tile.
   C. maintaining, enhancing, and creating wetlands to slow the release of water to prevent event related flooding.
2. Protect and enhance aquatic life habitat by:
   A. reducing sediment delivery to the surface water by 23%.
   B. creating, improving, and maintaining buffers to slow runoff and filter sediment.
   C. controlling construction site erosion through the use of best management practices.

D. encourage the placement of rip-rap along areas of eroded streambank to provide erosion control and spawning habitat for lake sturgeon and smallmouth bass.

3. Protect and enhance water quality by:
   A. controlling nutrients by a high level.
   B. promoting agricultural best management practices.

Bear Lake Subwatershed (BL)

Description

The surface water resources of the Bear Lake Subwatershed consist of Spiegelberg Creek, Bear Lake, Fox Lake, Vesey Lake and Woodnorth Lake. There are five miles of stream in this subwatershed that drain 7.2 square mile of land. Spiegelberg Creek flows north out of Bear Lake to the Little Wolf River. The stream is considered a Warm Water Forage Fish community (Wolf River Water Quality Management Plan, 1996).

Land use in this subwatershed is primarily agriculture though significant areas of woodland and wetland exist. The riparian area around Bear Lake is moderately developed with year round and seasonal residences. No point sources of pollution exist in the subwatershed. Land use in the subwatershed is 66% agriculture, 14% woodland, 13% wetland, and 7% urban or developed.

Surface Water Resource Conditions

The surface water resources of the Bear Lake Subwatershed are slightly degraded. Spiegelberg Creek has some sedimentation problems as well as some higher than normal bacteria levels. Habitat is good coming out of Bear Lake, but diminishes in quality nearer to the Little Wolf River.

There are four lakes in the subwatershed, with Bear Lake the largest and most heavily developed. Bear Lake has had historical phosphorus problems. TSI data collected at Bear Lake in 1996 indicate that it is mesotrophic to eutrophic. The other lakes are undeveloped and there is not enough data to characterize them. The Waupaca County LWCD and University of Wisconsin-Extension have encouraged the Bear Lake riparian owners to form a Lake Management Organization and have met with little success. A number of landowners have armored their banks with stone to prevent lake bank erosion.

Habitat evaluations (Ball, 1982) conducted on Spiegelberg Creek ranked the stream from "good" to "fair". Macroinvertebrate samples collected near the Highway 22 wayside, ranked the stream segments "good" in October, 1995 and "fair" in April, 1996 (Hilsenhoff, 1982). *These HBI results were the lowest recorded in the entire watershed and indicate the presence of some organic pollution.*

Water chemistry samples were collected after three rain events at the mouth of Spiegelberg Creek near the Highway 22 wayside. The ammonia, total P and ortho P levels were high in the sample from April 11, 1996. A bacteria violation occurred in the stream on September 9, 1996 (NR 102).

Dissolved oxygen and temperature were monitored at Spiegelberg Creek near the Highway 22 wayside from August 1st to August 8th. One dissolved oxygen violation occurred for four hours on August 7th. The dissolved oxygen went down to a low of 4.69 mg/l, barely below the state standard of 5 mg/l (NR 102). It is unlikely that 4.69 mg/l of dissolved oxygen would stress any aquatic life present.

The aquatic life habitat and water quality of Spiegelberg Creek is degraded. In-stream habitat is in good condition at the outlet of Bear Lake but muck and marl soon predominate the substrate. The stream channel becomes braided and velocity decreases. Good, hard bottom does exist under the soft sediments. The macrophytes *Sparganium sp., Ranunculus sp.,* and *Phalaris arundinacea* are abundant. *Vallisneria americana, Sagittaria sp., Elodea sp. and Heteranthera dubia* are present. *Lythrum salicaria* or purple loosestrife is common along the stream margins.

The flow of Spiegelberg Creek is dependant on the water levels of Bear Lake. The water quality of the stream is more influenced by the land use practices around it than by the water quality of Bear Lake. Spiegelberg Creek is a conduit for fish species to travel between the Little Wolf River and Bear Lake. The stream would benefit from the reduction of nutrients and to greater extent the reduction of sediments reaching the stream. Sediment reductions would provide greater in-stream habitat for aquatic fauna while reducing their dependance on the larger bodies of water.

Nonpoint Source Pollutants (BL)

- The Bear Lake Subwatershed contains 2 animal lots which contribute 62 pounds of phosphorus annually. This represents 1.1 percent of the phosphorus for the entire watershed.

- The upland sediment delivery in the Bear Lake Subwatrshed is 358 pounds per year. This represents 2.3 percent of the entire watershed load.

- Streambanks in the Bear Lake Subwatershed are minimally eroding and contributing little sediment to the surface water of the watershed.

Water Resource Goals and Objectives (BL)

1. Enhance and protect aquatic life habitat by:
   A. reducing sediment delivery to surface water by 16%.
   B. using construction site best management practices.
   C. creating, improving, and protecting buffers around lakes and streams.

2. Enhance and protect water quality by:
   A. ensuring septic systems are functioning correctly and up to code.
   B. encouraging good land use planning.
   C. reducing nutrients by a medium level.
   D. maintaining, enhancing, and creating wetlands to slow the release of water to prevent event related flooding.
   E. promoting the use of agricultural BMP's
   F. Forming a Lake District on Bear Lake to address land use and water quality problems.

Table 2-3. Surface Water Resources Conditions, Goals, and Objectives for the Lower Little Wolf River Watershed

SUBWATERSHED	STREAM NAME	LENGTH (MILES)	BIOLOGICAL USE (MILES)	LIMITING FACTORS	OBSERVED OR POTENTIAL SOURCES	SURFACE WATER RESOURCE GOALS	SURFACE WATER RESOURCE OBJECTIVES
Spaulding Creek	Spaulding Creek	0-2 2-10	Cold II (2) Cold I (8)	HAB	BDAM	-Protect and enhance aquatic life habitat	-Reduce sedimentreaching the stream -Promote the use of forestry BMP's -Conduct habitat improvement projects -Control construction site erosion using BMP's -Protect and enhance stream buffers
Whitcomb Creek	Whitcomb Creek S. Fork Whitcomb Creek Unn. Trib. to Whitcomb Creek (T24N-R13E-S16) Unn. Trib. to Whitcomb Creek (T24N-R12E-S12)	0-18 5 2 <1	Cold I (18) Cold I (5) Cold I (2) WWSF <1	HAB, SED, TEMP	NPS, CL, PSB, SB	-Reduce duration and intensity of high flow events -Maintain and improve aquatic life habitat -Maintain and improve water quality	-Promote agricultural BMP's -Reduce sediment delivered by 18% -Create, enhance and preserve stream buffers -Create, enhance and preserve wetlands -Promote adoption of forestry BMP's -Discourage drainage ditching and field tiling -Install habitat improvement structures -Control construction (road and home) site erosion -Control nutrients -expand fee aquisition project and include portions for stewardship easements
Blake Creek	Blake Creek North Fork Blake Creek South Fork Blake Creek	0-5 5-14 6 0-1 1-8	WWSF (5) Cold II (9) Cold II (6) Cold II (1) Cold I (7)	HAB, SED, TEMP	NPS, CL, PSB, SB	-Reduce duration and intensity of high flow events -Maintain and improve aquatic life habitat -Maintain and improve water quality	-Promote agricultural BMP's -Reduce sediment delivered by 25% -Create, enhance and preserve stream buffers -Create, enhance and preserve wetlands -Expand fee aquisition project area -Purchase streambank easements -Discourage drainage ditching and field tiling -Install habitat improvement structures -Encourage good land use planning for water quality -Control construction (road and home) site erosion

Table 2-3. Surface Water Resources Conditions, Goals, and Objectives for the Lower Little Wolf River Watershed

SUBWATERSHED	STREAM NAME	LENGTH (MILES)	BIOLOGICAL USE (MILES)	LIMITING FACTORS	OBSERVED OR POTENTIAL SOURCES	SURFACE WATER RESOURCE GOALS	SURFACE WATER RESOURCE OBJECTIVES
Upper Main	Little Wolf River Little Creek Shaw Creek Beaver Creek Fountain Creek	26.6 7 9 4 2	WWSF (26.6) WWFF (7) WWSF (9) Unknown Unknown	BAC, HAB, SED, TEMP	DRDG, NPS, PSB, SB, UR	-Reduce duration and intensity of high flow events -Maintain and improve aquatic life habitat -Maintain and improve water quality	-Promote agricultural BMP's -Reduce sediment delivered by 27% -Create, enhance and preserve stream buffers -Discourage drainage ditching and field tiling -Install habitat improvement structures -Purchase stewardship easments on the Little Wolf River -Control nutrients -Create, enhance and preserve wetlands -Control construction (road and home) site erosion
Lower Main	Thiel Creek	4	WWFF (4)	BAC, HAB, SED, TEMP, FLOW	DRDG, NPS, CL, PSB, SB, PSM, UR	-Reduce duration and intensity of high flow events -Maintain and improve aquatic life habitat -Maintain and improve water quality	-Promote agricultural BMP's -Reduce sediment delivered by 23% -Create, enhance and preserve stream buffers -Discourage drainage ditching and field tiling -Install riprap for erosion control and spawning habitat for sturgeon. _Create, enhance and preserve wetlands -Control construction (road and home) site erosion -Control nutrients
Bear Lake	Spiegelberg Creek	5	WWFF	BAC, HAB, SED	SL, NPS,CL, PSB	-Maintain and improve aquatic life habitat -Maintain and improve water quality	-Promote agricultural BMP's -Reduce sediment delivered by 16% -Create, enhance and preserve stream buffers -Control construction (road and home) site erosion -Ensure septic systems are fuctioning correctly and are up to code -Reduce nutrients -Create, enhance and preserve wetlands.

Limiting Factors	[3] Observed or Potential Sources
HAB - Habitat (lack of cover, sedimentation scouring etc.)	NPS - Unspecified nonpoint sources
SED - Sedimentation (filling in of pools)	CL - Cropland erosion
TEMP - Temperature (extreme high for trout)	SL - Shoreline erosion
DO - Dissolved Oxygen (to low)	SB - Streambank erosion
FLOW- Flooding or fluctuating water levels	PSB - Streambank pasturing
ALG - Algae (abundant)	BY - Barnyard or exercise lot runoff
NUT - Nutrient enrichment	PSM - Point source, municipal treatment plant discharge
TURB - Turbidity	PSI - Point source, industrial discharge (rotten granite pit dewatering)
BAC - Bacteria (MMFCC/100 ml)	NMM - Non-metallic mining (rotten granite/gravel)
	UR - Urban runoff

Rural Inventory Results, Nonpoint Source Pollutants, and Cost-Share Eligibility Criteria

This section describes the nonpoint source inventories, objectives and cost-share eligibility criteria for each pollutant source. These sources include: barnyard runoff; agricultural nutrients; and sediments from upland areas, gully erosion, and streambank and shoreline erosion.

Management Categories

Cost-share funds for installing pollutant control measures will be targeted at sites which contribute the greatest amounts of pollutants (barnyards, manure spreading, upland fields, streambank and shoreline erosion or streambank habitat degradation sites). Management categories define which nonpoint sources are eligible for financial and technical assistance; they are based on the amount of pollution generated by a source and the feasibility of controlling the source. Specific sites or areas within the watershed project are designated as either "critical," "eligible," or "ineligible." Designation as a critical site indicates that controlling that source of pollution is essential -- indeed, mandatory by state law -- for meeting the water quality objectives for the project. Nonpoint sources which are eligible but not critical contribute less of the pollutant load, but are included in cost sharing eligibility to further insure that water quality objectives are met. Nonpoint source pollutant load reduction in the Lower Little Wolf River Priority Watershed project will be achieved mainly through voluntary participation. Landowners with eligible sites need not control every eligible source to receive cost-share assistance. Landowners with any combination of eligible sites and critical sites, however, must control the critical sites in order to receive any cost-share assistance for the eligible sites.

Management category eligibility criteria are expressed in terms of tons of sediment delivered to surface waters from eroding uplands and streambanks; pounds of phosphorus [organic] delivered to surface waters; feet of streambank trampled by cattle. Any newly created sources requiring controls after the signing of a cost-share agreement must be controlled at the landowners expense.

The Waupaca County Land & Water Conservation Department (LWCD) will assist landowners in applying BMPs. Practices range from alterations in farm management (such as changes in manure-spreading and crop rotations) to engineered structures (such as diversions, sediment basins, and manure storage facilities), and are tailored to specific landowner situations.

Critical Management Category

Nonpoint sources included in this category contribute a significant amount of the pollutants impacting surface waters. 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 pollutant 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 participation.

Each site will be field verified before receiving notification as a critical site, with the findings sent to the DNR Northeast Region office in Green Bay. Landowners interested in receiving cost-share assistance for the installation of Best Management Practices will need to sign a cost-share agreement with the Waupaca County Land & Water Conservation Department.

