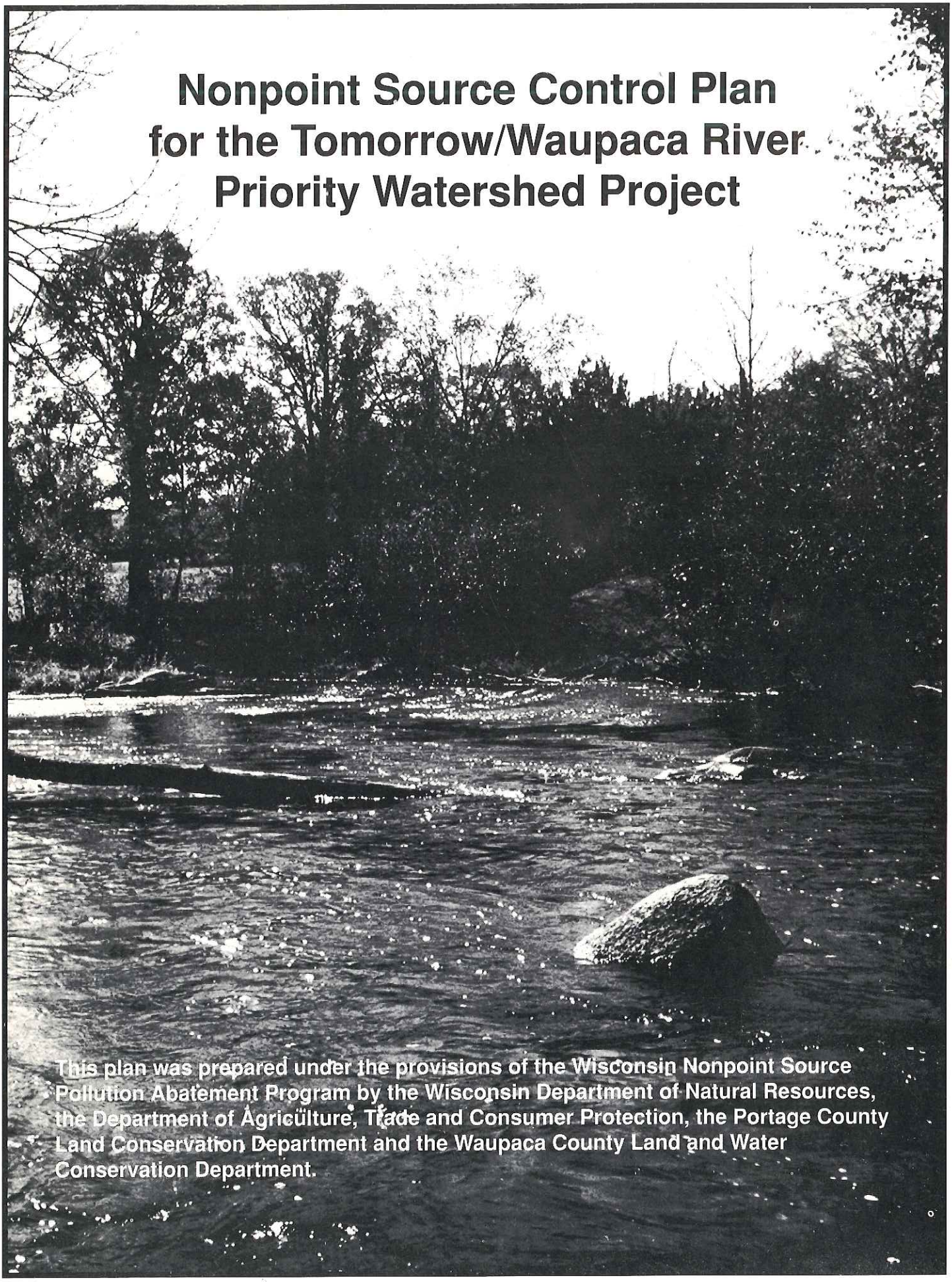
Nonpoint Source Control Plan for the Tomorrow/Waupaca River Priority Watershed Project



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, the Portage County Land Conservation Department and the Waupaca County Land and Water Conservation Department.

Watershed Plan Organization Information

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1995

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Nonpoint Source Control Plan for the Tomorrow/Waupaca River Priority Watershed Project

The Wisconsin Nonpoint Source Water Pollution Abatement Program

Plan Approved
October, 1995

This Plan Was Cooperatively Prepared By:

The Wisconsin Department of Natural Resources
Wisconsin Department of Agriculture, Trade and Consumer Protection
The Portage County Land Conservation Department
and
The Waupaca County Land and Water Conservation Department

Publication WR-434-95

For copies of this document please contact:

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The Department of Natural Resources acknowledges the Environmental Protection Agency's Region V Office for their involvement in the partial funding of this activity through Section 319 of the Water Quality Act.

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November 27, 1995

Mr. Leif Erickson, Chair
Portage County Land Conservation Committee
1516 Church Street
Stevens Point, WI 54481

Leif

Dear Mr. Erickson:

I am pleased to approve the Tomorrow/Waupaca River Priority Watershed Plan. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120, Wisconsin Administrative Code. This plan has been reviewed by the Department of Agriculture, Trade and Consumer Protection and was approved by the Land and Water Conservation Board. 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 necessary to support the project. 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 Portage County staff that participated in preparing the plan. I especially want to commend Steve Bradley for his work. We look forward to assisting Portage County and other units of government in the watershed in implementing the plan.

Sincerely,

George

George E. Meyer
Secretary

cc: Tim Victor - Portage County LCD
Tom Blake - NCD
Becky Wallace - WR/2
Cindy Hoffland - CA/8
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November 27, 1995

Mr. Ken Van Dyke, Chair
Waupaca County Land Conservation Committee
811 Harding
Waupaca, WI 54981

Dear ~~Mr.~~ Ken Van Dyke:

I am pleased to approve the Tomorrow/Waupaca River Priority Watershed Plan. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120, Wisconsin Administrative Code. This plan has been reviewed by the Department of Agriculture, Trade and Consumer Protection and was approved by the Land and Water Conservation Board. 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 necessary to support the project. 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. I especially want to commend Sarah Draak for her work. 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

cc: Bruce Bushweiler - Waupaca County LCD
Tom Blake - NCD
Becky Wallace - WR/2
Cindy Hoffland - CA/8
~~Karen Rahmeier - WR/2~~

RESOLUTION 115-94-96

TO THE HONORABLE CHAIRPERSON AND MEMBERS OF THE PORTAGE COUNTY BOARD OF SUPERVISORS:

RE: APPROVAL OF THE NONPOINT SOURCE CONTROL PLAN FOR THE TOMORROW/WAUPACA RIVER PRIORITY WATERSHED PROJECT

WHEREAS, the Portage County and Central Wisconsin area has become very sensitive to the need to protect its groundwater and surface water, and

WHEREAS, the Land Conservation Committee has limited resources to allocate to protection of the resource, and

WHEREAS, the Plan identifies the most sensitive areas of potential surface and groundwater contamination, and allocates Department of Natural Resources State NPS monies to these areas, and

WHEREAS, the Wisconsin Land and Water Conservation Board will be voting on this Plan on October 3, 1995,

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors of Portage County, Wisconsin goes on record supporting the Nonpoint Source Control Plan to be administered by the Portage County Land Conservation Committee.

Dated this 5th day of September, 1995.

Respectfully submitted,

LAND CONSERVATION COMMITTEE

(aye)	(aye)
Leif Erickson, Chairperson	Anthony Kiedrowski, Member
(aye)	(aye)
Richard Allen, Member	William Peterson, Member
(aye)	(aye)
Robert Brilowski, Member	Douglas Rendall, Member

RESOLUTION 23 (1995)

ADOPTING THE TOMORROW/WAUPACA RIVER NONPOINT SOURCE PRIORITY WATERSHED PLAN

TO THE WAUPACA COUNTY BOARD OF SUPERVISORS:

WHEREAS, the Tomorrow/Waupaca River Watershed was designated a priority watershed by the Department of Natural Resources in 1994 under the Wisconsin Nonpoint Source Water Pollution Abatement Program, and

WHEREAS, this project is a continuation of the Waupaca Co. Water Quality Program and compliments 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 1994 and 1995, 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 August 22, 1995, and

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

WHEREAS, the county wishing to receive cost sharing grants for landowners in the watershed must first adopt the Tomorrow/Waupaca River Watershed Plan.

NOW, THEREFORE BE IT RESOLVED, by the Board of Supervisors of the County of Waupaca, that the Tomorrow/Waupaca 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 100% by the State.

Passed this 26th day

of September, 19 95

25 ayes 0 nayes

ATTEST:

Mary A. Robbins

Mary A. Robbins

Approved As to Form:

Jeff Siewert
Corporation Counsel

Recommended for Introduction by:

WAUPACA COUNTY LAND AND WATER CONSERVATION DEPARTMENT

Donald L. Steenbock

SUMMARY

Introduction

This document summarizes the Nonpoint Source Control Plan developed for the Tomorrow/Waupaca River Priority Watershed Project. The full document will guide the implementation of nonpoint source control measures during the next ten years. These control measures are needed to meet specific water resource objectives for Tomorrow/Waupaca River and its tributaries.

The primary objective of the project is to reduce nonpoint source pollution and to enhance and protect the water quality of surface and groundwater in the watershed. The project is administered on the state level by the DNR and DATCP. The Portage County Land Conservation Department (LCD) and the Waupaca County Land and Water Conservation Department (LWCD) will administer the project on the local level with assistance from the University of Wisconsin-Extension and the Natural Resource Conservation Service (U.S. Department of Agriculture).

This summary describes the general characteristics of the watershed, water quality issues, sources of pollution and inventory results, project pollution reduction objectives, management actions and funds needed to meet the objectives, an implementation strategy, information and education plans, and the monitoring component to evaluate the project's success.

General Watershed Characteristics

The Tomorrow/Waupaca River Watershed drains 291 square miles of land in Portage, Waupaca and Waushara Counties in Central Wisconsin. The watershed is part of the Wolf River Basin. (Map S-1).

Land use in the watershed, as shown in table S-1, is mainly agricultural, and is currently a mixture of dairy livestock, non-irrigated cash crop and irrigated vegetable production. The watershed population is growing, and has approximately 13,000 people.