Notification of landowners with critical sites will begin when Waupaca County is able to identify individual fields for specific management categories in the FOCS/WINHUSLE database. The highest ranked critical sites will be notified first until all landowners or land operators with critical sites have been notified. A more detailed schedule is included in the "Cost-Share Agreement, Landowner Contact strategy and Inventory Completion" section of this plan. The notification will include the following information:

- The 36-month period in which landowners are eligible for the full level of state cost-sharing, after which the cost-share rate decreases by 50 percent.

- The potential consequences that a landowner may face if no action is taken as defined in either Chapter NR 243 for animal waste, or s. 144.025 (2)(u),(v), or receiving a notice of discharge, requiring a WPDES permit, or the issuing of a notice of intent.

- The right to appeal the designation of a critical site through a written request to the Land and Water Conservation Committee within 60 days of receipt of the notification letter. See also "Appeal Process" section.

Eligible Management Category

Specific nonpoint sources of pollution in this category contribute less significantly to water quality. These sites are eligible for technical and cost-share assistance but are not as critical to reaching water quality objectives. Other sites and practices which do not contribute pollution, but reduce pollutant loads; protect ground water; increase base flows; improve and protect habitat for fish and wildlife will be eligible for cost-share assistance.

Ineligible Management Category

Other sites not contributing significant amounts of pollutants are not eligible for funding and/or technical assistance under the priority watershed project. Other DNR programs (e.g., wildlife and fisheries management) can, if warranted, assist county project staff to control these sources as implementation of the integrated resource management plan for this watershed. Other local, state, or federal programs may also be applicable to these lands.

Barnyard Runoff

Runoff carrying a variety of pollutants from barnyards and other confined livestock areas is a major source of pollutants in the streams of the Lower Little Wolf River Watershed. Barnyard runoff is detrimental because of its high BOD (biological oxygen demand), COD (chemical oxygen demand), bacteria, phosphorus, ammonia, salts and sediment. Phosphorus is the nutrient of primary concern because it is most often the limiting nutrient in natural water bodies. Phosphorus is also the nutrient most amenable to control, and for this reason will be the target of most broad strategies for water quality management in the Lower Little Wolf River Watershed project. A total of 211 animal lots are a source of 5,485 pounds of phosphorus, per year table 2-4. Most of the oxygen-demanding pollutants and nutrients associated with these operations drain via concentrated flow to Lower Little Wolf River tributary creeks, lakes and wetlands.

The objective for barnyard runoff control is to reduce phosphorus loading to streams by a total of 25 percent. Based upon past experience, it was determined that a total of 75 percent of this reduction will be obtained solely through voluntary participation.

Barnyard sites contributing a phosphorus load greater than 180 lbs. on an annual basis will be designated as a critical site for control. An estimated 2 sites meet this criteria in the entire watershed. Those landowners with a animal lot designated as a critical site for control are eligible for a complete barnyard system. If the site owner is unable to manage installation or operation of a complete barnyard system, or if the LWCD determines that a complete system is not necessary to greatly reduce the phosphorus load from that site, the owner will only be required to divert upland clean water and roof runoff away from the lot. Installation of these low-cost practices alone will provide significant pollutant load reductions in the Lower Little Wolf River watershed. State cost-sharing is available for these low-cost clean water diversions, and landowners of critical sites will also be eligible for a full barnyard system to achieve more phosphorus control if they wish to install them with state cost-sharing.

Barnyard sites that contribute between 60 lbs. and 180 lbs. of phosphorus annually, will be considered as eligible for cost-sharing on either low-cost diversion practices or full barnyard systems. The barnyard inventory, identified about 23 yards which meet this phosphorus loading criteria.

Barnyard sites that drain to a lake and contribute 10 lbs or greater of phosphorus annually will be considered as eligible for cost-sharing on either low-cost diversion practices or full barnyard systems. The barnyard inventory, identified about 13 yards which meet this phosphorus loading criteria.

Low-Cost/Low-tech Only.

Barnyard sites that are contributing between 40 and 60 lbs. of phosphorus annually will only be eligible for clean water diversions and roof runoff control. Approximately 15 barnyards fall into this category. Barnyards contributing less than 40 lbs. of phosphorus are not eligible for cost-sharing unless they drain to lakes.

Certain components of waste management systems (as specified in NRCS Std. 312), specifically those involving collection, handling and storage, require the preparation of a nutrient management plan (NRCS Std. 590) for the acreage that the waste may be spread. Roof Runoff Management (NRCS Std. 588), Livestock Exclusion (NRCS Std. 472), Clean Water Diversion (NRCS Std. 362) are practices that are exempt from this requirement. Operations eligible for waste management systems are also eligible for cost-sharing of nutrient management practices, specifically the development of both nutrient management and pest management (NRCS Std. 595) plans, soil testing and crop scouting. See "Nutrient and Pest Management" later in this chapter for additional detail.

Internally Drained Barnyards

Internally drained barnyards drain to surface depressions or wetlands rather than directly to surface waters. A total of 10 internally drained yards and 1 yard draining to a sinkhole were identified in the Lower Little Wolf River Watershed. Eligibility for internally drained animal lots is based on a site by site analysis where significant groundwater contamination was determined to be likely.

Where eligibility of internally drained lots was not identified during the planning phase, field investigations will be conducted jointly by the county project staff, water resource management staff from the DNR's Northeast Region office, and staff from the DATCP.

Existing Critical Barnyard Runoff System Upgrade

The Lower Little Wolf Watershed was selected for the AG-160 Farmers Fund Program in the late 1980's. Complete barnyard runoff control systems were constructed on 12 of the most critical livestock operations in the watershed. These were all yards located on the floodplain or directly on the river system. All of these barnyards would be regulated under the Animal Waste Advisory Committee (AWAC) recommendations. The relatively low dissolved phosphorus readings recorded during the 1996 inventory sampling period were in part due to the establishment of those critical barnyard systems. Several of these critical barnyards have had trouble maintaining sod in their filter strips. This is primarily due to their proximity to the stream and lack of options for filter slope, width and length. To relieve the pressure on those filter strips, a manure auger will be installed at the lowest point in the barnyard. The landowner can then plug the barnyard outlet hole and auger the manure and liquids directly into a spreader to be put in a manure storage facility or field spread.

Table 2-4. Barnyard Inventory Results and Eligibility Criteria
Goal: 25% Reduction in Phosphorus Loading = 1300 Pounds

Subwatershed	Inventory Results			Criteria			
	Number of Barnyards	Pounds of Phosphorus	Percent of Barnyard Phosphorus by Subshed	Critical Sites > 180 lbs. P	Eligible Sites 60 - 180 lbs. P	Eligible Sites Clean Water Practices Only 40 - 60 lbs. P	Eligible Sites Lakes 10 - 180 lbs. P
				# Barnyards	# Barnyards	# Barnyards	# Barnyards
Spaulding Creek	2	36	1	0	0	0	0
Whitcomb Creek	29	663	12	0	1	3	4
Upper Main	113	3,184	58	2	16	8	6
Blake Creek	37	916	17	0	3	5	3
Bear Lake	2	62	1	0	0	0	2
Lower Main	28	624	11	0	4	1	0
Total	211	5485	100	2	24	17	15

Table 2-4a. Barnyard Runoff Pollution Reduction Objective: 25% (1,300 lbs. of P)

Category	No. of Sites	Lbs. Reduced	% Reduced (Goal)	% Reduction (Total)
Critical Sites	2	300	25%	6%
Eligible	56	1,000	75%	19%
Ineligible	153	----	---	---
Total	211	1,300	100%	25%

Agricultural Nutrients

The overall watershed goal is to reduce the amounts of nutrients, pesticides, and sediment that are being delivered to the stream. Mismanagement of manure, fertilizers, and pesticides causing runoff will be targeted for improved management through the adoption of a Nutrient Management Plan (NRCS standard 590) or Pesticide Management Plan (NRCS Standard 595).

Development of a Nutrient and Pesticide Management plan (NRCS standard 590 & 595) will give a landowner an opportunity to have an equal balance of enhancing water quality while maintaining a sustainable agricultural system that reduces excess nutrient/pesticide applications and the costs associated with it.

Nutrient and Pest Management

Nutrient and Pest Management is recognized as one of only a few BMPs that can be applied for protection or improvement of groundwater and surface water. Farmers can benefit from nutrient and pest management plans by taking nutrient credits for legumes and landspread manure. Commercial fertilizer applications are then adjusted to meet crop needs and can generally be reduced.

More than 50,000 acres of cropland from these operations will be eligible to participate in this program. Every landowner is eligible for cost-sharing for nutrient and pesticide management.

Nutrient and pest management will be addressed with the development of both nutrient management and pest management plans which may include crop scouting. These plans may be prepared by crop consultants and must be consistent with NRCS Standards 590 and 595. Landowners will be eligible for up to three years of cost-sharing for crop consultant fees, soil testing and residual nitrogen analysis, and manure nutrient analysis. A cost-sharing rate of 50 percent is available for all nutrient and pesticide management practices with a cost-share rate of 70 percent on spill control basins. These plans will be submitted to and approved by the Waupaca County Land & Water Conservation Department. Records should be kept showing progress towards reducing the use of fertilizer and pesticides.

Manure Storage

Nutrient management will be a significant component of manure management systems, barnyards, and manure storage facilities. Cost-sharing eligibility for a grant for manure storage practices will be based on a preliminary Nutrient Management Plan, developed in accordance with NRCS standard 590. An operation is eligible if the nutrient management plan demonstrates that manure cannot be practically managed during periods of snowcovered, frozen and saturated conditions without the installation of storage practices. The nutrient management plan must also demonstrate that proper utilization of the manure can be achieved following adoption of the intended storage practice.

Cost-sharing for storage facilities will be based on the least cost system. These options may include, but are not limited to: a properly sited unconfined manure stacks (in accordance with

Std. 312); the construction of a short term storage facility (capacity for 30 to 100 days manure production in accordance with NRCS Std. 313); the construction of a long term storage facility (capacity for up to 365 days production in accordance with NRCS Std. 313 or 425). Additional options for reducing the surface water quality impact from the over-application of manure to cropland are: a reduction in the number of animals; the rental of additional lands suitable for winter spreading; or haul or broker manure which cannot be spread without causing a surface water quality impact to a neighboring farm that can use the manure in accordance with a nutrient management plan. Landowners with site-specific manure handling problems coming directly from the barn and with indirect runoff to the stream will be eligible for temporary manure stacking based on Waupaca County LWCD staff and DNR's Northeast Region staff evaluation.

Landowners receiving cost-sharing funds for manure storage and/or barnyard practices are required to develop a nutrient management plan for those acres that will receive manure applications resulting from these practices.

Rural Sediments

Upland Sediment

Intensive agricultural practices have caused considerable amounts of eroded soil to reach streams, ponds, and wetlands in the Lower Little Wolf River Watershed. Upland erosion is the major source of the sediments that are carried downstream, beyond individual subwatershed boundaries.

Upland sediment sources were evaluated through subarea sampling and extrapolation for the entire watershed (152 square miles). An estimated 16,674 tons of soil per year are delivered to wetlands or streams in the watershed from croplands. An additional 1,727 tons/year are delivered from land use that is not cropland. Uplands are the source of 91 percent of the sediment delivered to surface waters. Table 2-5 summarizes upland sediment loading by land use for all subwatersheds.

Reduction Goal

A 35 percent reduction in sediment from eroding fields is targeted for agricultural lands. This would reduce the sediment load delivered to surface waters by approximately 6,000 tons/year. This translates into bringing all lands that are contributing sediment to streams at a rate greater than 0.6 tons/acre/year down to 0.6 tons/acre/year. Soil erosion and sediment delivery rates are calculated using the USLE in addition to other hydrology information located in the WINHUSLE model (FOCS database). A partial inventory (a representative sample of roughly 35 percent of the entire watershed land area) was completed at the time of plan writing and the results were extrapolated to the rest of the watershed; therefore, the county staff will need to continue the inventory throughout the first four years after plan approval to more thoroughly identify eligible and critical fields.

Cropland Critical Sites

To be classified as "critical sites", landowners' fields must be contributing greater than "T",(the tolerable soil loss in tons/acre/year), and be determined to deliver greater than 1.4 tons/acre/year of sediment reaching surface waters. Based on an extrapolation of the inventory information, approximately 1,483 acres of cropland in the Lower Little Wolf River Watershed meet the critical site criteria. Controlling these acres would reduce the sediment load delivered to surface waters by an estimated 1,543 tons per year. All critical site cropland fields will need to be reduced to T or less and deliver sediment to the stream at 1.4 tons/acre/year or less.

Cropland Eligible Sites

An additional 75 percent of the sediment load goal (6,000 tons) will be controlled through Eligible sites, which includes an estimated 12,000 acres, controlling 4,500 tons. Eligible classification includes those fields delivering sediment at a rate down to 0.2 tons/acre/year (See table 2-6).