Map S –1.
Tomorrow / Waupaca River Priority Watershed

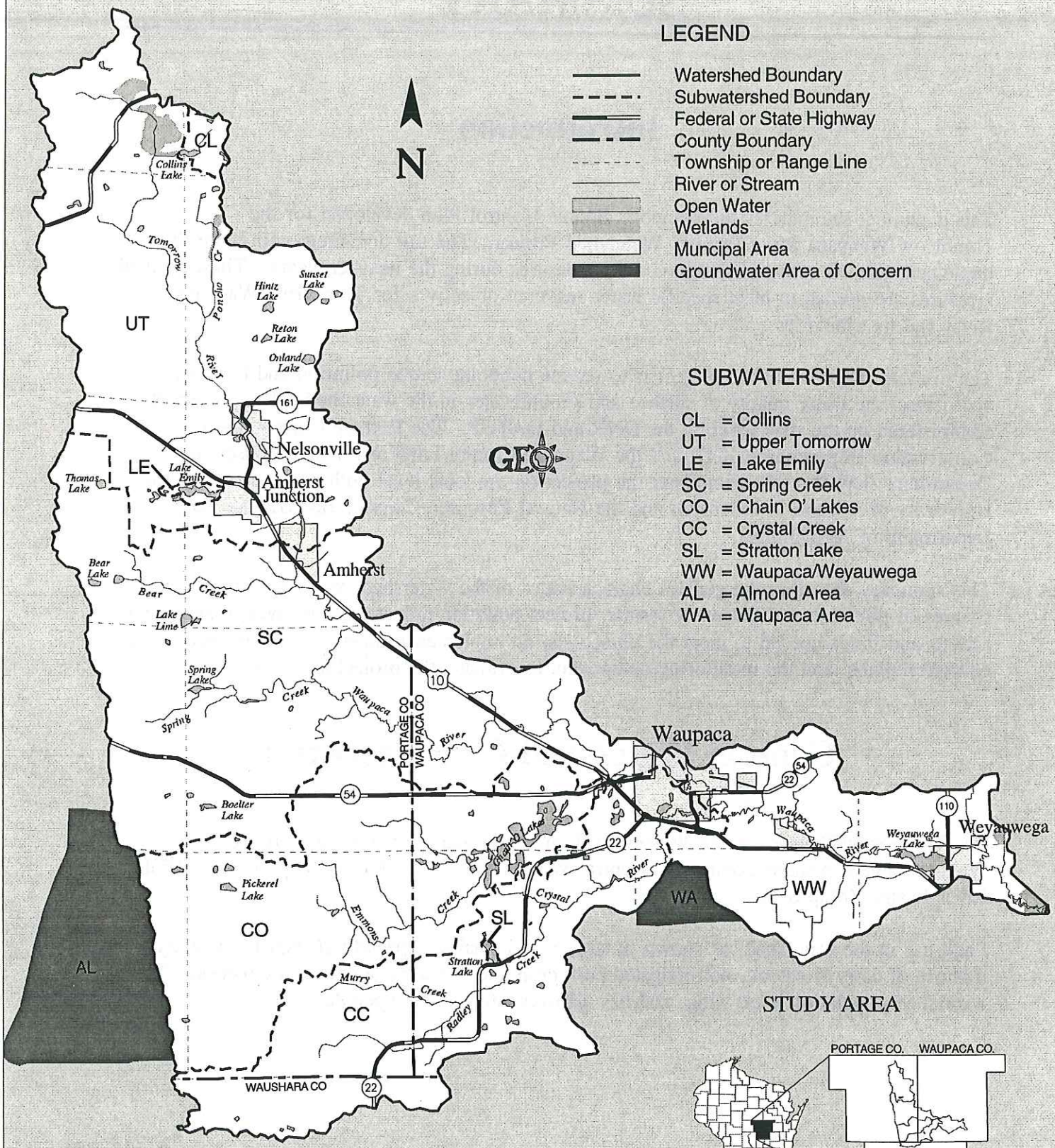


Table S-1. Land Use in the Tomorrow/Waupaca Watershed

Land Use	Percent of Watershed
Agricultural	55
non-irrigated	45
irrigated	10
Forest	35
Developed	5
Wetlands	5

Source: Portage and Waupaca Counties

Water Quality

The Tomorrow/Waupaca watershed supports a cold water sport fishery. Most of the surface waters are in good condition, with some degradation from nonpoint source pollution. Groundwater quality in the watershed is quite poor, and is the reason the project was selected.

Sources of Water Pollution

The Portage and Waupaca County LCD(s) collected data on all agricultural lands, barnyards, and streambanks in the watershed. These data were used to estimate the pollutant potentials of these nonpoint sources. The amount of phosphorus carried in runoff from each barnyard to a receiving stream was calculated. The amount of sediment reaching streams from eroding agricultural lands and streambanks was also determined. In the Tomorrow/Waupaca Watershed, about 60 percent of the sediment deposited in streams annually is derived from agricultural upland erosion. Forty percent of the sediment reaching streams originates from streambank erosion.

The following is a summary of the rural inventory results:

Barnyard Runoff Inventory Results

- 186 barnyards were assessed.
- These barnyards were found to contribute 2,985 pounds of phosphorus to surface waters and wetlands, annually.

Streambank Erosion Inventory Results

- 198 stream miles were inventoried
- 1,663 tons of sediment reach streams from eroding sites (40 percent of total sediment)
- There are 6 miles of eroding sites (3 percent of streambanks inventoried).

Upland Sediment Inventory Results

- 110,000 acres were inventoried.
- 2,445 tons of sediment are delivered to streams: (60 percent of total sediment).

Wetland Inventory Results

- 10,000 acres of wetlands inventoried.

Groundwater Inventory Results

- 137 Private well samples were taken.
- Existing well sample results were analyzed.
- The Farm Practices Inventory was conducted.

Pollutant Load Reductions

Pollutant load reductions are developed according to activities needed to achieve the water quality objectives. The following is a summary of reductions to be targeted for the entire watershed.

Sediment Goal: Reduce overall sediment delivered by 10 percent. To meet this goal, the following is needed:

- 10 percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- 15 percent reduction in streambank sediment delivered to all streams.

Phosphorus Goal: Reduce overall phosphorus load to surface water by 10 percent. To meet this goal, the following is needed:

- 10 percent reduction in organic pollutants from barnyards in all subwatersheds.

Nitrogen Goal: Reduce overall nitrogen load to groundwater.

This plan calls for pollutant reduction objectives of 10 to 15 percent due to relatively undegraded surface waters and fiscal restraints. However, greater reductions are possible, should participation rates of landowners increase. In the case of improved participation, the surface water and groundwater quality would be better protected and improved. To

encourage this protection, broad eligibility criteria were established. Eligibility criteria were set based on the professional judgement of the project team on what could cost-effectively reduce pollutants. Should all eligible landowners participate, pollutant reductions of 45 to 55 percent would be possible.

Table S-2 identifies the potential reductions possible if 100% of the eligible landowners participate.

Table S-2. Pollutant Reduction Potential

Pollutant Source	Pollutant Reduction Objective	With all eligible landowners participating reduction would be:
Upland Sediment	10%	45%
Streambank Sediment	15%	55%
Barnyard Nutrients	10%	40%
Excessive Nitrogen Application	Reduce nitrogen application	50%

Management Actions

Management actions are described in terms of best management practices (BMPs) that are needed to control nonpoint sources to the pollutant levels described above. Cost-share funds for installing pollutant control measures will be targeted at operations which contribute the greatest amounts of pollutants. Cost-share funds will be available through the Wisconsin Nonpoint Source Water Pollution Abatement Program for certain BMPs. These rates range from 50 to 70 percent and are listed in Wis. Adm. Code s. NR 120.18 and in the watershed plan.

The Portage and Waupaca County LCD(s) will contact all landowners who are eligible to receive cost-share funds during the project's 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 as either "critical," "eligible," or "ineligible." Designation as a critical site indicates that controlling that source of pollution is essential for meeting the pollutant reduction goals 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. Landowners with eligible sites need not control every eligible source to receive cost-share assistance.

The Portage and Waupaca County LCD(s) 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. County staff will also examine the need for Wellhead protection areas, which are surface and subsurface areas surrounding a water well or well field, supplying a public water system, through which contaminants area reasonably likely to move toward and the water source.

The following is a brief description of significant nonpoint pollutant sources, project eligibility criteria, and BMP design targets for the project.

Agricultural Lands

All agricultural lands contributing sediment to streams at a rate greater than 2.4 tons per acre per year will be classified as Critical for implementation and must be brought down to a rate below 2.4 tons per acre per year. This involves an estimated 155 acres of cropland, (207 tons, 7 landowners) or 4 percent of the upland sediment in the watershed. Eligible areas will include all lands contributing sediment to streams at a rate between 0.50 and 2.4 tons per acre per year. This involves 72 percent (3,968 tons) of the upland sediment in the watershed.

The BMPs identified by the County LCD(s) emphasize both improving farm management and controlling pollutants. Cost share rates are listed in NR 120 and included in the plan.

Animal Lots

Barnyards contributing greater than 120 pounds of phosphorus per year will be classified as critical for implementation and must be brought down to a rate below 120 pounds. This involves one barnyard (1 landowner). Eligible barnyards include those contributing between 30 and 120 pounds of phosphorus per year).

Streambanks

Project participants with identified sites contributing more than 250 tons of sediment per year (one landowner) will be Critical. Those contributing between 25 and 250 tons per year, will be Eligible. Overall, approximately 1,105 tons of sediment (9 landowners) from streambanks are eligible for control. This involves 66 percent of the streambank sediment.

There will be an emphasis on controlling bank erosion and improving fish and wildlife habitat in all subwatersheds, to enhance water quality and habitat conditions.

Critical Sites

There were 13 sites designated as "critical." In order to reach the water quality objectives of this plan these sites must be corrected, and if necessary, enforcement will be used. See table S-3 for a listing of critical sites.

Table S-3. Critical Sites

Pollutant Source	Number of Sites
Upland Sediment	11
Streambank Sediment	1
Barnyard Nutrients	1
Excessive Nitrogen Application	unknown

Funds Needed for Cost Sharing, Staffing, and Educational Activities

The DNR will award grants to Portage and Waupaca Counties for cost sharing, staff support and educational activities. Table S-4 includes estimates of the financial assistance needed to implement nonpoint source controls in the Tomorrow/Waupaca Watershed, assuming a 75 percent participation rate of eligible landowners.