Table 2-5. Summary of Upland Sediment Loading By Land Use: Lower Little Wolf River Watershed

Subwatershed		Cropland	Pasture	Woodland	Natural Areas	Wetlands	Developed	Totals
Spaulding Creek	Acres	1,129	25	3,135	72	1825	72	6258
	Sediment	34	0	1	0	0	4	39
Whitcomb Creek	Acres	7581	206	3,725	1,620	3,547	957	17,636
	Sediment	886	10	0	0	0	53	949
Upper Main	Acres	22,743	37	8,575	2,237	2,237	1,491	37,320
	Sediment	9485	0	0	0	0	776	10,261
Blake Creek	Acres	9130	199	5,009	1,065	5,006	846	21,255
	Sediment	1894	0	0	0	0	187	2,081
Bear Lake	Acres	3,060	0	180	449	583	315	4,587
	Sediment	1503	0	0	0	0	438	1,941
Lower Main	Acres	6,665	0	835	329	1,450	945	10,224
	Sediment	2,872	0	0	0	0	258	3,130
Totals	Acres	50,308	467	21,459	5,772	14,848	4,426	97,280
	Sediment	16,674	209	1	0	0	1,716	18,401

Notes: Sediment is reported in tons/year.
Data was extrapolated from subarea sampling.

Table 2-6. Cropland Sediment

Subwatershed	Inventory Results			Goal: 35% Reduction In Sediment Delivered = 6000 Tons						
	Cropland Area - (Acres)	Tons per year - Sediment Delivered From Cropland	% Contributed by Sub-Watershed	Critical Sites > T Soil Loss and > 1.4 Tons/Acre/Year Sediment Delivery			Eligible Sites >= 0.2 Tons/Acre/Year Sediment Delivery			Total % of Goal From Each Subshed Based on WINHUSLE Alone
				# Acres	Target Tons Reduced	% Reduced of Goal	# Acres	Target Tons Reduced	% Reduced of Goal	
Spaulding Creek	1,129	34	1%	0	0	0	68	0	0	0%
Whitcomb Creek	7,581	886	5%	135	41	0%	3,883	150	3%	3%
Upper Main	22,743	9,485	57%	835	711	12%	19,179	2,505	42%	54%
Blake Creek	9,130	1,894	11%	269	95	2%	5,939	510	8%	10%
Bear Lake	3,060	1,503	9%	218	314	5%	2,505	920	15%	20%
Lower Main	6,665	2,872	17%	26	382	6%	6,039	415	7%	13%
Total	50,308	16,674	100%	1483	1543	25%	37,613	4,500	75%	100%

*Thirty-five Percent of upland inventory was completed. The remaining 65% was extrapolated through WINHUSLE.

Gully Erosion

Gully erosion is a major problem in this watershed. Any active gullies identified during farm conservation planning will be evaluated to determine if they are delivering sediment to the stream. Those gullies meeting the eligibility requirements will be cost-shared.

Soil erosion that occurs from gully activity on cropland will mainly be controlled through the installation of grassed waterways. In some instances, other Best Management Practices, including high residue management and/or the installation of structural practices, such as sediment and erosion control basins, may reduce or eliminate the need for grassed waterways.

If an on-site evaluation of an active gully leads local LWCD staff to the conclusion that the installation of structural practices would not be cost effective, that site will be deemed as ineligible for those specific practices. All active gullies will be eligible for critical area stabilization and seeding. See Table 2-6a for eligibility criteria.

Less obvious ephemeral gullies are suspected to be a significant part of the erosion problems in northeastern Wisconsin, in general, with its glacial till soils with moderate slopes. During runoff events, they both erode and degrade; but after the runoff has dissipated, the landowner is able to eliminate them with agressive tillage techniques. As part of their landowner contacts, LWCD staff will consider upland areas on the farm which may be susceptible to ephemeral gullies and examine options with the landowner for reducing sediment runoff from them.

Table 2-6a Gully Erosion Sediment Reduction Objective - 25% (2,000 tons)

Management Category	Description	Target Reduction
Eligible	Actively Eroding Gullies	25% Reduction goal or 2,500 tons
Not Eligible	Inactive Gullies	N/A

Streambank Erosion

Streambank erosion contributes 9 percent of the total sediment to surface waters in the Lower Little Wolf River Watershed. Approximately 43 miles of streams (86 miles streambank) were evaluated. Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 10 miles of streambank. An estimated 1,918 tons of sediment are eroding into streams annually. See table 2-7a for streambank inventory results.

Streambanks on warm water streams contributing greater than 15 tons/year/site will be eligible for cost-sharing (20 sites). Critical sites are those that contribute greater than 95 tons/year/site. See table 2-7b for eligibility criteria.

Eligible streambanks on cold water streams are those that contribute greater than one ton/year/site.

Streambank riprapping provides critical spawning habitat for lake sturgeon that traditionally utilize the Lower Little Wolf River below the Manawa Dam. Rock Riprapping also provides year round habitat for smallmouth bass. (Nieber, 1996).

Since coldwater streambank erosion has not been identified as a significant problem in the watershed, no critical sites for control will be designated. If an on-site evaluation of an eroding streambank leads local LWCD staff to the conclusion that installation of structural practices to correct the problem would not be cost effective , that site will be deemed as ineligible. Generally, streambank sites that are located within woodland or wetland areas are not acessible and the installation of structural practices would not be cost effective.

However, if an on-site evaluation leads LWCD and DNR Fishery Staff to the conclusion that erosion is a problem and installation of a BMP would be cost effective, cold water habitat improvement structures, will be cost-shared.

Livestock Access

Eligible area streambanks include all those with livestock access.

See table 2-8 for streambank eligibility criteria and additional information on streambank eligibility. Additional sites on continuous streams, uninventoried ditches, and intermittent streams which meet the criteria above may be identified.

While shoreline erosion is not a major sediment problem, there may be areas where shoreline habitat is being effected where erosion is present.

Eligible sites for shoreline erosion are those with banks >2.5 feet in height, with a lateral recession rate of 0.10/ft/year/site or >1 ton/year/site.

Streambank Inventory Results: Lower Little Wolf River Watershed

Table 2-7a. Streambank Erosion and Degraded Habitat

Subwatershed	Inventoried Streambank Length (feet)	Eroded Sites (feet)	Trampled Sites (feet)	Slumped Sites (feet)	Cattle Access (feet)	Total Sediment Loss Tons/Year	% Bank Degraded From E, T, S	% of Total Bank Erosion in Watershed
Spaulding Creek	50,000	2,500	0	750	0	123	7%	6%
Whitcomb Creek	63,360	3,168	360	950	360	216	8%	9%
Upper Main	214,864	17,210	690	3,395	690	405	10%	42%
Blake Creek	84,480	4,224	520	1,267	520	377	8%	12%
Bear Lake	15,840	702	0	238	0	38	6%	2%
Lower Main	54,912	11,205	0	3,705	0	759	27%	29%
Totals	483,456	39,009	1,570	10,305	1,570	1,918	11%	100%

Source: Waupaca LWCD

Table 2-7b. Streambank Eligibility Criteria and Reduction Goals: 25% Reduction In Sediment Delivered = 500 Tons

Management Category	# Sites	Sediment Delivery	Target Reduction	% of Load Reduction	% of Goal
Critical Sites	3	> 95 Tons/Site/Year	340 Tons	17%	66%
Eligible - Cold Water Fisheries	15	> 1 Ton/Site/Year	25 Tons	1%	5%
Eligible - Warm Water Fisheries	15	> 15 Ton/Site/Year	150 Tons	7%	29%
Not Eligible - Cold Water Fisheries	N/A	< 1 Ton/Site/Year or in areas where BMPs would not be cost effective	N/A	N/A	N/A
Not Eligible - Warm Water Fisheries	N/A	< 15 Ton/Site/Year or in areas where BMPs would not be cost effective	N/A	N/A	N/A

Table 2-8. Trampled Streambanks Eligibility Criteria

Management Category	**Description**	**Objective**
Eligible	Trampled/Degraded/Livestock Access	Maintain Vegetated Cover
Not Eligible	Vegetated/No Current Livestock Access	N/A

Table 2-9. Shoreline Eligibility Criteria

Management Category	**Description**	**Objective**
Eligible	Bank Height > 2.5 ft. and a lateral recession rate = or > .1 ft./yr. or a sediment delivery rate of > 1 ton/yr/site	25 percent reduction in sediment from eroding sites
Not Eligible	Vegetated Sites < the Above Criteria	N/A

Pollutant Reduction Goals and Project Objectives for Rural Nonpoint Sources

Goals for water quality in the Lower Little Wolf River Watershed were identified earlier in the chapter as protection, enhancement, and restoration or water resources. In rural areas these will be achieved through project objectives for sediment, and phosphorus.

The following is a summary of reductions to be targeted for the entire watershed.

Sediment Objectives: Reduce overall sediment delivered by 35 percent. To meet this, the following is needed:

- 35 percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- 25 percent reduction in streambank sediment delivered to all streams and a 25 percent overall repair of streambank habitat in all subwatersheds.
- 25 percent reduction in shoreline sediment delivered to lakes.

Table 2-10 summarize the sediment reduction goals for the Lower Little Wolf River Priority Watershed Project.

Phosphorus Objective: Reduce overall phosphorus load by 25 percent. To meet this, the following is needed:

- 25 percent reduction in phosphorus from barnyards in all subwatersheds.
- A reduction in phosphorus from landspread manure. Farm Practices Inventory (FPI) indicates that <10% of landowners properly crediting manure nutrients.
- 25 percent reduction in P from sediment delivered from uplands to all streams in the watershed.
- 50 percent reduction from current cropland P application rates through nutrient management planning efforts.

Nitrogen Objectives: Reduce current cropland N application rates by 25% through nutrient management planning efforts.

Table 2-10. Sediment Reduction Objective

Source	Sediment Delivered (tons)	Sediment Reduction Goal	Sediment Reduced (tons)
Cropland	16,674	35%	6,000
Streambank	1,918	25%	500
Gully	10,000	25%	2,500
Total	28,592		9,000

Eligibility for Wetland Restoration and Easements

Wetland Restoration

There will be no Critical areas for wetland restoration. All wetlands will be classified as eligible for restoration.

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. Secondary benefits of wetland restoration may be enhancement of fish and wildlife habitat.

Wetland restoration is an available option to address any of the following:

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.

3. Prior converted wetlands downslope or upslope from fields identified as Critical Management Area upland sediment sources through the WINHUSLE model.

   Restoration of wetlands in these situations will do one of two things: 1) create a wetland filter which reduces the pollutants from an upslope field(s) to a water resource; or 2) reduces the volume and/or velocity of water flowing from an up-slope wetland to a down-slope critical field. Two eligibility conditions must be met to use wetland restoration in this situation:

   - All upland fields draining to the wetland must be controlled to a soil loss rate that is less than or equal to the soils "T" value.

   - Wetland restoration costs must be the least-cost practice to reach sediment reduction goals.

Land 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.

Easements may also be considered for protecting municipal well heads if it can be established that vegetative cover will correct an existing groundwater quality threat.

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 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.
    - The streambank is severely trampled and eroding.
    - channel erosion is exacerbated by livestock grazing such that unvegetated streambanks are two feet or more in height.

2. When elimination of row cropping and the establishment of permanent vegetative cover will stabilize a critical area. Easements are strongly recommended whenever:

    - Row cropping is occurring within 60 feet or less of streams or intermittent streams.
    - Row cropping is being practiced on slopes greater than 6 percent.

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

- The eligible wetland restoration is greater than 3 acres in size.

4. When a barnyard or animal feedlot is located within the flood plain and: a) a permanent easement is the least-cost alternative to provide adequate pollution reduction or b) a permanent easement provides a greater level of pollution reduction than on-site engineering options at a price that is cost-effective when compared to the level of pollution reduction and the price of the available engineering options. Easements are strongly recommended whenever:

   - Engineering options would require intensive management in order to continue to provide adequate pollution reduction.
   - Surrounding land use is largely agricultural and it is anticipated that it will remain so for two decades or more.

Ordinances

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.

Waupaca County enacted an animal waste storage ordinance in 1987.

Construction Site Erosion

A number of local governments recognize that the cost of preventing 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 Lower Little Wolf River Project.

The townships of Little Wolf, Helvetia, Union and Wyoming will be encouraged to adopt construction site erosion control ordinances.

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.

Industrial Point Sources of Pollution

Discharges of wastewater from permitted municipal and industrial sources are important considerations for improving and protecting surface water resources. Chapter 147, 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.

At time the plan was written there are no sites in the watershed that accept and spread industrial sludge. Industrial sludge is primarily cheese and meat packing factory waste.

Municipal Waste Water Treatment Plants

Sanitary sewer service availability is minimal throughout the Lower Little Wolf River Watershed. Approximately 1,200 people, 25 percent of the watershed population, receive service. Wastewater generated by the remainder of the watershed residents is disposed of through private on-site systems.

The City of Manawa is the only city in the Lower Little Wolf River Watershed Project that has a municipal wastewater treatment plant that discharges to surface water.

The City of Manawa Wastewater Treatment Plant: The City of Manawa WWTP discharges to the Lower Little Wolf River. The treatment system was upgraded in 1996 and is operating well

within its design capacity. The system uses an activated sludge-extended aeration treatment system. The system was designed to serve 2,134 people.

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 maintenance such as tanks which go unemptied. Pollutants from septic system discharges are nitrates, bacteria, viruses and hazardous materials from household products. Generally, in the Lower Little Wolf River Watershed, the majority of soils are not suitable for conventional septic tank soil absorption systems. The types of septic systems typically being installed at the time of this writing include above-ground, mound systems. Landspreading of septic system waste during the winter months can also create surface water quality problems.

Counties have been using the Wisconsin Fund since 1981. The Wisconsin Fund is a Private Sewage System Replacement Grant Program offering financial assistance designed to help eligible homeowners and small business operators offset the costs of replacing a failing septic system. The program is administered by the Waupaca 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. Interested individuals should contact the Waupaca County Zoning Department for more information.

Land Application of Municipal and Industrial Wastes

Sludge is an organic, non-sterile, by-product of treated wastewater, composed mostly of water (up to 99 percent). The re-use of sludge through land application is considered a beneficial recycling of nutrients and a valuable soil conditioner. Use of sludge in this manner is also considered to be the most cost-effective means for the treatment facility to dispose of the material.

Land application of municipal and industrial sludge is regulated under NR 204 and NR 214 respectively. Land spreading requires a WPDES permit,which includes site criteria, minimum distances from wells, application rates to ensure that environmental and public health concerns are addressed. Proper soil types, depth to groundwater, distance from surface water, and the type of crop to be grown on sludge amended fields are taken into consideration when the DNR approves agricultural fields for sludge application.

Municipal

The Lower Little Wolf River Watershed has a total of 30 acres of land that is permited to accept municipal sludge.

Solid Waste Disposal Sites

There are 6 inactive formerly licensed landfills in the Lower Little River Watershed. The locations of the landfills are as follows:

Town of Bear Creek, SEl/4, SW1/4, S.19, 24N, 14E, opened in 1965 and closed in 1990.
Town of Helvetia, SE1/4, SW1/4, S.29, 24N, 12E, opened in 1965 and closed in 1990.
Town of Little Wolf, SW1/4, NE1/4, S.33, 23N, 13E, opened in 1973 and closed in 1991.
Town of Union, SE1/4, SE1/4, S.24, 24N, 13E, opened in 1969 and closed in 1989.
City of Manawa, NW1/4, SE1/4, S.15, 23N, 13E, opened (unknown) and closed in 1962.
Town of Wyoming, NW1/4, SE1/4, S23, 25N, 12E, opened in 1964 and closed in 1989.

None of the landfills ranked high enough to have monitoring wells installed. There are no active landfill sites in the Lower Little Wolf River Watershed. The DNR approved county landfill is located in the Lower Little Wolf River Watershed. The landfill is not active at this time although it could be used in the future.

Petroleum Storage: Leaking Underground Storage Tank (LUST) Sites

The Wisconsin Remedial Response Site Evaluation Report (DNR publication number SW-144-91) lists the sites identified through the LUST program. There are 6 sites listed within the watershed.

Other Contaminated Sites

The Wisconsin Remedial Response Site Evaluation Report listed fourteen sites or facilities which may cause or threaten to cause environmental pollution. The spills program list includes sites or facilities identified under the Hazardous Substance Spill Law.

Mining

There is no known metallic mining in the Lower Little Wolf River Watershed. There is some mining of sand and gravel in the Lower Little Wolf River Watershed Project. Waupaca County passed an ordinance March 1, 1985 that applies to all mineral extraction operations conducted. The ordinance also contains language regarding the reclamation of mined sites.

CHAPTER THREE
Implementation

Intoduction

This chapter identifies the means for implementing the management actions for nonpoint source pollution control described in the previous chapter. The success of this priority watershed project depends on the aggressive implementation of these nonpoint source pollution control strategies. This chapter identifies:

- 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, including the critical sites notification schedule;
- The critical site designation appeal process;
- The estimated project budget for cost-sharing, staffing, and other support.

Best Management Practices

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. 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.

If the installation of BMPs destroys significant wildlife habitat, NR 120 requires that habitat will be recreated to replace the habitat lost. The DNR District Private Lands Wildlife Specialist or a designee will assist the LWCD in determining the significance of wildlife habitat and the methods used to recreate the habitat. Every effort shall be made during the planning, design, and

installation of BMPs to prevent or minimize the loss of existing wildlife habitat. Wildlife habitat restoration components of the practice are cost-shared at 70 percent.

The practices eligible for cost-sharing and the cost share rates for each BMP are listed in tables 3-1 and 3-2 below; the BMPs listed in table 3-1 can either be cost-shared at 50% or at the flat rates listed.

Table 3-1. Practices with Flat Rates for State Cost-Share Funding

BEST MANAGEMENT PRACTICE	MAXIMUM FLAT RATE
Contour Farming	**$ 9.00/ac[1]**
Contour Stripcropping	**$ 13.50/ac[1]**
Field Stripcropping	**$ 7.50/ac[1]**
High Residue Management	**$ 18.50/ac[2]**
Riparian Buffer Strip	**$100.00/ac[3]**
Cropland Protection Cover	**$25.00/ac[4]**

[1] Wildlife habitat restoration components of this practice are cost-shared at 70 percent.
[2] Cost-shared up to six years.
[3] Cost-shared up to five years.
[4] Cost-shared up to three years.

Table 3-2. State Cost-Share Rates for Best Management Practices

BEST MANAGEMENT PRACTICE	STATE COST-SHARE RATE
Nutrient and Pesticide Management	50% [6]
Pesticide Handling Spill Control Basins	70% [5]
Livestock Exclusion from Woodlots	50%
Intensive Grazing Management	50% [1]
Manure Storage Facilities	70% and 50% [2]
Manure Storage Facility 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%
Barnyard 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%
Lake Sediment Treatment	70%
Well Abandoment	70%

[1] To a maximum of $2,000 per watering system

[2] Manure storage is cost-shared at 70% for the first $20,000 of cost and at 50% for the remaining cost, not to exceed $35,000.

[3] Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See Chapter Two 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%.

[5] Maximum cost-share $15,000.

[6] Maximum 3 years cost-share.

Following are brief descriptions of some of the most commonly used BMPs. More detailed descriptions can be found in NR 120.14.

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

Contour Stripcropping. Alternate strips of row crops and grasses or legumes on the contour.

Field Diversions. A channel constructed across the slope with a supporting ridge on the lower side, to divert excess water to safe outlet other areas.

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.

High Residue Management. A system which leaves at least 30 percent of the ground covered with crop residue after crops are planted.

Nutrient Management. The management and crediting of nutrients from all sources, including legumes, manure, and soil reserves for the most appropriate application of manure and commercial fertilizers. Management includes the rate, method and timing of the application of 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 includes manure nutrient testing, routine soil testing, and residual nitrogen soil testing.

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

Cropland Protection Cover (Green Manure). Cropland protection cover are close-growing grasses, legumes or small grain grown for seasonal soil erosion protection and soil improvement.

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.

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.

Lake Sediment Treatment. Lake sediment treatment is a chemical, physical, or biological treatment of polluted lake sediments. Sources of pollution to the lake must be controlled prior to treatment of lake sediments. Treatment does not include dredging.

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

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

Barnyard Abandonment or Relocation. Relocation of an animal lot from a critical site such as a floodway to a suitable site to minimize the amount of pollutants from the lot to surface or groundwater.

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.

Manure Storage Facility Abandonment. Manure storage system abandonment is the proper abandonment of leaking and improperly sited manure storage systems, including: a system with bottom at or below groundwater level; a system whose pit fills with groundwater; a system whose pit leads into the bedrock; a system which has documented reports of discharging manure into surface or groundwater due to structural failure; and a system where there is evidence of structural failure. The practice includes proper removal and disposal of wastes, liner materials, and saturated soil as well as shaping, filling, and seeding of the area.

Milking Center Waste Control Systems. A milking center waste control system is a piece of equipment, practice or combination of practices installed in a milking center for purposes of reducing the quantity or pollution potential of the wastes.

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.

Livestock Exclusion from Woodlots. The exclusion of livestock from woodlots to protect the woodlots from grazing by fencing or other means.

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.

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

Well abandonment. The proper filling and sealing of a well to prevent it from acting as a channel for the contaniments to reach groundwater.

Interim Best Management Practices

Under some circumstances, practices may be recommended that are not included on the BMP list. Administrative Rule NR 120.15 provides for alternative 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 alternative best management practice.

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.
- Non-stationary manure spreading equipment.
- Practices needed for land use changes during the cost-share agreement period.
- Other practices necessary to achieve the objectives of the watershed project.
- Minimum levels of street sweeping and leaf collecting.

- Operation and maintenance of cost-shared BMPs.

- Practices already installed,with the exception of repairs to the practices which were rendered ineffective due to circumstances beyond the control of the landowner.

- Practices required to control sources which were adequately controlled at the time the cost-share agreement was signed, but which are producing an increased amount of pollutant loading to the surface or groundwater, counter to the water resource objectives of the watershed plan, due to the landowner's change in land management.

- Practices whose purpose is to accelerate or increase drainage of land or wetlands, except where drainage is required as a component of a BMP.

- Practices normally and routinely used in growing crops and required for growing crops or feeding livestock.

- Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program or covered in other ways by Chapter 147 of Wis. Statutes, except urban nonpoint sources that must be controlled to obtain a WPDES permit if control of the sources is identified in the priority watershed plan and the sources are not required to obtain coverage under a WPDES stormwater permit for discharges associated with an industrial activity, as defined under ch. NR 216.

- Livestock operations which: have applied for and are eligible for WPDES permits, have been issued WPDES permits, have greater than 1,000 animal units, or are greater than 1,000 animal units and have been issued a notice of discharge.

- Septic system controls or maintenance.

- Dredging activities.

- Silviculture activities except as necessary for site stabilization.

- Practices to control spills from commercial bulk storage of pesticides, fertilizers, petroleum and similar materials.

- Activities and structures intended solely for flood control.

- Activities required as part of a license for a solid waste management site.

- Activities funded through state or federal grants for wastewater treatment plants.

- Active mining activities.

- Pollution control measures needed during building and utility construction and stormwater management practices for new developments.

- Pollution control measures needed during construction of highways and bridges.

- Other practices or activities determined by DNR not to meet the objectives of the program.

Cost Containment

Cost Containment Procedures

Wis. Admin. Code Ch. NR 120 requires the LWCDs, as grantors of cost-share agreements, identify and agree to use one or more of the following cot containment procedures that are describe below to control the costs of installing BMPs. The cost containment procedure for this watershed project will likely frequently involve determining average costs and range of costs, but all the procedures listed below may be used to contain costs.

Average Costs: Based on past cost information, the LWCD determines an average cost per unit of materials and labor for the installation of BMPs which may not be exceeded.

Range of Costs: Based on past cost information, the LWCD establishes a cost range for installing a BMP. Eligible costs may not exceed the maximum cost of the range.

Bidding: The LWCD requires the landowner or land operator to request bids from contractors for installing a BMP. The cost-share payment shall be calculated based on the lowest bid received.

Flat Rates: BMPs using flat rates are shown in Table 3-3. The rates shown are the state's share of the practice installation costs.

Maximum Cost Share Limit: The LWCD or the DNR established a maximum cost-share rate limit not to exceed the rates specified in Chapter NR 120.18 for installing a BMP.

Municipal Work Group: The LWCD hires or assigns its employees to install a BMP for a number of landowners and land operators if the employees are able to perform the work at a cost lower than the private sector.

Wisconsin Conservation Corps: The LWCD may use the WCC to install BMPs for landowners.

Payments for "in kind" contributions will be based on the county guidelines. Cost-share recipients who wish to install a BMP using their own labor, material and equipment must submit a quote plus one quote form a qualified contractor for the practice installation.

Cost-share payments will be based on actual installation costs. If actual installation costs exceed the amount of cost-sharing determined by the cost estimates, then the amount paid the grantee shall be documented in writing, explaining the unusual circumstances and attached to the cost-share agreement or amendment and attached to the request for reimbursement submitted to the DNR by the LWCD.

Implementation Schedule

Cost Share Agreement Administration

Money for cost-share agreements is distributed to landowners by the LWCD from a Nonpoint Source grant provided by the DNR. The LWCD receives additional grant money to support its staff and other administrative responsibilities. Cost-share agreements are binding contracts between landowners and the LWCD. To qualify for cost-sharing funds, landowners must meet eligibility criteria defined in the previous chapter.