Table S-4. Cost Estimates for the Tomorrow/Waupaca Priority Watershed Project

Eligible Activity	Total Cost	State Share
Cost Sharing	$6,196,051	$3,973,088
Easements	487,500	487,500
County(s) Staffing	1,261,580	1,261,580
Educational Activities	30,000	30,000
Other Direct	60,000	60,000
Urban Non-structural Practices	60,000	60,000
Engineering Assistance	13,000	13,000
Totals	$8,108,131	5,855,168

* Estimates based on 100% participation.

Project Implementation

Project implementation is scheduled to begin in 1995. Participants may sign cost-share agreements throughout the implementation phase, but all practices on the agreement must be installed before the project is scheduled to end. Landowners must maintain practices for at least ten years from the installation of the final practice on the agreement. BMPs can be installed as soon as a landowner signs a cost-share agreement with wither Portage or Waupaca County.

Information and Education

The County LCD(s) will have overall responsibility for conducting an information and education program during the project. University of Wisconsin-Extension staff in the county will provide assistance. This program will be most intense during the first four years of the project with activities then tapering off. The activities will include BMP demonstrations, tours, newsletters and public meetings.

Project Evaluation and Monitoring

The evaluation strategy for the project involves collecting, analyzing and reporting information to track progress in three 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 LCD(s) will track the progress in this area and report to the DNR and DATCP annually.

2. **Pollutant Reduction Levels**: The LCD(s) will calculate the reductions in nonpoint source pollutant loadings resulting from changes in land use practices and report to the DNR and DATCP at an annual review meeting.

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

CHAPTER ONE
Plan, Purpose and Legal Status

Wisconsin Nonpoint Source Water Pollution Abatement Program

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 291-square-mile Tomorrow/Waupaca Watershed, located in Portage, Waupaca and Waushara Counties, was designated a "priority watershed" in 1993. The primary objective of this project is to reduce nonpoint source pollution loads to the surface waters and groundwater and to enhance and protect the water quality watershed.

Legal Status of the Nonpoint Source Control Plan

The Tomorrow/Waupaca 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, land conservation departments for Portage and Waupaca counties.

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.

Similarly, this plan is subject to the amendment process under NR 120.08(e) for substantive changes. The DNR will make determination if a proposed change will require a plan amendment. 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.

Plan Organization

The remainder of this plan covers three areas: the watershed assessment (Chapters Two, Three and Four), a detailed program for implementation (Chapters Five, Six and Seven), and project evaluation (Chapters Eight and Nine). The contents of each chapter are described below.

The Watershed Assessment

Chapter Two. "General Watershed Characteristics," is an overview of the cultural and natural resource features pertinent to planning and implementation efforts for the priority watershed project.

Chapter Three. "Water Quality Conditions, Objectives and Nonpoint Pollution Sources," presents field inventory results and identifies the water quality or water resource problems and improvements that can be obtained through implementing a nonpoint source control project. This chapter discusses the level of pollutant control needed to achieve the water resource objectives, and describes the nonpoint sources and other sources of pollution.

Chapter Four. "Management Actions," identifies the level of urban and rural nonpoint source control needed to meet the water quality objectives. Eligibility criteria for funding to control nonpoint sources under the priority watershed project are also presented.

A Detailed Program for Implementation

Chapter Five. "County Implementation Program," describes how local units of government administer the project, and estimates a local assistance and management practice cost-share budget.

Chapter Six. "Information and Education Program," describes techniques and activities for increasing awareness and understanding of water resources in the watershed, principles of nonpoint source pollution, best management practices and the priority watershed project in general.

Project Evaluation

Chapter Eight. "Progress Assessments," discusses how to access the amount of nonpoint source control gained through installation of best management practices in the watershed.

Chapter Nine. "Evaluation Monitoring," presents a monitoring strategy and schedule to determine the water quality impacts of implementing nonpoint source controls in the Tomorrow/Waupaca Watershed.

Other Resources Relating to this Plan

The Wolf River Areawide Water Quality Plan (1991, PUBL-WR-281-91) gives an overview of water quality in the watersheds near the Tomorrow/Waupaca Watershed. Administrative Code NR 120 provides the basis for the watershed program. A *Watershed Planner's Guide* (DNR, 1995) provides further guidance.

CHAPTER TWO
General Watershed Characteristics

Location

The Tomorrow/Waupaca Watershed is a 291-square-mile drainage basin located roughly between Stevens Point and Appleton, in central Wisconsin (map 2-1). It was selected as a priority watershed in 1993. Approximately 189 square miles (65%) of the watershed are in Portage County, 93 square miles (32%) in Waupaca County and 9.5 square miles (3%) located in Waushara County. The watershed includes approximately 80 named lakes, including the Chain O' Lakes. Several rivers are also included in the watershed. The main river is called the Tomorrow River in Portage County, and becomes the Waupaca River in Waupaca County. The Tomorrow/Waupaca Watershed is within the Wolf River sub-basin (map 2-2).]

Topography, Geology and Soils

The relief in the region is largely flat, with several small hills. Over half of the area is internally drained, with surface waters flowing to potholes and small ponds. A glacial moraine ended approximately at the Portage/Waupaca county boarder, with Portage County receiving more rocks and sands from the outwash than Waupaca County. Most of the watershed has extremely sandy soils.

Cultural Features

Civil Divisions

The Tomorrow/Waupaca Watershed lies within Portage, Waupaca and Waushara Counties. Incorporated areas in the watershed include the cities of Waupaca and Weyauwega, villages of Amherst, Amherst Junction , Nelsonville and Almond. Public land within the watershed can be found at the three State Fishery Areas: Tomorrow River, Radley Creek and Emmons Creek. Also within the watershed in Hartman Creek State Park, Myklebust State Natural Area, and Richard Hemp Fish and Wildlife Area.

Population Size and Distribution

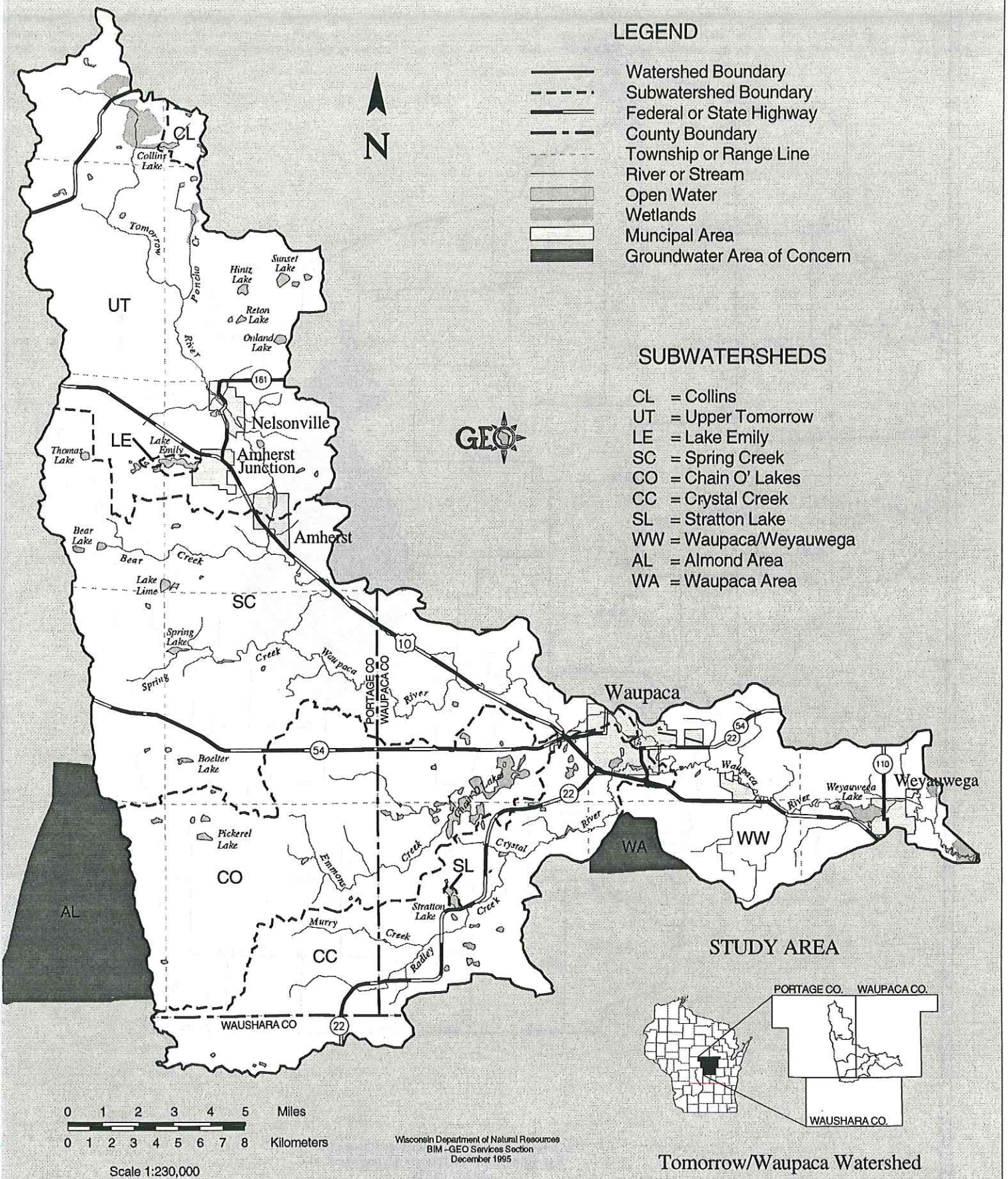
The Tomorrow/Waupaca River Watershed population is estimated to be about 13,000 persons. Most of the watershed population lives in urban or suburban areas. Population growth rates in the watershed are increasing. In Portage County, the villages of Amherst and Amherst Junction had population increases over the past decade of 13 and 20 percent respectively. The villages Almond and Nelsonville declined in population over the past decade 5 and 16 percent respectively. The townships of Amherst, Belmont, Buena Vista, Lanark, New Hope, Sharon, and Stockton had growth rates over the past decade of 10 percent, with the exception of Almond Township which had a population decline of 6 percent.