Landowner Contact Schedule

- During the first six months of the implementation period, all landowners with sites defined as "eligible" or "critical" nonpoint sources will receive correspondence from the county LWCD explaining the project and how they can become involved.

- County LWCD staff will continue to make contacts with eligible landowners until the landowners have made a definite decision regarding participation in the program.

- County staff will contact all eligible landowners not signing cost-share agreements by personal letter six months prior to the end of the cost-share sign-up period to encourage participation.

Sediment Delivery Inventory Completion Schedule

- Approximately 65 percent of the watershed's upland fields remain to be inventoried as of plan approval. Each year, the LWCD staff will complete 17 percent of the remaining uplands. At this rate, the inventory will be completed within 4 years of plan approval.

- As part of the annual inventory work, LWCD staff expect to identify fields that meet the criteria for critical sites. The LWCD staff will verify all sites identified each year and note these in a report to DNR as explained in the critical site notification process below.

Critical Site Notification Process (This is the process to be followed for all sources that were 100% inventoried, such as barnyards.)

Note: At the time of critical site verification, any uninventoried sites on the same farm must be inventoried. This would determine all critical sites on a farm so the landowner would receive only one critical site notice and avoid the possibility of a notification of a barnyard critical site notice one year and another for uplands years later.

- Project staff will begin to contact the highest-ranked critical sites for verification immediately after plan approval and complete the contacts within six-months. Highest-ranked is defined as the top 25 percent of the inventoried critical site load. The plan approval date is the same as

the date on which the project receives the Nonpoint Source grant. The department may allow up to three 90-day extensions beyond the six-month period to allow the counties sufficient time to verify that all sites meet the critical site criteria. The county shall make a request to DNR, in writing, which includes the reasons to support the extension.

After critical site verification, the project staff will send a report to DNR that states each site meets the critical sites criteria or has changed status according to sec. NR 120.09(6), Adm. Code. The reasons for these conclusions will be included. Documentation of site visits and additional information will be maintained at the appropriate LWCD offices and will be available for inspection upon request.

- Following receipt of the report, the DNR has 60 days to send critical site notification letters to the landowners.

- The county LWCD staff will complete the verification of critical sites at the rate of 25 percent per year. All critical sites will be verified before Janurary 1, 2001.

Yearly Schedule For Critical Site Verification and Notification

- April-November: Conduct site visits and verification work.
- December-January: Prepare report.
- February 1: Send report to DNR implementation coordinator.
- April 1: DNR sends notification to the critical site landowners.

- The notification schedule may be modified and revised at the annual watershed review meeting when progress on critical sites is discussed.

Critical Site Appeals Process

The owner or operator of a site designated as a critical site may appeal the critical site designation to the Waupaca County Land Conservation Committee. The site owner or operator, now called the appellant, must write to the LWCC and ask for an informal hearing. The appeal request must be received by the LWCC within 60 days of the day that the notification letter was received by the owner or operator.

The Land & Water Conservation Committee shall:

- provide the appellant with a hearing and give reasonable notice of the hearing to the appellant, the DNR and the DATCP.
- conduct the hearing as an informal hearing. Chapter 68.11(2), Wis. stats., does not apply to this hearing. This language describes the conduct of the hearing.
- hold the hearing in a place that is convenient for the appellant.

The appellant and project staff will present information about the site so that LWCC members may make a decision. Representatives of DNR and DATCP may attend the hearing. DNR is required to submit a report and recommendation to the LWCC within 60 days after the hearing. DATCP has the option to submit a report and recommendation within 60 days.

The LWCC shall:

- provide a decision, in writing, within 45 days of receiving:

  (1) the DNR and DATCP reports and recommendations,
  (2) the notification by the DNR and DATCP that no report or recommendations would be submitted, or
  (3) the conclusion of the 60-day period following the hearing.

The LWCC may support or overturn the designation of the site as a critical site. To make its decision, the LWCC shall consider whether or not the critical site designation is consistent with the critical site criteria established in the project's priority watershed plan. The LWCC shall also consider whether governmental representatives erred in their verification of the site conditions or management. Loss of profit is not grounds for support of an appeal. Violations by, or appeals granted to, other appellants shall not justify support of an appeal.

The owner or operator of a site designated as a critical site may request a review of the LWCC decision by filing a written request with the Wisconsin Land and Water Conservation Board within 60 days after receiving the decision of the county LWCC.

The owner or operator of a site designated as a critical site may request a contested case hearing under Chapter 227 to review the decision of the Wisconsin Land and Water Conservation Board by filing a written request with the DNR within 60 days after receiving an adverse decision by the LWCB.

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 4-3. The capital cost of installing the BMPs are listed for a 100 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 $ 7.4 million, assuming 100 percent participation. At 75 percent participation the capital cost is $5.6 million.

- State funds necessary to cost-share this level of control would be approximately $ 4.1 million.

- The local share provided by landowners and other cost-share recipients would be approximately $1.4 million.

Easement Costs

Chapter Two 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 4-3. At 75 percent participation, the estimated purchase price of easements on eligible lands would be $100,000 . Easements are funded at the 100 percent and will be purchased by the state or by Waupaca County.

Table 3-2. Rural BMP Cost-Share Budget Needed to Meet Lower Little Wolf River Watershed Goals in Waupaca County

BMP	number		cost/ unit ($)	total cost	seventy-five percent participation			
					state share	local share	hrs/ unit	total hours
Upland Control								
Change in Crop Rotation	2,000	ac	NA	0	0	(1)	.1	150
Contour Cropping	500	ac	9	4,500	3,375	(1)	.3	113
Contour Strip Cropping	900	ac	13.5	12,150	9,113	(1)	.5	338
High Residue Management (2)	60,000	ac	18.5	1,110,000	832,500	(1)	.1	4,500
Cropland Protection Cover (3) (Green Manure)	1,500	ac	25	37,500	28,125	(1)	.04	45
Intensive Grazing Management (Rotational Grazing)	15	ea	4,000	60,000	22,500	22,500	15	169
Critical Area Stabilization	20	ac	800	16,000	8,400	3,600	.5	8
Grass Waterways	30	ac	3,000	90,000	47,250	20,250	22	495
Field Diversions and Terraces	15,000	ft	3	45,000	23,625	10,125	.04	450
Grade Stabilization	115	ea	4,000	460,000	241,500	103,500	50	4,313
Agricultural Sediment Basin	150	ea	9,000	1,350,000	708,750	303,750	50	5,625
Nutrient Management (3)	37,500	ac	6	225,000	84,375	84,375	.1	2,813
Nutrient and Pest Management (3)	37,500	ac	10	375,000	140,625	140,625	.1	2,813
Spill Control Basin	4	ea	15,000	60,000	31,500	13,500	40	120
Wetland Restoration	40	ea	1,500	60,000	31,500	13,500	34	1,020
Riparian Buffer Strips (4)	250	ac	500	125,000	93,750	(1)	2	375
Livestock Exclusion, Woods	5,000	ft	1	5,000	1,875	1,875	.01	38
Upland subtotal				**4,035,150**	**2,308,763**	**717,599**		**23,385**

BMP	number		cost/ unit	total cost	seventy-five percent participation			
					state share	local share	hrs/ unit	total hours
Barnyard Runoff Control and Manure Storage								
Complete System	40	ea	25,000	1,000,000	525,000	225,000	95	2,850
Roof Gutters	52	ea	1,500	78,000	40,950	17,550	2	78
Clean Water Diversion	30	ea	2,500	75,000	39,375	16,875	21	473
Roofs	2	ea	25,000	50,000	26,250	11,250	0	0
Barnyard Abandonment or Relocation	4	ea	60,000	240,000	126,000	54,000	100	300
Manure Storage Facility (5)	22	ea	40,000	880,000	330,000	264,000	100	1,650
Manure Storage Facility Abandonment	10	ea	10,000	100,000	52,500	22,500	20	150
Cattle Mounds	20	ea	2,000	40,000	21,000	9,000	15	225
Milking Center Waste Control	15	ea	7,000	105,000	55,125	23,625	20	225
Barnyard subtotal				**2,568,000**	**1,216,200**	**643,800**		**5,951**
Streambank Erosion Control								
Shape and Seeding	10,000	ft	10	100,000	52,500	22,500	.1	750
Fencing	10,000	ft	1	10,000	5,250	2,250	.06	450
Rock Riprap	7,000	ft	40	280,000	147,000	63,000	.2	1,050
Bio-Bank Stabilization (lakes)	2,500	ft	25	62,500	32,813	14,063	.5	938
Crossing	5	ea	2,000	10,000	5,250	2,250	18	68
Remote Watering Systems	10	ea	2,000	20,000	10,500	4,500	15	113
Streambank subtotal				**482,500**	**253,313**	**108,563**		**3,369**
Miscellaneous								
Well Abandonment	19	ea	500	9,500	4,988	2,138	10	143
Subtotal				7,095,150	3,573,264	1,382,100		
Land Acquisition	100	ac	2,000	200,000	200,000	0		0
Easements	100	ac	1,000	100,000	100,000	0	8	600
Total				**7,395,150**	**4,083,264**	**1,517,000**		**32,878**

(1) Local share consists of labor and equipment costs. Also see flat rates in table 4-1.
(2) High Residue Management is cost-shared per acre over a six year period. Number of acres shown represents six times the eligible acres.
(3) Cropland Protection Cover and Nutrient and Pest Management are cost-shared per acre over a three year period. Number of acres shown represent three times the eligible acres.
(4) Riparian Buffer Strips are cost-shared per acre over a five year period. Number of acres shown represents five times the eligible acres.
(5) Manure storage is cost-shared at 70% for the first $20,000 of cost and at 50% for the remaining cost, not to exceed $35,000.

Source: Wisconsin DNR, DATCP, and Waupaca County

Budget and Staffing Needs

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

Staff Needs and Costs

Table 3-5 lists the total estimated staff needed to implement the project assuming a 75 percent level of participation by eligible landowners. Approximately 54,000 staff hours are required to implement this plan. This includes 3,420 staff hours to carry out the information and education program.

Currently, two positions are being funded on the Lower Little Wolf River Watershed project. The LWCD and agencies will determine the need for additional staff based on an annual workload analysis.

The estimated cost for staff at the 75 percent participation rate is $1.1 million. These costs will be paid by the state through the Local Assistance Grant Agreement.

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 3-4. The estimated cost to the state is $5.4 million. The estimated cost to landowners and others is $1.5 million for a total project cost of $7.4 million. This figure includes the capital cost of practices, staff support, and easement costs as presented above.

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; the amount of support costs, and money provided by other programs.

Table 3-4. State Share of Total Project Costs at 75 percent Landowner Participation

Item	Costs
Cost-Share Funds: Practices	4,083,264
Cost-Share Funds: Easements	100,000
Local Assistance Staff Support	1,092,000
Information and Education Direct	50,000
Other Direct (travel, supplies, etc.)	80,000
Engineering Assistance	15,000
Total	5,420,264

Source: DNR, DATCP, and Waupaca County Land & Water Conservation Department

Table 3-5 Estimated Staff Hours Needed to Meet the Water Quality Goals in Waupaca County for 10 Years of Project Implementation at 75 Percent Landowner Participation

Activity	Staff Hours
Project and Financial Management	6,240
Information and Education Program	3,420
Inventory and Planning	8,320
Practice Design and Installation	
Upland Sediment Control	23,385
Animal Waste Management	5,951
Streambank Erosion Control	3,369
Easements	600
Monitoring	832
Training	2,080
Total:	54,197
Estimated Staff Required per year	3
Hours per year	6,044

Source: DNR, DATCP, and the Waupaca County LWCD

Cost Share Agreement and Administration

Consistent with s. 144.25 and NR 120, cost share funding is available to landowners and local units of government for a percent of the costs of installing BMPs to meet project objectives. Cost share agreements must be initiated within seven years after formal approval of the watershed plan and are filed as part of the property deed. Agreements may be amended throughout the ten year project period.

Practices included on cost share agreements must be installed within the schedule agreed to on the cost share agreement. Practices must be maintained for a minimum of ten years from the date of installing the final practice listed within the cost share agreement.

Local, state, or federal permits may be needed prior to installation of some BMPs. Areas in which a permit is generally required include zoned wetlands and the shoreline areas of lakes and streams. These permits are needed whether the activity is a part of the watershed project or not. The cost share recipient is responsible for acquiring the needed permits prior to installation of practices.

Local units of government are responsible for enforcing compliance of cost share agreements to which they are a party. Where DNR serves as party to an agreement with a unit of government, the DNR will take responsibility for monitoring compliance. The responsible party will insure that BMPs installed through the program are maintained in accordance with the operation and maintenance plan for the practice for the appropriate length of time.

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 DNR, the Waupaca County Board, and the Wisconsin Land and Water Conservation Board.

The project implementation period is ten years. Conservation planning and cost-share agreements may be signed throughout the implementation phase. 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 2007.

The initial Nonpoint Source grant will cover the cost of practices over the entire ten year implementation phase. The amount of the Nonpoint Source grant is calculated at 75 percent participation by eligible landowners; see Table 3-4 for a detailed explanation. This grant may be amended due to changes needed for time of performance, funding levels, or scope of work.

Local Assistance grants will be disbursed annually to Waupaca County to cover the costs of personnel, operating expenses, and equipment. The DNR will evaluate an annual workload analysis and grant application submitted by Waupaca County.

CHAPTER FOUR
Integrated Resource Management Program

Introduction

The purpose of this chapter is to identify existing state, federal and local resource management programs which provide benefits for water quality and/or fish and wildlife resources in the Lower Little Wolf River Watershed. LWCD staff will work to coordinate the efforts of these programs to provide the best possible management of land and water resources in the watershed. This comprehensive approach will facilitate consideration of the various goals and objectives for all the programs in which the landowner participates. Each of these activities is described below.

Fisheries and Wildlife Management

Watershed best management practices (BMPs), such as streambank protection, shoreline buffer strips and easements, should be implemented in a manner that preserves and enhances the management goal of providing a quality fishery in the Lower Little Wolf River Watershed. Specifically, all streambank protection BMPs will be installed using large diameter-sized rock below the water line. Rock riprap 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. Wildlife habitat components will 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 the county, DNR staff will also review placement of agricultural sediment basins, provide technical assistance when the installation of BMPs will require the removal of obstructions or other wildlife habitat. DNR staff will propose measures to minimize impact on wildlife habitat, and assist in resolving questions concerning effects of agricultural nonpoint source BMPs on wetlands.

Wetland Restoration

The general guidelines for wetland restoration, easement acquisition and shoreline buffers to protect existing wetlands will be followed. Wetlands that are important wildlife habitats will be identified in consultation with DNR Wildlife Management and Water Management personnel. Eligible wetlands are those that have been manipulated to change drainage patterns. 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. Abandoned wells are a significant threat to groundwater quality in the Lower Little Wolf River watershed.

Waupaca County LWCD 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 Environmental Quality Incentive Program (EQIP), which is administered by the Farm Services Agency (FSA), may provide cost-share assistance to Lower Little Wolf River Watershed farm operators to properly seal abandoned wells to protect groundwater resources. Well abandonment is also an eligible cost-share practice under NR 120. Waupaca County is submitting request to USDA for EQIP Fund for this watershed. For further information contact the LWCD.

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 district water supply personnel should be consulted for more information concerning income limits and other eligibility requirements.

Eligible landowners will be encouraged to apply for well replacement funds through the Wisconsin Well Compensation Grant Program.

Private Sewage System Maintenance and Rehabilitation

Poorly sited or improperly functioning private sewage systems have the potential to contaminate groundwater and surface waters in the Lower Little Wolf River Watershed. Pollutants from sewage system discharge includes bacteria, viruses, household chemicals, nitrates and phosphorus. Many sewage systems located in riparian areas are out-dated and installed in soils which do not adequately filter pollutants due to the poor filtering ability of the soil and/or a high water table. Failing sewage systems in riparian areas are a special concern since pollutants can enter the surface waters with minimal filtering. Sewage system failure is often due to poor maintenance, primarily a failure to pump septic tanks on a regular basis.

Waupaca County staff will distribute educational materials to promote the proper maintenance of private sewage systems. Sewage system maintenance and household tips to reduce groundwater contamination will also be stressed during field visits and "home environmental audits".

It is also recommended that Waupaca County adopt an "update at date of sale" policy to require the proper inspection, update and/or replacement of septic systems when homes are sold in Waupaca County.

Wisconsin Fund

The Private Sewage System Replacement & Rehabilitation Grant Program (Wisconsin Fund) provides financial incentives to protect and improve groundwater quality in Wisconsin. The Wisconsin Fund provides funds to update private sewage systems installed before 1978. To be eligible the septic system must have been inspected by the Waupaca County Sanitarian and determined to be failing by discharging waste to the groundwater or surface water. Only permanent residences qualify, and there are income restrictions. Applications for Wisconsin Fund assistance are made through the Waupaca County Zoning and Solid Waste Department.

Waupaca County staff will inform watershed residents about the benefits of the Wisconsin Fund grant program and encourage eligible landowners to apply.

Riparian Zones

Cattle access to streams and lakes has not been identified as a serious problem in the watershed. 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.

Where possible, riparian zones along creeks should be protected with fencing to protect them from livestock grazing and trampling. These areas are important wildlife habits, particularly for wood ducks. This watershed also has nesting sites and habitat for Blanding's turtles which should be protected.

DNR Wildlife Management suggests that:

- audio censusing (for frogs and toads) should be conducted at a representative sample of the targeted critical sites and at the bottom end of each subwatershed, with similar surveys done at control sites where no BMPs will be implemented. This should be done each year, and continue for several years after implementation to document any changes in anuran populations.

- Since audio censusing does not survey salamander populations, a limited number of drift fences should be installed and monitored throughout the project duration, and several years afterwards to document population changes.

- Wisconsin Conservation Corp. Will conduct these surveys whenever possible. DNR wildlife managers will provide formal training.

Waupaca County staff will promote the protection of riparian areas where possible.

Upland Wildlife Habitat

In this watershed stream sedimentation is the major problem. One of the emerging BMPs to reduce sedimentation is buffer strips. Buffer strips are described as vegetated areas immediatly adjacent and parallel to perernial streams, seasonal streams or drainage ditches.

Riparian buffers are grass or combination of grass trees and shrubs strips which promote overland sheet flow from upslope drainage areas and provide habitat and/or cooridors for a diversity of wildlife species and protect and stabilize riparian areas.

Maintence of these areas will be conducted to protect a variety of species of wildlife.

- The DNR Wildlife Biologists will be consulted on each buffer strip practice initiated.

- The Watershed goal is 250 acres of buffer area.

Stewardship

The streambank protection program is an important additional means of protecting water quality. Under this program, the DNR could obtain an easement on both sides of streams in the watershed (generally 66 feet wide on each side). If needed, the DNR will financially support the fencing of the stream to protect it from livestock access.

Streams eligible or proposed to be eligible in the watershed:

* *Lower Whitcomb Creek*

** Blake Creek*

Additional streams will be nominated when the nomination period is reopened..

Waupaca County supports the nomination of the Lower Whitcomb and Blake Creek for stewardship eligibility. Waupaca County staff and DNR Fisheries personnel will participate in the selection process and review watershed streams for recommendation.

Forestry Programs

Private forest lands, which account for over 22,000 acres within the Lower Little Wolf River Watershed, are important producers of forest products in Waupaca County. Private forest lands also contribute to the quality of water, fish and wildlife resources in the watershed. Financial assistance is available for forest management and soil and water resource protection through the Forestry Incentive Program (FIP), 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 the development of management plans and 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. 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. Waupaca County has the highest number of managed forest land contracts in Central Wisconsin.

Other Stewardship Programs

Some other forest stewardship programs available to watershed landowners include the following USDA programs, Forest Improvement Program (FIP) and Enviromental Quality Incentive Program (EQIP). These programs provide funding for the establishment of timber stands.

Waupaca County LWCD staff and DNR Foresters will encourage eligible forest landowners in the Lower Little Wof River Watershed to participate in Forest Stewardship Programs to benefit water resources and forest habitat. Protection of soil and water resources should be addressed in all SIP and MFL plans where applicable.

Coordinating Regulations, Permits, and Zoning

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

The Waupaca County will work closely with the DNR Water Regulation staff, the Waupaca 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.

Waupaca County will work in cooperation with the Property Listing Department, Zoning Department and the DNR to provide information packets to new waterfront property owners throughout Waupaca County to educate residents about the existence of zoning regulations and the proper contacts to make within each agency. The guides will also educate lakefront residents about the steps they can take to become responsible lake stewards.

Coordination With State and Federal Conservation Compliance Programs

The Lower Little Wolf River 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 LWCD 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. There are 28 FPP plans and 348 FSA plans within the watershed project.

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 several known archaeological sites within the Lower Little Wolf River Watershed. The sites are found in and around the shores of Little Wolf River, Twin Lake, Bear Lake, Mountain Lake and Blueberry Marsh. The status of many of the sites is unknown.

Burial mounds and cemeteries are reported for the area near the Lower Little Wolf River. Other undiscovered cemeteries may be present, both Native American and European immigrant. Things to look for besides the mounds would be an unplowed corner of a field in which large trees are still present -- this may just be a sugar bush, but it may also be a place at which skeletons were once uncovered and left uncultivated.

A list of all the registered cemeteries in the watershed may be obtained through the State Historical Society. Wisconsin state law makes it illegal to knowingly disturb a burial. Landowners themselves may have information on some sites that have not been reported.

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 framwork of the state watershed program.

Before finalizing the cost-share agreement with the landowner, project staff will review the maps showing known archaeological and historic sites. Also, staff will review the list of practices of concern listed below. 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 consult with the DNR Northeast Region watershed coordinator to arrange an informal visit to the area by a

cultural resource professional (either DNR employee or otherwise). This first visit would consist of a "pre-review" to ensure that the *specific* location of the proposed BMP will not disturb the known archaeologic or historic site. In some cases, a representative from the U.S. Natural Resources Conservation Service (NRCS) may conduct the review. Instructions and cultural resource site review documentation forms are available in the Implementation Handbook.

If it is too difficult to determine through a pre-review, or if it appears that the known site would indeed be disturbed, contact the Wisconsin State Historical Society 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 (Runoff Management) Program will pick up the costs of professional historic and archaeological site reviews.

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 Lower Little Wolf River 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 Bureau'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 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:

epioblasma Triquetra, snuff box, mussel.

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;
Buteo lineatus, red shoulder hawk, bird;
Lythrurus umbratilis, red fin shiner, fish;
Notropis anogenus, pugnose shiner, fish;

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:

Notropis texanus, weed shiner, fish;
Etheostoma microperca, least darter, fish;
Arabis missouriensis var dean, deans rockcress, plant;
Acipenser fuluescens, lake sturgeon, fish;
Botrychium oneidense, blunt-lobe grape-fern, plant;
Medeola virginiana, indian cucumber-root, plant.

Natural Areas

Natural areas are sites that contain high quality examples of natural communities. The following natural areas have been identified in the Lower Little Wolf River Priority Watershed. The natural communities found at each area are also listed.

Northern Dry-mesic Forest, Northern Dry-mesic Forest, Community
Northern Sedge Meadow, Northern Sedge Meadow, Community
Calcareous Fen, Calcareous Fen, Community
Lake--Shallow, Hard, Seepage, Lake--Shallow, Hard, Seepage, Community
Stream--Fast, Hard, Cold, Stream--Fast, Hard, Cold, Community
Northern Mesic Forest, Northern Mesic Forest, Community
Northern Dry-Mesic Forest, Northern Dry-Mesic Forest, Community
Northern Wet-Mesic Forest, Northern Wet-Mesic Forest, Community
Northern Wet-Mesic Forest, Northern Wet-Mesic Forest, Community
Northern Wet Forest, Northern Wet Forest, Community
Northern Wet-Mesic Forest, Northern Wet-Mesic Forest, Community
Northern Wet-Mesic Forest, Northern Wet-Mesic Forest, Community
Northern Mesic Forest, Northern Mesic Forest, Community
Lake--Shallow, Hard Drainage, Lake--Shallow, Hard Drainage, Community
Stream--Fast, Hard, Cold, Stream--Fast, Hard, Cold, Community
Northern Mesic Forest, Northern Mesic Forest, Community
Lake--Deep, Hard, Drainage, Lake--Deep, Hard, Drainage, Community
Norther Mesic Forest, Northern Mesic Forest, Community
Emergent Aquatic, Emergent Aquatic, Community
Shrub-Carr, Shrub-Carr, Communtiy

If specific locational or other information is needed about these species or natural communities, 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 FIVE
Information and Education Activities

Goal

The goal of the Information and Education Program (I&E) is to improve water quality by maximizing landowner participation in the Lower Little Wolf Priority Watershed Project.

Surface and Groundwater protection are the primary goal of the watershed project. The information and education plan outlines the goals and objectives that will assist the local staff in protecting water quality through project implementation. The I&E plan will be updated by the Citizens Advisory Committee on an annual basis.

Localized groundwater problems have been identified. The groundwater I&E component is critical in this watershed to illustrate to landowners what groundwater problems are, where the problems originate and how each individual can help solve the problem.

Urban & rural nutrient management, well protection/abandonment, stormwater management, construction site erosion control, septic systems maintenance and alternatives to hazardous household waste are important topics to demonstrate. Demonstrations are not costly and they will provide strong evidence to persuade landowners to implement surface and groundwater-safe changes in land management.