In Waupaca County, the cities of Waupaca and Weyauwega populations grew over the past decade of 11 and 7 percent respectively. The townships of Dayton, Farmington, Lind Royalton, Waupaca, and Weyauwega had growth rates over the past decade of 17 percent. Regional trends suggest that the watershed's population will continue to increase.

Land Uses

Rural land uses dominate in the watershed. Agriculture is the most important land use, comprising 55 percent. Dairy farming and dry land agriculture are the primary enterprises, with the average farm size 250 acres. Irrigated vegetable production is also an important land use with approximately 20,000 acres. Woodlands are abundant and cover 35 percent of the land area. Developed land uses occupy 5 percent of the watershed (table 2-1).

Map 2 –1.
Tomorrow / Waupaca River Priority Watershed



Map 2-2. Wolf River Basin

Wisconsin Department of Natural Resources
Bureau of Water Resources Management
January 1996

Table 2-1. Tomorrow/Waupaca River Watershed Land Use (acres)[1]

	Non IRR AG[2]	%	IRR AG[3]	%	Forest	%	Wetland	%	Developed	%	Total
Collins Lake	327	31	320	30	307	29	53	5	53	5	1,060
Upper Tomorrow	18,278	39	1,600	3	21,770	46	4,259	9	1,420	3	47,327
Lake Emily	183	45	0	0	182	45	8	2	32	8	405
Spring Creek	27,591	53	3,115	6	17,406	33	1,794	3	2,390	5	52,296
Almond Area	1,000	8	8,960	70	2,432	19	24	<1	384	3	12,800
Chain O' Lakes	16,931	50	2,205	7	10,921	32	1,673[4]	5	2,089	6	33,819
Crystal River	12,986	43	3,860	13	11,598	38	302	1	1,512	5	30,258
Stratton Lake	0	0	0	0	99	80	0	0	25	20	124
Waupaca	10,813	62	0	0	4,039	23	1,656[4]	9	1,054	6	17,562
Weyauwega	1,839	48	0	0	1,111	29	575	15	306	8	3,831
TOTAL	89,948	45	20,060	10	69,865	35	10,344	5	9,265	5	199,482

[1] Based on 1994 Statistical Report of Property Valuations (rough estimate based on tax parcels)
[2] There are 296 non-irrigated ag landowners (163 cash crop and 133 livestock with more than 20 animal units)
[3] There are 36 irrigated landowners in the Watershed
[4] Includes surface water acreage in Waupaca Co.

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. A list of species present in the watershed is included in Appendix A. For more information, refer to the *Watershed Planner's Guide* (DNR, 1995). Endangered and threatened resources should be protected during installation of BMPs.

CHAPTER THREE
Water Quality Conditions, Nonpoint Sources and Resource Objectives

Introduction

Topics covered in this chapter include:

- major nonpoint source pollutants
- establishment of water quality objectives
- results of nonpoint source inventories
- individual subwatershed's general characteristics
- amount of pollutant control necessary to achieve desired water resource conditions
- other potential pollutant sources

Major Nonpoint Source Pollutants

Major nonpoint source pollutants are nutrients (such as phosphorus and nitrogen sediment, and toxics (such as metals and chemicals). These are further described in *A Watershed Planner's Guide* (DNR, 1995).

Groundwater Quality

The condition of groundwater in the Tomorrow/Waupaca Watershed is a concern. As part of the *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995), private well samples were collected and analyzed for nitrate + nitrite. Sample analytical results are summarized in table 3-1. Samples analyzed for nitrate + nitrite showed concentrations ranging from not detected to 40 parts per million or one milligram per liter (mg/L). The groundwater enforcement standard (ES) for nitrate is 10 mg/L. Nitrate + nitrite concentrations above 2 mg/L exceed the states preventive action limit (PAL).

Enforcement Standard (ES) Health Advisory Level: The concentration of a contaminant at which the enforcing agency, either the Department of Industry, Labor & Human Relations, the DATCP, or DNR, must take action.
Preventative Action Limit (PAL): A lower concentration of a contaminant than the Enforcement Standard, the PAL is a warning that human activities are affecting groundwater quality.

Thirty-nine samples (28 percent) exceeded 10 mg/L and 116 (85 percent) of the samples exceeded 2 mg/L. Results so far do not indicate a pattern of groundwater contamination that can be linked to specific sources of nitrate.

Table 3-1. Well Sampling Results: Tomorrow/Waupaca Watershed

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	%	Total
Upper Tomorrow	1	4%	19	70%	7	26%	27
Spring Creek	1	4%	23	85%	3	11%	27
Chain O' Lakes	1	17%	1	17%	4	67%	6
Crystal Creek	2	29%	4	57%	1	14%	7
Waupaca-Weyauwega	9	53%	4	24%	4	24%	17
Almond	7	13%	26	49%	20	38%	53
Totals	21	15%	77	56%	39	28%	137

Note: Samples were taken primarily from sites having livestock operations.

Summary of Watershed Conditions

Groundwater

The Stevens Point area, including parts of the Tomorrow/Waupaca Watershed, is one of the most studied and best understood areas of the state in terms of groundwater. Studies have been conducted by the University of Wisconsin-Stevens Point, the Central Wisconsin

Groundwater Center, the Plover-Whiting Wellhead Protection Project, the DNR-funded Port Edwards Groundwater Project, the Natural Resource Conservation Service (NRCS, formerly SCS) Golden Sands Resource Conservation and Development office, the Waupaca County Waterwise Program, and numerous other county or private organizations.

The interaction between surface water and groundwater is complex, making it difficult to draw conclusions about how one affects the other. This plan strongly encourages more research in this area. Furthermore, the connection between land use practices and groundwater quality is difficult to prove, except in intensely monitored research areas. Such research is expensive, and beyond the scope of this watershed project.

Therefore, the observations made and conclusions drawn in this watershed plan should be taken as a first attempt to improve groundwater quality in the watershed. It is expected that knowledge and technology will improve throughout the life of the watershed project, and that new information might change the recommendations in this plan.

Existing groundwater information

In general, groundwater quality in this watershed is poor, and is a primary reason why the watershed was selected by the DNR as a "priority" watershed. A high percentage of private wells in Portage County exceed the healthy standard for nitrates. Additionally, one of Waupaca's municipal wells has a nitrate level just below the health standard.

The sandy excessively drained soils common in this watershed allow for rapid infiltration of water to groundwater. Because water moves quickly from the surface to groundwater, contaminants in the soil and water—such as pesticides—are not removed as they would be in soils with more clay. Land use activities have more of an impact on groundwater quality in this watershed then in other areas where soils are better able to filter out the contaminants.

Because water infiltrates rapidly, lakes and streams are fed mainly by groundwater rather than surface water runoff. In Wisconsin's surface water, the inorganic forms of nitrogen (ammonia and nitrite/nitrate) are normally less than 0.3 mg/L. Some surface water samples collected during low flow conditions in the Tomorrow/Waupaca watershed had nitrate levels greater than 2.0 mg/L. These unusually high nitrate levels suggest that land use is affecting groundwater quality and that lakes and streams may be receiving nitrate from groundwater.

For a description of geology, soils and land use, see Chapter 2 or the *Watershed Planner's Guide* (DNR, 1995). More information is also available in the *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995).

Groundwater Goals and Objectives

One overall goal of this watershed project is to improve and protect groundwater quality. As a step toward achieving these goals, watershed project staff seek to improve groundwater quality to the point that all well samples show nitrate concentrations below the PAL of 2 mg/L. Given the sandy porous soils and existing land uses within the watershed, this

objective will be difficult to obtain. Further, recognizing that it may take decades to noticeably improve groundwater quality, and that local efforts to improve groundwater quality will continue beyond the ten-year term of this watershed project, watershed project staff have set 10-year and 30-year groundwater quality objectives.

State law requires that all groundwater be protected equally—to a level at which it is safe to drink. However, given this watershed's significant groundwater contamination, susceptible soils, and land use practices, watershed project staff found it necessary to set priorities for groundwater protection. For example, ore resources will be devoted to protecting the groundwater currently used for drinking water than will be devoted to protecting the groundwater known to recharge area lakes.

Data directly linking land use practices and groundwater quality will bolster information and education efforts designed to change landowner behavior. Continued well testing and the development of a Geographical Information System (GIS) designed to analyze the relationship between land use practices and well test results will likely improve the groundwater quality in the watershed.

Much effort went into developing groundwater goals and objectives. Watershed staff recommend that the following table (3-2a) be used by DNR and others to better monitor and protect/improve groundwater quality.

For the purposes of this watershed project, the table serves as a guide of what would optimally be done. Because fiscal restrictions may limit what the watershed project will fund, additional funding sources are listed in the table. However, numerous groundwater protection BMPs are eligible for cost-sharing in this project, and are further described in Chapter 4. Planned expenses and funding for groundwater BMPs are listed in Chapter 5.

In this watershed plan, Chapter 3 is written from the point of view from the water. Chapter 4 is written from a land management perspective. Chapter 6 is written from a landowner behavioral and educational perspective. This plan attempts to tie all those perspectives together, in an effort to improve water quality.

Chapter 3 gives specific water quality nitrogen goals and objectives that are measurable through water chemistry sampling and monitoring. Chapter 4 gives fairly broad water quality goals and objectives that are indirectly measurable through numbers of BMPs installed and through computer models. Chapter 6 gives specific nitrogen application and reduction objectives that are measurable through educational tools.

This watershed project will be evaluated through several avenues, such as those described in Chapters 3, 4, and 6.