Farm Practices Inventory (FPI)

The framework for the I&E plan comes from the Farm Practices Inventory (FPI) survey. The FPI survey was the tool used to provide baseline information on the needs, attitudes, behavior and practices of agricultural landowners in relation to nutrient and pest management. This assessment identifies potential obstacles for adopting Best Management Practices (BMPs) which helps watershed staff target educational programs and technical assistance to overcome these obstacles.

The University of Wisconsin Extension (UWEX) Environmental Resources Center supplied the FPI survey and data analysis in addition to providing technical guidance during survey distribution. UWEX worked very closely with watershed staff to make the surveys a success.

The FPI indicates that Lower Little Wolf Watershed farmers spend $6.44 per acre/year more than needed on commercial fertilizer. According to the survey, a combination of lack of nutrient crediting from manure and legumes and over-application of commercial fertilizer results in a large amount of excess fertility in the soil. This not only lowers the profitability of the farm but provides the opportunity for those nutrients to run off into streams or leach to the groundwater.

Due to the uniformity of the watershed (83% dairy and livestock), the sub-watersheds will not be treated separately.

Table 5-1. FPI Inventory Data

Nutrients	UW-Ext. Rec. (lbs/acre)	Current Rate* (lbs/acre)	Surplus lbs	Objective
Nitrogen	160	201	41 lbs	Reduce current N rate by 26% to 160 lbs/acre.
Phosphorous	40	141	101 lbs	Reduce current P rate by 50% to 70 lbs/acre.
Potassium	25	342	317 lbs	Reduce current K rate by 50% to 171 lbs/acre.

*Rate includes commercial fertilizer applications as well as legume and manure nutrient credits.

Implementation Team

The education strategy was developed by Waupaca County Land & Water Conservation Department staff with assistance from the watershed Citizens Advisory Committee, UW Extension, DNR, and the Land Conservation Committee.

The Waupaca County Land & Water Conservation Department will take lead responsibility for the implementation of the information and education strategy. The University of Wisconsin Cooperative Extension (UWEX), the Department of Natural Resources, (DNR), and the Department of Agriculture (DATCP) will provide supporting assistance. The Waupaca County Land & Water Conservation Department will work with and seek support from local units of government and organizations such as lake rehabilitation districts, villages, lake associations, and other community groups and businesses.

Audience

The primary audience of the I&E Program is priority watershed landowners who have been classified as eligible for project participation. Secondary audience is priority watershed landowners that are not eligible for project participation, suppliers of services to the priority watershed, interest groups and the general public.

1. Agricultural Audience: Agricultural producers (includes livestock & non-irrigated cash grain)

2. Urban Audience: Landowners that live within city limits and/or in concentrated rural areas (subdivisions).

3. Rural Non-Farm Audience: Landowners that:

a) live outside city limits & subdivisions
b) do not produce crops, dairy or livestock
c) do not live on or adjacent to a lake, river or stream.

4. Riparian Audience: Landowners that live on or adjacent to a lake, river or stream.

Agricultural Objectives

Objective: Nutrient and Sediment Management

- Landowners will locate temporary manure storage stacks in areas that reduce the risk of surface and groundwater contamination.
- Milkhouse waste will be properly treated.
- Landowners will have access to a cropfield utilizing conservation tillage in their "neighborhood".

Objective: Manure Crediting

The FPI concluded that 56% of the farmers that have manure take nutrient credits for it. However, no one in the survey credited within 10% of UWEX values. Twenty-nine percent (29%) over-credited and 71% either did not credit or under-credited by greater than 10%.

The *objective* will be to increase the number of farmers crediting for manure to 75%. Proper crediting will be accomplished on 50% of those crediting.

Objective: Legume Crediting

The FPI indicated that 17% of the farmers that have legumes in rotation take nutrient credits when they are available. Of those with eligible credits, 13% over-credited, none credited properly and 87% either under-credited or took no credit.

The *objective* will be to increase the number of farmers crediting for legumes to 50%. Proper crediting will be accomplished on 25% of those crediting.

Objective: Sediment Management

- Increase the utilization of conservation tillage techniques from 10% to 50% by the end of the project.

Urban, Rural Non Farm and Riparian Objectives

Goal: Nutrient and Sediment Management

- Landowners will take regular lawn soil tests and fertilize by following UWEX recommendations.
- The watershed community will increase their knowledge and acceptance of properly applied septic/municipal sludge spreading on farm fields

Goal: Well and Groundwater Protection

- Landowners will be able to abandon wells according to DNR guidelines.
- City of Manawa will develop a wellhead protection plan.
- Residents with private wells will conduct regular water testing for at least nitrate and coliform bacteria.
- Residents will be able to explain the connection between storm drain runoff and surface water problems
- Lake associations and districts will develop lake management plans and implement them.
- Local municipalities will implement and manage stormwater, salt, snow, leaves and sediment removal.

Goal: Lakeshore/Streambank Protection

- Riparian residents will be able to implement and maintain streambank restoration.

Goal: Inform Landowners Within the Watershed of Progress on General Goals

- Public officials will encourage growth and development to be located on lands least susceptible to potential surface/groundwater contamination.

- Developers and contractors will employ techniques to reduce or eliminate potential surface/groundwater contamination.

Activities

The activities used to reach these goals will include but not be limited to: newsletters, news releases, public meetings, field demonstrations, tours, fact sheets, slide shows and displays. Specific activities will be list below.

Table 5-2. Activities related to Nutrient and Sediment Management Goals

Activity	Who	When	Cost	Time
Staff cooperating with Manawa Lake District will conduct urban nutrient & pesticide managment education meeting	W/S staff UWEX Manawa Lake District. Officials	1997, 2000, 2003	$300	120 Hrs.
Conservtn. Tillage Demo plots will be developed, signed & field days conducted	W/S staff UWEX	3/ yr. 1998-2001	$1000	120 Hrs/Yr
Newsletter w/cons. tillage, milkhouse waste treatment, soil test.,whey, sludge and septic spreading info	W/S staff UWEX DNR	2 per year	$1000/yr	80 Hrs.
Develop partnerships with agribusiness to promote NPM & cons. tillage (through meetings)	W/S staff UWEX	1997-07		20 Hrs/Yr
Conduct cons. tillage field day to demonstrate equipmt.	W/S staff UWEX	1998 2002	$500	120 Hrs/ event
Conduct soil erosion demo for State Forage Field Day at Walter Strebe farm	Co Conservation W/S staff UWEX	June 1997	$500	80 Hrs
Construct a barnyard runoff control. system, sign & conduct a field day	W/S staff UWEX	1997-98	$300	40 Hrs
Construct a manure storage system, sign & conduct a field day	W/S staff UWEX	1997-98	$300	40 Hrs

Table 5-3. Activities Related to Groundwater and Well Protection

Activity	Who	When	Cost	Time
Newsletter & news releases regarding well & groundwater protection	See Activity 3, Table 5-1 Nutrient & Sed.			
Waupaca Co. Water Quality Program will discuss well- head protection w/City of Manawa & provide cost-share assistance.	County Conservationist W/S staff	1998-2000	$5000 (Co. cost-share)	40 Hrs/yr

Table 5-4. Activities Related to Stormwater Management

Activity	Who	When	Cost	Time
Develop land/stormwater management plan for City ofManawa	W/S staff UWEX	2000	$10,000	200 Hrs
Educational meetings with residents of Manawa regarding stormwater issues	W/S staff UWEX, DNR & Manawa Lake District officials	1998 2002		40 Hrs.
Speak to Manawa City Council concerning stormwater management	W/S staff UWEX DNR	1998 2002		20 Hrs.
Stormwater drain stenciling	W/S staff	1998 2002	$300	80 Hrs.
Establish lake district in Manawa	Co.Conservationist UWEX	1997 5 meetings		80 Hrs.
Complete lake mgmt. plan for Manawa Pond	Co.Conservationist Water Quality Pro.	1998 5 meetings	$1500 (Co. cost-share)	80 Hrs.

*Format to follow plans developed in Cities of Waupaca and Weyauwega.

Table 5-5. Activities Relating to Informing Public of Progress Toward General Goals

Activity	Who	When	Cost	Time
Public Information meetings	W/S staff	December of each year	$300	40 Hrs.
News Releases to local papers on variety of subjects	W/S staff	6 per year	$30	24 Hrs.

Table 5-6. Activities Related to Lakeshore/Streambank Protection

Activity	Who	When	Cost	Hours
Establish & sign a stream- bank protection project	W/S staff	1997	$300	100 Hrs. (engineering)
Conduct a field day at above site	W/S staff	1998 2002	$100	80 Hrs.

Evaluation

An evaluation report of information and education activities will be prepared annually. Evaluation will be built into the program activities where feasible. Activities may be evaluated through recording the number of attendees at a function, the target audience reached, event surveys and other methods. A Farm Practices Inventory will be conducted at the end of the project to measure overall effectiveness for agricultural landowners.

Table 5-7. Information & Education Budget and Staff Needs

Activity	Total Number	Total Direct Cost	Required Years 1-5	Staff Hours Years 5-1 0
Newsletters	20	$20,000	400	400
News Releases	60	600	120	120
Public Meetings	15	9,000	300	300
Farm Field Days	15	9,400	840	--
Agri-business Meetings	10	--	100	100
Wellhead Protection	8	5,000*	220	--
Stormwater Meetings				
Stormwater Stenciling	2	1,200	160	--
Establish Lake District	5	--	80	--
Complete Lake Mgmt. Plan	5	1,500*	80	--
Stormwater Plan	1	10,000	200	
Totals	141	$50,200	2500	920

*Paid by Waupaca County Water Quality Program

CHAPTER SIX
Project Evaluation

This chapter briefly summarizes the plan for monitoring the progress and evaluating the effectiveness of the Lower Little Wolf River Priority Watershed Project. The evaluation strategy includes these components:

- Administrative review
- Pollution reduction evaluation
- Watershed Resource Evaluation Monitoring

Information on the first two components will be collected by the Waupaca County LWCD and reported on a regular basis to the DNR and the DATCP. The project team will meet early in the year throughout the implementation phase to review and evaluate the accomplishments of the preceding year. 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 Assistance. The Watershed Resource Evaluation Monitoring follows guidance established by DNR's Bureau of Water Resources Management to select and monitor specific sites in the watershed to monitor resource quality changes.

A final report will be prepared for Little Wolf River Priority Watershed Project within 18 months of the end of the grant period. This report will include information on landowner participation, project management, grant management, technical assistance, and any Signs of Success sites completed within the watershed among other topics. It is developed to evaluate progress, provide documentation on attainment of water quality and pollutant load reduction objectives, evaluate BMP effectiveness, and provide recommendations on which target key areas needing improvement in the NPS program. The Waupaca County LWCD will prepare the final report or will provide the necessary pollutant load reduction to the DNR for inclusion in the final report.

Administrative Review

The first component, the administrative review, will focus on the progress of Waupaca 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.

Accomplishment Reporting

The Waupaca County LWCD will provide the following data to the DNR and the DATCP annually:

- Planned and completed BMPs
- Planned and completed conservation systems
- Major information and education activities undertaken

Accomplishment data are summarized in the Annual accomplishment Report prepared by DATCP and DNR, and are also discussed at watershed review meetings held annually for projects in implementation. Additional evaluation data provided by Waupaca County LWCD 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
- Effectiveness of construction site erosion control activities
- Status of stormwater management activities for new development undertaken by Waupaca County LWCD.

Likewise, participating local units of government implementing the urban nonpoint source management program meet periodically with DNR staff to review progress. The DNR and local units of government will jointly evaluate the urban implementation program. Annual reports of governmental units will include:

- Information and education activities
- Construction site erosion control ordinance amendments adopted
- Number of permits monitored for ordinance compliance
- Implementation of urban "housekeeping" program activities
- Acres of existing urban development, by land use, covered by storm water management plans for controlling water quality
- Acres of new urban development, by land use, covered by storm water management plans for controlling water quality
- Storm water management ordinance provisions adopted

Details of the reporting requirements are contained in DNR Publication WR-223-94, which is reviewed every two years by DATCP and DNR and revised as necessary.

The Field Offices Computing System (FOCS) is a computer data management system that has been developed by the U.S. Natural Resources Conservation Service (NRCS). The NRCS, the DNR and the DATCP use FOCS to meet the accomplishment reporting requirements of all three agencies. The Waupaca County LWCD will use FOCS to collect data for administrative accomplishments, and will provide the information to the DNR and the DATCP for program evaluation.

Financial Expenditures

The Waupaca County LWCD and other participating units of government will provide the following financial data to the DNR and the DATCP on a quarterly basis:

- 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 Waupaca County LWCD staff
- Amount of money paid for installation of BMPs, and money encumbered in cost-share agreements

The Waupaca County LWCD and other participating units of government will also provide the DNR with the following financial data on an annual basis:

- Staff training expenditures
- Interest money earned and expended
- Total budget and expenditures on the project

Time Spent On Project Activities

The Waupaca County LWCD 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

Nonpoint Source Pollutant Load Reduction

The purpose of the second evaluation component, pollutant load reduction, is to estimate reductions in nonpoint source pollutants as a result of installing BMPs. Key sources were identified for estimating changes in pollutant loads that reach surface waters in the Lower Little Wolf River Watershed. Data collected for evaluation include sediment load reduction from uplands; streambanks and gullies; reduced winter spreading of manure; and streambank (habitat) protection. Chapter Two of this plan describes target pollutant reductions for each of the subwatersheds.

Cropland Sources

Waupaca County LWCD will use the WINHUSLE (Wisconsin Nonpoint Source) model to estimate sediment reductions due to changes in cropping practices. The Waupaca County LWCD will use FOCS to provide data for the WINHUSLE model on an annual basis, as described above.

Streambank Sources

Waupaca County LWCD staff will estimate changes in streambank sediment erosion. A tally will be kept of landowners contacted, the amount of streambank sediment (in tons) being generated at the time of contact, and changes in erosion levels estimated after installing BMPs.

Barnyard Runoff

County LWCDs will use the BARNY model to estimate phosphorus reductions due to the installation of barnyard control practices. The LWCDs will report the information to the DNR through FOCS. In the event that FOCS is replaced, the replacement system will be used for all project tracking.

Construction Sites

Local units of government participating in the urban implementation program will report annually to the DNR on the number of construction sites served by adequate erosion control practices, number of construction sites receiving appropriate permits, and any amendments to construction site erosion control ordinances that affect sediment loads associated with these sources.

Urban Areas

Local units of government will report annually to the DNR on any activities that may result in changes in urban pollutant loadings. Such activities include acres of existing and new urban land, by land use, served by new storm water BMPs; new urban lands, by land use, not served by storm water BMPs; and other information requested by the DNR concerning BMP characteristics.

Water Resource Evaluation Monitoring

The DNR may monitor changes in water quality, habitate and water resource characteristics periodically during the project and at the end of the project period. Limited funds and the intensive staffing needed to properly evaluate water quality changes prohibits monitoring each watershed individually. Instead, two types of evaluation monitoring are being conducted on a state-wide basis: Whole Stream Monitoring and Signs of Success. The goal of the evaluation monitoring activities is to determine the progress the Nonpoint Source Program is making towards improving the quality of Wisconsin's water resources. Evaluation monitoring actives were developed to answer five questions about the water resource objectives and the pollution reduction goals:

1) Do the levels and types of best management practices recommended in the watershed plans achieve the water resource objectives?

2) Do the types and levels of best management practices recommended in the watershed plans achieve the pollutant reduction goals?

3) Does any level of practice installation below 100 percent achieve the water resource objectives or the pollutant reduction goals?

4) Do we need to adjust the pollutant load reduction goals to achieve the water resource objectives?

5) Can we use simple environmental indicators in many of the watershed projects to provide some early evidence that the practices might achieve the water resource objectives and pollutant reduction goals?

A team of experts from state and federal agencies, and the University of Wisconsin was formed to develop and direct the evaluation monitoring activities at the Whole Stream Monitoring and Signs of Success sites.

Whole Stream Monitoring Sites

Criteria was developed to select and monitor twelve streams around the state. The stream sites represent the five major types of fishery found in agricultural and urban parts of priority watersheds, and they also represent three of the five ecoregions in the state. The five fishery types are: high gradient cold water sport fishery, high gradient warm water sport fishery, high gradient warm water forage fishery, low gradient warm water forage fishery, and low gradient cold water sport fishery. A stormsewer outfall is also being monitored. The three ecoregion types represented are the Southeastern Wisconsin till plains, the Driftless area, and the North Central Hardwood Forest.

All but one of the stream sites drains a small area (about ten square miles or less). The schedule involves two years of monitoring before any best management practices are installed, five years of monitoring during the practice installation phase, 2 years of monitoring during the response period, and two years of monitoring during the post-practice installation phase, for a total of eleven years of monitoring.

State-of-the-art chemical and physical monitoring is being done at all the stream sites. State-of-the-art biological monitoring will be done at eight of the twelve streams. Results of the monitoring will be used to determine how well the best management practices achieve the pollution reduction goals and objectives. Improving the fish community is the most important water resource objective for all the streams.

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 fencing 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.

The results of the Signs of Success monitoring will be featured in educational materials such as local newsletters and newspapers and the statewide newsletter "Fields and Streets."

Potential SOS sites for Lower Little Wolf River are still being identified. If any sites meet selection criteria, one SOS site may be established shortly after the implementation phase begins.

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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

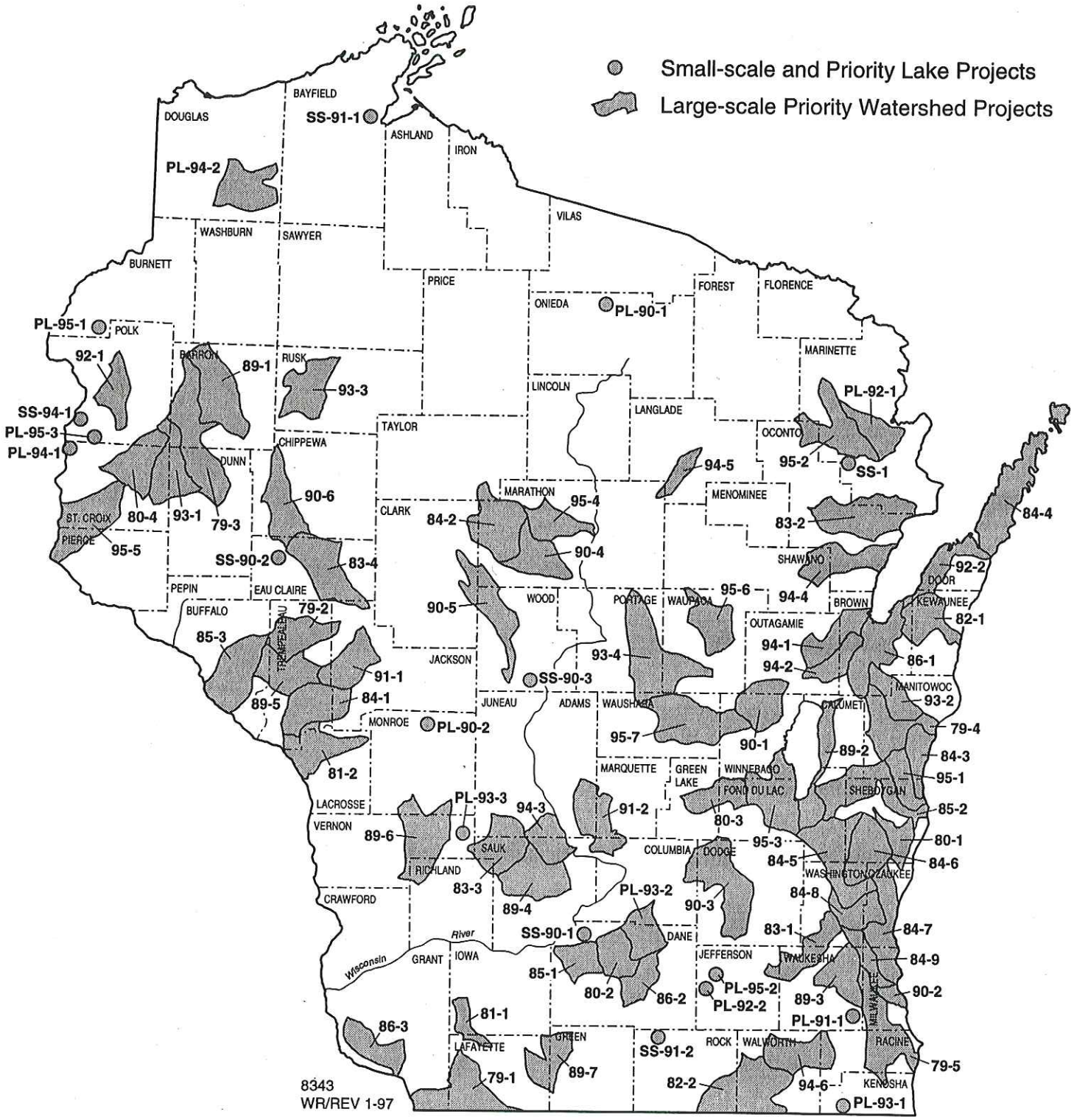
Year Selected-Map Number	Small-scale Priority Watershed Project	County(ies)
SS-1	Bass Lake ♦	Marinette
SS-90-1	Dunlap Creek	Dane
SS-90-2	Lowes Creek	Eau Claire
SS-90-3	Port Edwards - Groundwater Prototype	Wood
SS-91-1	Whittlesey Creek	Bayfield
SS-91-2	Spring Creek	Rock
SS-94-1	Osceola Creek	Polk

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



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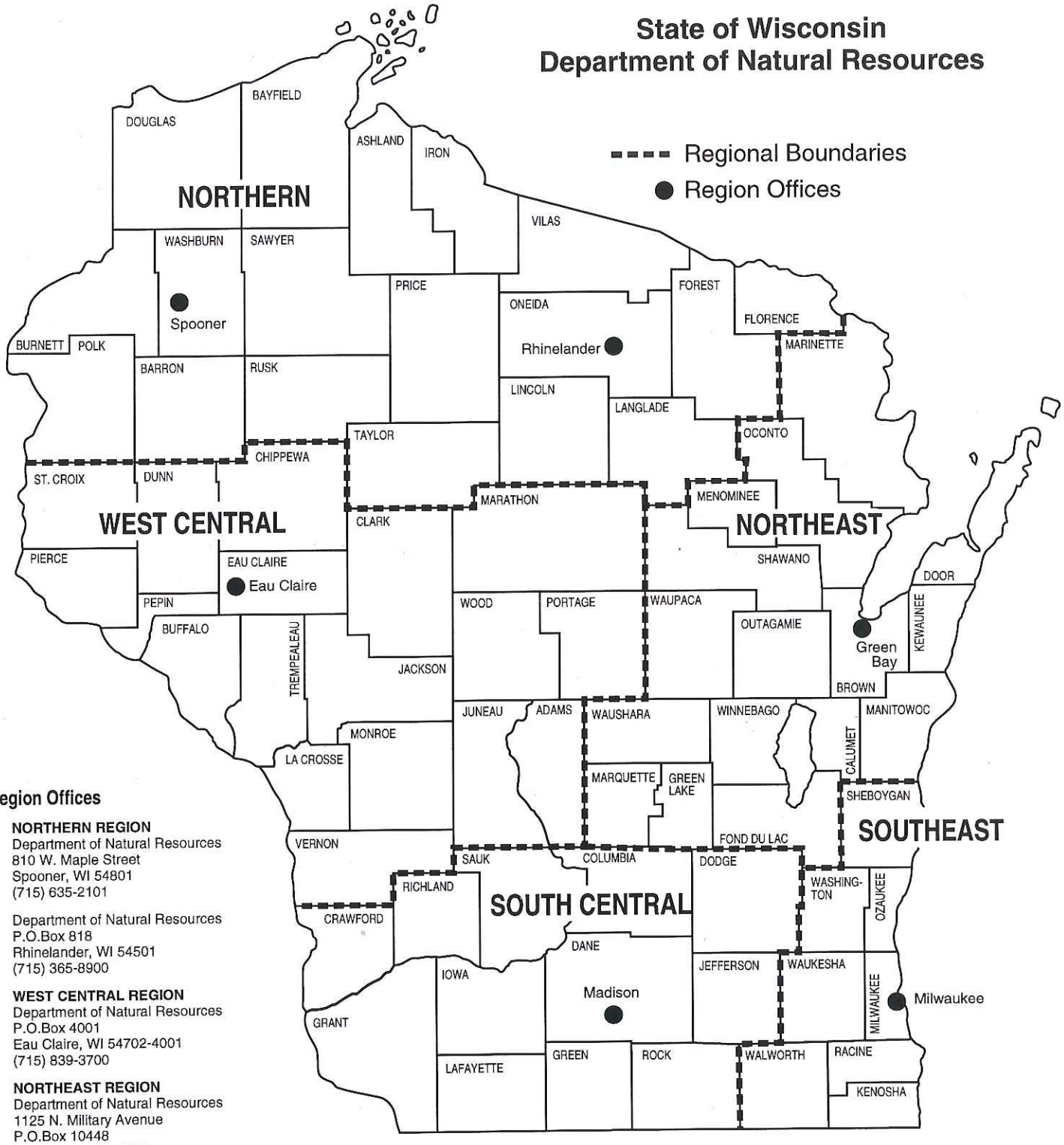

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To protect and enhance our Natural Resources—
our air, land and water;
our wildlife, fish and forests.

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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