Table 3-2a. Groundwater Goals and Objectives for the Tomorrow/Waupaca Watershed

Well or Water Body Type	10-Year			30-Year			Possible Funding Sources
	Objective	Evaluation Strategy	Estimated Cost (annual)	Objective	Evaluation Strategy	Total Cost 30 years	
High Capacity Irrigation Wells	Nitrate levels in high capacity irrigation wells to below ES at 10ppm. Atrazine and other pesticide levels in high capacity irrigation wells are less than Health Advisory Standards (ES).	Water chemistry monitoring is conducted twice per year at selected high capacity irrigation wells.	$2,000 ($40/test)	Reduce nitrate to 5 ppm or less. Reduce other chemicals to PAL or below.	5 year incremental monitoring of 50 high capacity irrigation wells.	Approx. $8,000	DNR, County
Municipal Wells	Nitrate levels in all municipal wells are less by 25%. Atrazine and other pesticides levels in municipal wells reduced by 25%.	Water chemistry monitoring is conducted annually at 10 selected municipal wells.	$600 ($40/test)	Reduce nitrate levels to below PAL. Reduce other chemicals to below PAL.	5 year incremental monitoring of 10 municipal wells.	Approx. $2,400	City or local municipality[5]
Municipal Wellhead Recharge Areas	Recharge areas of municipal wells are better protected. Nitrate and pesticide levels are reduced.	Land easements or direct purchase is used to restrict land use in recharge areas that are within the 1 year zone of influence of municipal wells[6].	Approx. $50,000	Recharge areas of municipal wells are better protected. Nitrate and pesticide levels are reduced.	Purchase land or easements to restrict land use in recharge areas that are within the 5 year zone of influence of municipal wells	Approx. $1 million	DNR, County
Groundwater-fed streams[1]	Nitrates levels in groundwater are reduced by an average of 1 ppm. Atrazine and other pesticides levels in groundwater are reduced by 50 %	Winter low-flow water chemistry monitoring of selected streams (approximately 40) is conducted annually for the duration.	$4,000	Nitrate levels in all groundwater-fed streams to PAL. Atrazine and other pesticides in groundwater-fed streams are below the PAL[2].	Annual monitoring of 40 streams.	Approx. $80,000	EPA, County, DNR, Lake Districts/Associations, Watershed Associations.
Lakes	Nitrate levels in lakes are reduced by 1 ppm. Atrazine and other pesticide levels in lakes reduced by 50%.	Spring and fall water chemistry monitoring of 35 named lakes with public access is conducted annually.	$6,300 ($180/test)	Nitrate levels in lakes are less than PAL. Reduce other chemicals to below PAL.	Annual spring and fall monitoring of 35 named lakes with public access	Approx. $126,000	Lakes Dist/Assn. DNR, County, EPA.
Private Wells[3]	Reduce nitrate levels to less than ES. Atrazine and other pesticide levels in private wells are less than the PAL.	Spring and/or fall water chemistry annual monitoring of 200 private wells is conducted.	$8,000	All private wells have nitrate levels below 5 ppm. All private wells have atrazine levels to below the PAL.	Annual monitoring of 200 private wells.	Approx. $160,000	Private land owner, County, Lake Dist/Assn.

Table 3-2a. Groundwater Goals and Objectives for the Tomorrow/Waupaca Watershed (Cont.)

Well or Water Body Type	10-Year			30-Year			Possible Funding Sources
	Objective	Evaluation Strategy	Estimated Cost (annual)	Objective	Evaluation Strategy	Total Cost 30 years	
All Groundwater and Surface Waters	GIS is used to make fast, accurate, useful water quality recommendations and to evaluate specific water quality objectives. GIS will facilitate making the necessary link between existing and expected future land use practices and water quality. GIS will allow comparisons of improvements in land management practices on a subwatershed basis.	A joint DNR-University-County GIS is established. The Waupaca Area Storm Water/Land Management Planning effort is entered onto a GIS by June, 1996. One full time GIS person is hired by June, 1996. GIS-assisted water quality recommendations supplement the watershed plan by June, 1997.	$25,000	The usefulness of GIS for making water quality recommendations and measuring water quality improvements is demonstrated on a subwatershed basis.	n.a.	$250,000	County, WI Land Records Board, DATCP, UW, DNR.

[1] Sampled just prior to snow-melt in the spring
[2] The PAL (Preventative Action Limit) for Atrazine is 0.3 μg/l. The ES (Enforcement Standard) for Atrazine is 3.0 μg/l. The PAL for Nitrates is 2.0 mg/l. The ES for Nitrates is 10.0 mg/l.
[3] In the City of Waupaca, approximately 30% of the homes served by municipal wells also have private wells.
[4] Assumed natural background level of nitrates is 2.0 ppm.
[5] Sampling is currently being done as part of DNR permit.
[6] Wellhead protection areas currently exist or are being pursued in Amherst, Weyauwega and Waupaca.

Surface Water

For methods used to collect data, see the *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995)

The Tomorrow/Waupaca watershed ranked as a medium priority for streams and high for groundwater under the Nonpoint Source (NPS) Priority Watershed selection process. There was insufficient data on the majority of lakes within the watershed to include them in the above ranking.

The surface waters of this watershed appear to be in good condition. Most of the river and its tributaries are well buffered by natural vegetation. However, there are specific problem areas of streambank erosion, terrestrial and aquatic habitat loss, sedimentation and organic loading from animal waste. Also, there are impoundments located on the main stem of the river at the cities of Amherst and Weyauwega, and two small impoundments located on the tributaries Spring Creek and Crystal River. These impoundments eliminated instream habitat and cause elevated summer water temperature variations detrimental to trout below the impoundments.

Table 3-2b summarizes the conditions of the surface waters, and water resource goals and objectives. A brief look at each subwatershed follows. More detail can be found in the appraisal report mentioned above.

Lakes

For methods used to collect data, and for characteristics of particular lakes, see the "Waupaca County Lake and Stream Priority Watershed Appraisal for the Tomorrow/Waupaca Watershed" (DNR, Rasman, 1995). There are more than 80 named lakes in the watershed. The water quality conditions varies by lake.

A survey of riparian landowners along lakes and rivers within the Tomorrow/Waupaca Watershed was conducted to ascertain ownership patterns. In Waupaca County, the Chain O' Lakes has 220 (27%) permanent residences and 600 (73%) seasonal residences. The same pattern is evident around Stratton Lake, where approximately 22 (22%) residences are permanent and 78 (78%) are seasonal. Along the Waupaca and Crystal Rivers the opposite is true. A vast majority of residences are permanent along these two waterways.

In Portage County, the 40-plus lakes within the watershed exhibit differing results, ranging from little or no development to full development, and from permanent to seasonal residences. According to the Portage County Planning and Zoning office, seasonal residences are more highly clustered on heavily developed lakes within the watershed while lakes with little to moderate development tend to house more permanent residences.

Table 3-2b. Surface Water Resources Conditions, Goals, Objectives for Subwatersheds in the Tomorrow/Waupaca River Watershed

Subwatershed	Stream Name	Length (Miles)	Biological* Use (Miles)	NR 102 OR/ERW	Limiting Factors	Observed or Potential Sources	Surface Water Resource Goals	Surface Water Resource Objectives
	Tomorrow/ Waupaca R.	0–32.6 32.6–45.8 45.8–49.3 49.3–56.0 56/0–69.3	WWSF/32.6 COLD/13.2 CLASS II COLD/3.5 CLASS I COLD/6.7 CLASS II COLD/13.3 CLASS I	 ORW ERW ORW	SED,NUT HAB	CL,SB,BY PSB	—Maintain and improve wildlife habitat —Maintain and improve aquatic life habitat and water quality	—Preserve wetland and woodland corridors —Keep livestock out of streams —Preserve wetland and woodland buffer strips —Control runoff
Chain O' Lakes	Allen Creek Carden Feeder Emmons Creek Hartman Creek	4 1 9 2	COLD/4 CLASS I COLD/1 CLASS I COLD/9 CLASS I WWSF/2	 ERW ERW ORW	SED,NUT, HAB	SL,	—Maintain and improve wildlife habitat —Maintain and improve aquatic habitat and water quality —Reduce nutrient and sediment loading from shoreline development —Preserve migrating strain of brown trout in Emmons Cr. and Chain O' Lakes	—Stabilize eroding shorelines —Educate shoreline property owners on proper riparian ownership —Preserve wetland and woodland corridors —Preserve wetland and woodland buffer strips
Crystal River	Crystal River Murray Creek Naylor Creek Radley Creek	0–2 2–13 4 1 13	WWSF/2 COLD/11 CLASS II COLD/4 CLASS I COLD/1 CLASS I COLD/13 CLASS I	 ERW ERW ORW	SED,NUT HAB	CL,NPS	—Maintain and improve wildlife habitat —Maintain and improve aquatic habitat and water quality	—Preserve wetland and woodland corridors —Preserve wetland and woodland buffers —Control runoff

Table 3-2b. Surface Water Resources Conditions, Goals, Objectives for Subwatersheds in the Tomorrow/Waupaca River Watershed

Subwatershed	Stream Name	Length (Miles)	Biological* Use (Miles)	NR 102 OR/ERW	Limiting Factors	Observed or Potential Sources	Surface Water Resource Goals	Surface Water Resource Objectives
Spring Creek	Bear Creek	0—1.4	COLD/1.4 CLASS II		SED,NUT HAB	CL,SB,BY PSB	—Protect Calcareous Fen community —Maintain and improve wildlife habitat —Maintain and improve aquatic habitat and improve water quality —Protect Stedman Creek's valuable spawning habitat —Reduce sediment, phosphorus and nitrogen loading to Spring Lake	—Install Conservation Easements and/or through education —Preserve wetland and woodland corridors —Preserve wetland and woodland buffer strips —Limit livestock access to Bear and Mack Creeks and associated headwater wetlands —Control runoff
		1.4—8	COLD/6.6 CLASS I	ERW				
	Mack Creek	2	COLD/2 CLASS I	ERW				
	Spring Creek	0—3.5	WWSF/1.5					
		3.5—5	COLD/3.5 CLASS I	ERW				
	Stedman Creek	2	COLD/2 CLASS I	ERW				
	Upper Spring Cr.	1	COLD/1 CLASS I	ERW				
Upper Tomorrow	Eske Creek	1	UNK.		SED,NUT HAB	CL,SB,BY PSB	—Maintain and improve wildlife habitat —Maintain and improve aquatic life habitat and water quality	—Preserve wetland and woodland corridors —Keep livestock out of Tomorrow River —Control runoff
	Poncho Creek	5	COLD/5 CLASS I	ERW				
	Stoltenburg Cr.	3	COLD/3 CLASS I	ERW				
Waupaca/ Weyauwega	Unn. Tributary (T22n—R12E —S35,SE SE)	1	UNK.		SED,NUT HAB	CL,SB,PSB, SL	——Maintain and improve wildlife habitat —Maintain and improve aquatic life habitat and water quality —Reduce nutrient and sediment loading from shoreline development	—Preserve wetland and woodland corridors —Control runoff —Stabilize eroding lake shoreline banks

***Biological Use**
COLD/ - cold water trout stream
CLASS I - populations are sustained entirely by natural reproduction
CLASS II - some natural reproduction, but may need stocking to maintain a desirable fishery
WWSF - Warm water sport fishery

Limiting Factors
HAB - Habitat (lack of cover, sedimentation, scouring, etc.)
SED - Sedimentation (filling of pools)
NUT - Nutrient enrichment

NR 102 Overview
ORW - Outstanding resource waters as defined by NR 102
ERW - Exceptional resource waters as defined by NR 102

Observed Potential Factors
NPS Unspecified nonpoint source
CL - Cropland erosion
SL - Shoreline erosion
SB - Streambank erosion
PSB - Streambank pasturing

BY - Barnyard or exercise lot runoff
SEP - Septic systems
UNK - Unknown

Length
River miles are measured from the mouth of the stream to the headwaters

With these results in mind, the following goals can be developed to aid in the enhancement of water quality around lakes in the watershed:

Lake Goals for All Lakes within the Tomorrow/Waupaca Watershed

1. Monitor nitrate levels within the lakes and if they exceed 2 ppm, and can be attributed to septic systems, explore alternative methods of septage control, including sanitary sewer systems.
2. Educate homeowners on the lakes concerning the use of herbicides, pesticides, and fertilizers and their effects on water ecosystems.
3. Promote shorescaping practices, including buffer strips or vegetative buffer zones and erosion control practices on steep slopes.
4. Address well abandonment concerns and issues.
5. All named lakes in the watershed should be considered for evaluation and implementation of best management practices from the program.
6. The large number of lakes and streams where there is no data should be monitored to gauge any change in water quality over the life of the project.
7. Design public boat landings to incorporate water diversions and other best management practices to handle runoff water. Most public landings provide direct drainage from roads and other impermeable surfaces to lakes. The improved design could greatly reduce nutrient and sediment delivery to many lakes.
8. Monitor pesticide levels within lakes.

Results of Nonpoint Source Inventories

Barnyard Runoff

Runoff carrying a variety of pollutants from barnyards and other livestock feeding, loafing, and pasturing areas is a significant source of pollutants in the streams of the Tomorrow/Waupaca Watershed. Livestock operations comprised of 186 animal lots load 2,985 pounds of phosphorus, per year (table 3-3) to surface waters and wetlands. Most of the oxygen-demanding pollutants and nutrients associated with these operations drain via concentrated flow to creeks and wetlands. An additional 137 animal lots drain directly to groundwater. These operations contribute significant levels of nitrogen to the groundwater.

Table 3-3. Barnyard Inventory Results: Tomorrow/Waupaca Watershed

Subwatershed	Number of Barnyards Draining To Surface Water	Total Phosphorus[1] (lbs)	Percent Watershed P Load	Number of Barnyards Draining to Groundwater[2]
Upper Tomorrow	30	704	30	56
Collins Lake	0	0	0	0
Lake Emily	0	0	0	0
Spring Creek	39	991	43	41
Almond Groundwater Area	2	29	1	3
Chain O' Lakes	4	64	3	12
Crystal River	5	108	5	7
Waupaca	15	381	16	9
Weyauwega	4	57	2	1
Stratton Lake	0	0	0	0
Totals	99	2,334	100	129

[1] Based on Annual Phosphorus Loads, BARNY model
[2] Based on number of animals on lot

Sources: Portage and Waupaca County LCDs, DNR and DATCP

Upland Sediment

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

Topography in this watershed includes many internally drained areas, wetlands, and well-buffered streambanks. Because of this topography, and because this project was selected as a groundwater project (surface water quality is higher than in typical priority watershed projects), the WINHUSLE computer model for upland sediment was used only in one subwatershed (Weyauwega). A spreadsheet to estimate upland sediment delivery was created by staff from NRCS, LCD, DNR and DATCP for use in this watershed. The upland sediment numbers in this watershed plan are best used to compare different sites within this watershed, rather than to compare with other priority watershed projects.

The results of this inventory are summarized in table 3-4. An estimated 2,445 tons of soil per year are delivered to wetlands or streams in the watershed from croplands. Uplands are the source of 60 percent of the sediment delivered to surface waters.

Table 3-4. Summary of Upland Sediment Loading Tomorrow/Waupaca Watershed

Subwatershed	Sediment delivered to streams (tons)[1]
Upper Tomorrow	769
Spring Creek	2,278
Chain O' Lakes	331
Crystal River	250
Waupaca	1,449
Weyauwega	215
Totals	5,300

[1] Calculated from modified Universal Soil Loss Equation

Sources: Portage and Waupaca County LCDs.

Streambank Erosion

Streambank erosion contributes 40 percent of the total sediment to surface waters in the Tomorrow/Waupaca Watershed. Approximately 198 miles of streams were evaluated. Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 6 miles of streambank. An estimated 1,663 tons of sediment are eroding into streams annually. See table 3-5 for streambank inventory results.

Table 3-5. Streambank Erosion[1]

	Total Length (Ft)	Degraded Length[1] (E+T+S)[3]	Percent Degraded	Sediment Loss (T/Yr)	Trampled Length
CO	No Streams				
UP	210,409	3,370	2	58	2,070
EM	No Streams				
SP	289,808	6,480	2	65	4,400
AL	No Streams				
CH	115,130	0	0	0	0
CR	246,138	3,125	1	78	200
ST	No Streams				
WA[2]	102,474	13,075	13	1,196	0
WE[2]	80,142	7,950	10	266	0
TOTAL	1,044,101	31,600	3	1,663	4,670

[1] Does not include erosion from streambank undercutting
[2] No erosion due to livestock access but steep (30-40 ft) and sandy banks are typical in the Waupaca subwatershed. Also, water level fluctuations (as much as 4 ft.) are common of the Waupaca River because of dams in the cities of Waupaca and Weyauwega.
[3] Eroded, trampled and slumped

Spreading of Manure

Spreading of manure, and any over-application of manure, including stacking on sandy soils, is a water quality concern. In this watershed, the greatest concern is that excessively drained soils provide a rapid conduit for nutrients to contaminate groundwater. Most of the soils found in the watershed are sandy. An inventory using the Manure Storage ranking Worksheet Guide was conducted to identify those sites most susceptible to groundwater contamination from over-applied manure. Those soils with permeability rates greater than six inches per hour were considered the greatest risk.

In this watershed, autumn is the most critical period for groundwater protection. Nitrogen leaching to groundwater is greatest on sands and loamy sands until the soil temperature drops below 50°F.

Although winter-spreading of manure is a major concern, in this watershed over half the barnyards drain directly to groundwater, and therefore, fall-spreading of manure is a greater concern.

One hundred-seventy-one (171) livestock operations were inventoried. Of these, 57, or 27%, were considered to be extremely high risk for groundwater contamination.

Urban Nonpoint Sources

Urban runoff carries a variety of pollutants to surface water. Some pollutants are specific to urban runoff while others are also found in runoff from agricultural areas. Pollutants found primarily in urban runoff include heavy metals (lead, copper, zinc, cadmium and chromium) and a large number of toxic organic chemicals (PCBs, aromatic hydrocarbons, esters and many others). Other substances in urban runoff that are also found in runoff from rural areas include sediment, nutrients, bacteria and other pathogens, and pesticides. For more information, refer to the *Watershed Planner's Guide* (DNR, 1995).

Establishing and enforcing state and local ordinances can be an effective means to reduce construction site erosion and its adverse water quality impacts. In 1986, the DNR and the League of Wisconsin Municipalities cooperatively developed a model ordinance for the control of construction site erosion (DNR, 1987). It contains provisions for planning, designing, installing and maintaining erosion control practices. It also contains guidance for administering and enforcing the ordinance.

Storm Water Management in the City of Waupaca and Surrounding Towns

Local governments recognize that improperly located or mis-managed development can have a devastating impact on not only the image of the local area, but natural resources—specifically surface and groundwater quality. Subdivisions improperly located; industrial developments and commercial developments constructed without precaution to erosion or stormwater runoff; riparian development with without consideration to potential groundwater contamination can all have negative impacts on the current and future water quality.

Wisconsin Statute 66.30 provided for units of government to work together on issues or concerns that are of mutual benefit to each municipality. Common 66.30 agreements include fire districts, ambulance districts, police protection, recycling, etc. Multi-jurisdictional land management planning efforts can also be accomplished via this Statute. However, these efforts can also often be accomplished voluntarily.

The inventory, analysis and recommended land uses, including storm water management, that result from a land management planning effort are the first and most important steps in the long term protection of the local areas natural resources such as unique sites, wetlands, surface water quality, groundwater quality, etc. As a result of a well throughout and developed land use management plan, implementation efforts can be accomplished through storm water management ordinances, subdivision ordinances, revising zoning ordinances, preservation of natural sites or corridors, agricultural best management practices, construction site runoff and erosion control plans, shoreline or stream bank erosion control

practices, and more. All of these tools can be used to make the community's future vision and land management plan a reality.

Numerous Wisconsin Statutes give cities, villages, towns and counties authority to implement these tools. However, if there is no well throughout and community-wide land use management plan, the cumulative positive effects of the various tools to protect or improve the local natural resources will not be achieved.

A significant positive approach to assist in the improvement of the surface and groundwater quality of the Tomorrow/Waupaca Priority Watershed is the willingness of the city of Waupaca and the surrounding towns of Dayton, Farmington, and Waupaca to jointly enter into a voluntary growth management agreement. This 3-phased effort includes a Vision of what the local residents would like the area to be and look like in the year 2020; the development of a land use management plan, including storm water management; and the review and revision of zoning and other ordinances and regulations to allow the vision and plan to become reality. The Visioning effort will be completed 1995.

The most time consuming and significant aspect of the area's growth management effort will be developing of a land use management plan. This effort will represent one plan encompassing the entire Waupaca area (towns of Dayton, Farmington, and Waupaca, and the City of Waupaca). This three township/city geographic area contains the greatest percentage of residents within the entire Tomorrow/Waupaca Priority Watershed (projected to be about 15,000 in the year 2010). This geographic area of the watershed also contains the greatest concentration of lakes.

The land use management planning effort, including storm water management, is available through the Waupaca County UWEX office. This effort is recommended to be implemented as a significant part of the Tomorrow/Waupaca Priority Watershed Plan. Funding for the development of this overall land management plan, is identified in NR 120.21 and water quality-related plan components should be cost shared 100 percent.

In addition, the results of this planning effort will identify other phase 3 implementation tools—such as detailed storm water management ordinances, revised zoning ordinances, revised subdivision regulations, erosion control plans, etc. to assist further implementation of this overall land use management effort. These individual efforts will in turn maintain or enhance the surface and groundwater quality of the Tomorrow/Waupaca Priority Watershed. Funding for implementation of each of the specific implementation tools identified via the land use management planning effort should also be given consideration for 100 percent cost sharing through DNR or other agencies. Cost sharing via NR 120.21 for phase 3 implementation and enforcement of the plan should remain available for up to five years. See Chapter Four for eligibility criteria. See Chapter Five for cost estimates.

Also of concern in this watershed is the planned expansion of Highway 10. The highway runs from Appleton to Stevens Point following the Tomorrow/Waupaca River and cuts right through the watershed. The highway is currently 2-lane, and scheduled to become 4-lane in 1997. Construction site erosion controls will be carefully implemented to protect water quality.

Urban Water Resource Goals

Urban Water Resource Goals

1. Local and county government officials within the watershed should be welcomed into the implementation process of this plan. These officials are changing the zoning and are granting conditional uses and variances which affect land use decisions in the watershed. These land use decisions can have a direct impact on the water quality, habitat enhancement, and protection and prevention goals and objectives outlined in this plan. These officials need to be educated about the priority watershed project and how their decisions impact water quality in their community and region.

2. This process should also work to find ways of connecting state agencies, county departments, and local governments to work together in the water quality goals and objectives. All communities should be encouraged to have a future land use development plan prepared. If a community has a previously prepared land use plan, the community should be encouraged to update this plan every 3 to 5 years. Town governments which fall under county zoning should also be encouraged to have a land use plan prepared for their town. Planning should be promoted to these communities in order to help the county zoning board to make educated decision regarding he future development and growth management plans for the town.

Pollutant Load Reductions

Pollutant load reductions are developed according to activities needed to achieve the water quality objectives. The following is a summary of reductions to be targeted for the entire watershed.

Sediment Goal: Reduce overall sediment delivered by 10 percent. To meet this goal, the following is needed:

- Ten percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- Fifteen percent reduction in streambank sediment delivered to all streams.

Phosphorus Goal: Reduce overall phosphorus load to surface waters by 10 percent. To meet this goal, the following is needed:

- Ten percent reduction in organic pollutants from barnyards in all subwatersheds.

Nitrogen Goal: Reduce overall nitrogen load to groundwater.

Table 3-6 identifies the potential reductions possible if 100% of the eligible landowners participate.

Table 3-6. Pollutant Reduction Potential

Pollutant Source	Pollutant Reduction Objective	Pollutant Reduction Potential with 100% Participation
Upland Sediment	10%	45%
Streambank Sediment	15%	55%
Barnyard Nutrients	10%	40%
Excessive Nitrogen Application	Reduce nitrogen application	50%

Other Water Quality Pollution Sources

This section describes pollution sources that have an impact on water quality in the Tomorrow/Waupaca Watershed, but which are beyond the scope of this project. Control of these pollution sources occurs through other state and county regulatory programs, as described below.

Municipal and Industrial Point Sources of Pollution

Discharges of wastewater from permitted municipal and industrial sources are important considerations for improving and protecting surface water resources. Wastewater treatment plants are located in the watershed at the Village of Amherst, the Wisconsin Veteran's Home in King, the city of Waupaca, the city of Weyauwega and the Waupaca Foundry. Chapter 147, Wis. Stats., requires any person discharging pollutants into the waters of the state to obtain a Wisconsin Pollutant Discharge Elimination System (WPDES) Permit.

Failing Septic Systems

All of the residences and businesses in the watershed, outside of a few sewered municipalities and the area around a couple of lakes in the Chain of Lakes, rely on septic systems for treatment of sewage discharges.

A septic system consists of a septic tank and a soil absorption field. The majority of soils in the Tomorrow/Waupaca Watershed are suitable for conventional septic systems. However,

areas which preclude the use of conventional systems (steep slopes, shallow groundwater, or slowly permeable soils) are common. Mound systems or holding tanks may be required in these areas.

Many of the septic systems in the watershed were installed prior to modern codes in the late 1970's, and are likely failing to properly treat the sewage effluent prior to discharge to groundwater, or are discharging to the ground surface with ultimate runoff to surface waters.

To date only a few organized sanitary surveys, primarily around highly developed lakes, have been conducted in the watershed to identify failing septic systems. The Wisconsin Fund Grant program, which can provide financial assistance to property owners who replace failing septic systems, has been administered in Portage County (by the Planning and Zoning Department) since 1979, and in Waupaca County (by the Zoning Department) since 1991. Identification and replacement of older septic systems in areas of soils with high groundwater has an immediate beneficial effect on the groundwater of the watershed.

Even properly sited and installed septic systems (designed to remove pathogenic bacteria from septic effluent) will, if located in the rapidly permeable soils common in the watershed, contaminate groundwater with highly soluble substances such as nitrates, viruses, and hazardous chemicals from household products. Proposed changes in state codes, and property owner education programs, may minimize these types of pollutants.

Other Contaminated Sites

Groundwater and surface water can also be contaminated by solid waste disposal sites, leaking underground storage tanks, and spills. Although cost-sharing for the cleanup of these problems is not available through the watershed program, funding may be available through other programs. A list of known sites is included in the appendix.

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 non-toxic 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 which require a WPDES permit, site criteria, minimum distances from wells, application rates to ensure that environmental and public health concerns such as 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.

There are approximately 25 sites, more than 600 acres, in Portage County and approximately 55 sites, 2,300 acres, in Waupaca County that have been approved by the DNR for the land application of septage pumped from septic tanks, holding tanks, septage pits and grease traps.

Atrazine Prohibition Areas

There are currently three atrazine prohibition areas in the watershed. See table 3-7.

Table 3-7. Atrazine Prohibition Areas

Year Adopted	County	Townships	Size
1995	Portage	Sharon Stockton	3 sq mi
1995	Portage	Amherst New Hope	30 sq mi
1995	Waupaca	Farmington	2 sq mi

Other Contaminated Sites

Groundwater and surface water can also be contaminated by solid waste disposal sites, leaking underground storage tanks and spills. Although cost-sharing for the cleanup of these problems is not available through the watershed program, funding may be available through other programs. A list of known sites is included in Appendix B.

CHAPTER FOUR
Management Actions: Control Needs and Eligibility For Cost-Share Funding

Introduction

This chapter describes the management actions developed to meet the pollution reduction goals established during the water resource appraisal process. Also, this chapter describes the criteria which determine the eligibility of each pollutant source for cost-share funding through the DNR's nonpoint source program.

Management Strategy

Nonpoint source control needs are addressed by assigning "management categories" to each major nonpoint source pollution site (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 under the priority watershed project. Categories are based on the amount of pollution generated by a source, and the feasibility of controlling the source. Management category eligibility criteria are expressed in terms of tons of sediment delivered to surface waters from eroding uplands and streambanks; pounds of phosphorus delivered to surface waters, annually; the feet of streambank trampled by cattle; and acres of cropland available for proper application of nutrients.

The criteria used to define these management categories must be confirmed at the time that the county staff visit a site. A source may change management categories depending on the conditions found at the time of the site visit. A management category may be revised up to the point that a landowner signs a cost-share agreement. Any sources, created by a landowner, requiring controls after the signing of a cost-share agreement must be controlled at the landowners expense for 10 years.

Surface Water Critical Sites

Current Critical Sites draft language in NR 120 revisions requires that watershed plans develop a management strategy that ensures a "significant likelihood" that water resources goals be met. Critical site criteria can be quantitative (data from analytical models) or descriptive. An example of the latter may be to describe physical attributes of a site that would be designated as critical. Which ever criteria are used, the watershed plan must include a Critical Sites criteria that ensures (significant likelihood) that objectives will be met.

Nonpoint sources included in this category contribute a significant amount of the pollutants impacting surface waters. Reducing their pollutant load is essential for achieving the water quality objectives in the watershed project. Nonpoint sources are eligible for funding and/or technical assistance under the priority watershed project. Critical sites must be controlled in order to reach the goals of the watershed plan. If necessary, enforcement actions will be used.

Eligible

Nonpoint sources included in this category contribute a significant amount of the pollutants impacting surface waters. Reducing their pollutant load is essential for achieving the water quality objectives in the watershed project. Nonpoint sources are eligible for funding and/or technical assistance under the priority watershed project.

Not Eligible

Nonpoint sources of pollution in this category do not contribute a significant amount of the pollutants impacting surface waters and 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 federal programs may also be applicable to these lands.

Approach

Goals and criteria were set watershed-wide. More stringent criteria were set for lands draining to lakes (assumed to be primarily in subwatersheds Chain O'Lakes, Lake Collins, Stratton Lake, Lake Emily and Spring Creek). Sites draining to lakes must have eligibility field-verified by LCD staff prior to signing a cost-share agreement. Rationale: This is primarily a groundwater protection project. Therefore, 1) groundwater problems are widespread and have been caused by years of land use practices, 2) short-term improvements in groundwater quality are not expected, 3) groundwater flow is generally west to east, 4) it is very difficult to directly link land use practices at one site with groundwater quality at

another site. In conclusion, general watershed-wide goals are more meaningful than subwatershed-specific goals.

Water Resource Goals

This is primarily a "protection" watershed project, as opposed to a "remediation project; because surface waters are currently in very good condition. Groundwater quality is the major concern. Streambanks are currently in very good condition upstream of Waupaca. Streambank habitat protection and maintenance is desired.

Conclusions from the *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995) indicate that the control of nutrient leaching to groundwater is critical to the success of this project. While reduction of sediment from all sources, and control of barnyard runoff to surface waters are also goals of the project, groundwater protection will be the primary objective of this project.

Groundwater Critical Sites

The lack of information on individual landowners' use of nitrogen precludes identification of those individuals who apply excessive quantities of nitrogen. Therefore, there are no designated critical sites based on groundwater at this time. However, if sites are found where nitrogen is applied at rates exceeding twice the crop need, based on University of Wisconsin recommendations, these sites would be critical, and enforcement would be possible, unless the landowner reduces nitrogen application to less than twice the crop need.

1) Upland/Cropland Inventory

The Portage and Waupaca County Land Conservation Department conducted a comprehensive (100%) inventory of all cropland in the watershed. A soil loss/sediment delivery spreadsheet was used instead of the WINHUSLE model because there are many wetlands, buffers, and internally drained areas in this watershed, which are not addressed by the WINHUSLE model. However, both models were used on the Waupaca subwatershed, and the WINHUSLE results were used to calibrate the delivery ratios in the new model.

The LCD staff found that 5,300 tons of sediment were being loaded to streams, by roughly 1,400 cropped fields. See tables 4-1 through 4-3.

Table 4-1. Upland Sediment Erosion Eligibility Criteria in the Tomorrow/Waupaca Watershed — Streams

Management Category Control	Eligibility Criteria Sediment Delivery (tons/acre/year)	Number of fields	Number of acres	Tons Controlled	Percent Control (of total load)
Critical	greater than 2.4	11	200	286	5%
Eligible (drain to streams)	greater than or equal to 0.50 or greater than 5 tons/site/year	403	5,000	2,203	41%
Not Eligible	less than 0.50	roughly 1,100	87,000	0	0

Note: A modified soil loss model was used, rather than WINHUSLE.

Source: DNR, Portage and Waupaca County LCD

Table 4-2. Upland Sediment Erosion Eligibility Criteria in the Tomorrow/Waupaca Watershed — Lakes

Management Category Control	Eligibility Criteria Sediment Delivery (tons/acre/year)	Number of fields	Number of acres	Tons Controlled	Percent Control (of total load)
Critical	greater than 0.30	0	0	0	0
Eligible (drain to lakes)	greater than or equal to 0.30 OR greater than 1.0 ton/site/year	13	100	32	37%
Not Eligible	less than 0.30	120	750	0	0

Note: A modified soil loss model was used, rather than WINHUSLE.

Source: DNR, Portage and Waupaca County LCD

Table 4-3. Upland Sediment Erosion Eligibility Criteria in the Tomorrow/Waupaca Watershed — Internally Drained

Management Category Control	Eligibility Criteria Soil Loss (tons/acre/year)	Number of Fields	Number of Acres	Tons Controlled	Percent Control (of total load)
Critical	none	0	0	0	0
Eligible (internally drained)	greater than or equal to 8.0	66	600	5,300[1]	12%
Not Eligible	less than 8.0	roughly 1,000	17,000	0	

Note: The a modified soil loss model was used, rather than WINHUSLE.

Source: DNR, Portage and Waupaca County LCD.

[1] Note: Total tons lost is 43,963 tons/year.
Above eligibility criteria applies to internally drained fields and fields with very low sediment delivery rates.

1. Eligibility

Watershed staff and the Department determined that any upland field delivering sediment to surface waters at a rate equal to or greater than 0.50 tons/acre/year or eroding at greater than 5 tons/site/year could receive consideration for eligibility for cost sharing. Any cropland site that delivers sediment to lakes at a rate equal to or greater than 0.30 tons/acre/year or greater than 1 ton/site/year could receive consideration for eligibility for cost sharing. Any cropland site that drains directly to groundwater, and is eroding at greater than 8 tons/acre/year could receive consideration for eligibility for cost sharing.

2. Water Resource Objectives (from *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995) and the "Waupaca County Lake and Stream Priority Watershed Appraisal for the Tomorrow/Waupaca Watershed", February, 1995)

Given the nature of the watershed and potential for improvement, the project team determined that the water resource objectives of the watershed project should be as follows:

a. Maintain and improve aquatic life habitat and water quality.
b. Maintain and improve wildlife habitat.
c. Reduce nutrient and sediment loading from shoreline development.
d. Promote shorescaping practices, including buffer strips or vegetative buffer zones and erosion control practices on steep slopes.
e. Reduce the level of nitrates in groundwater.
f. Reduce the level of atrazine and other pesticides in groundwater.

Watershed staff, groundwater specialists, DATCP and DNR have determined that controlling upland sediment would also control nutrient and pesticide levels in groundwater and surface water. The rationale is that controlling sediment erosion will keep the fine sediments and the organic and loamy soils on the site. Having more of these soils present will slow down the infiltration of water, increase the attenuation of nutrients and agrichemicals by the soil, and reduce the need to apply additional nutrients and agrichemicals. (F. Madison, USGS, personal communication, 1995 and the "Soil Test Recommendations for Fields, Vegetables and Fruit Crops," University of Wisconsin-Extension, publication A2809-1991)

With the completion of the water resource objectives, project staff can now determine the reduction of sediment needed to meet objectives. As a first step, project staff, in consultation with water resource biologists, determine that a 10% reduction of sediment is desirable to meet water resource objectives. In this watershed a total reduction of 530 tons is needed.

3. Setting of Eligibility Criteria

Project staff determine that 530 tons of sediment need to be controlled to meet water resource objectives. Project staff determined that in the Tomorrow/Waupaca Watershed, 50% of the load reduction can be achieved solely from voluntary participation. Therefore, 265 tons need to be controlled through critical sites. This correlates to all sites loading greater than 2.4 tons/acre/year being critical sites." See tables 4-4 through 4-6.

Those sites contributing equal to or greater than 0.50 tons/acre/year or greater than 5 tons are eligible. (370 fields) (27% of all fields) (approximately 5,000 acres)

Those sites contributing greater than 2.4 tons/acre/year are critical. (11 fields, 7 land owners) (roughly 200 acres)

Seven sites would receive notification as Critical Sites. (5 landowners)

4. Notification of Critical Sites

Presently proposed critical sites language requires that the highest 25% (132 tons) of the pollution reduction goal (530 tons) will receive initial notification as a Critical Site. The project staff will notify and send notification letters to the seven sites that contributes the top 115 tons, which corresponds to those delivering greater than 2.7 tons/acre/year. If voluntary participation is not sufficient to meet goals, it will be mandatory for the remaining four Critical Sites uplands above the critical site criteria (2.4 tons/acre/year) to participate in the project by installing necessary practices.

Table 4-4. Upland Critical Sites (draining to streams)

Site	Sediment delivery (t/ac/yr)	Tons delivered (tons/yr)	Tons delivered after control (50%)	Cumulative tons controlled	Percent of goal reached (530 tons)
1 [critical*]	3.19	79.6	39.8	39.8	7.5
2 [critical*]	3.19	43.5	21.7	61.5	11.6
3 [critical*]	3.19	15	7.5	69	13
4 [critical*]	3	47.9	24	93	17.6
5 [critical*]	2.81	22.5	11.2	104.2	19.7
6 [critical*]	2.81	14	7	111.2	21
7 [critical*]	2.81	8.4	4.2	115.4	21.8
8 [critical]	2.65	167.1	83.5	199	37.6
9 [critical]	2.65	71.6	35.8	234.8	44.3
10 [critical]	2.4	62.1	31	265.8	50.2
11 [critical]	2.4	40.7	20.4	286.2	54.1
12 [eligible]	2.25	20.2	10.1	296.3	56
13	2.25	15.7	7.9	304.1	57.5
14	2.2	94.8	47.4	351.5	66.4
15	1.87	5.6	2.8	354.4	66.9
16	1.86	7.4	3.7	358.1	67.6
...					
365 [eligible]	0.5	0.4	0.2	2011.9	380
366 [not eligible]	0.46	10.6	5.3	2017.2	381
...					
1428 [not eligible]	0.01	0	n.a.	n.a.	n.a.

Note: [critical*] — landowners who would receive notification of Critical Site status at beginning of project.
[critical] — landowners who would receive notification letter if there was not sufficient voluntary participation.

Note: additional sites meeting the "greater than 5.0 tons/site" criteria are also eligible.

Table 4-5. Upland Critical Sites (draining to natural lakes)

Site	Sediment delivery (t/ac/yr)	Tons delivered (tons/yr)	Tons delivered after control (assume 50%)	Cumulative tons controlled	Percent of goal reached (no goal)
1 [eligible]	0.83	1.6	0.8	0.8	
2 [eligible]	0.59	9.4	4.8	5.6	
3 [eligible]	0.37	3	1.6	7.2	
4 [not eligible]	0.25	0.4	0.2	7.4	
5	0.17	2.6	1.2	8.6	
6	0.12	4.8	2.4	11	
7	0.09	2.6	3.2	14.3	
...					
133	0	0	n.a.	n.a.	n.a.

Note: Additional sites meeting the "greater than 1.0 tons/site criteria are also eligible.

Table 4-6. Upland Critical Sites (internally drained)

Site	Soil loss (t/acre/yr)	Tons eroded (tons/yr)	Tons delivered after control (assume 50%)	Cumulative tons controlled	Percent of goal reached (no goal)
1 [eligible]	18.2	860.2	430.1	430.1	
2 [eligible]	18.7	374.0	187.0	617.1	
3	18.7	37.4	18.7	635.8	
4	18.7	130.9	65.5	701.3	
5	18.7	130.9	65.5	766.7	
6	18.7	149.6	74.8	841.5	
7	18.7	37.4	18.7	860.2	
8	15.0	315.0	157.5	1017.7	
9	15.0	315.0	157.5	1175.2	
10	15.0	240.0	120.0	1295.2	
11	15.0	240.0	120.0	1415.2	
12	13.3	119.7	59.9	1475.1	
13	11.2	11.2	5.6	1480.7	
14	11.2	201.6	100.8	1581.5	
...					
66 [eligible]	8.0	32.0	16.0		
67 [not eligible]	7.9				
...					

Barnyard Inventory — summary

All barnyards draining to surface waters were inventoried by LCD staff using a computer model called BARNY which estimates pollutant loadings to surface water. Internally drained barnyards (drain directly to groundwater) were not inventoried because the BARNY model does not predict nitrogen loading to groundwater. (BARNY predicts the amount of manure that leaves the animal lot during rainfall, predicting both phosphorus and chemical oxygen demand (COD) loadings.)

Barnyards were also ranked by the type of surface water to which they drained. A category of 1 through 6 was assigned to each barnyard, clarifying where it drained. The goal was to differentiate between different wetland types, which assimilate nutrients to varying degrees. After analysis of the barnyard data, watershed staff divided barnyards into three categories:

1. drains to surface waters (includes wetlands contiguous to surface waters and sites less than 1000 feet from surface waters)

2. drains to wetlands (includes wetlands with the "H" modifier — standing water present, and wetlands with the "K" modifier — wet soils)

3. drains to groundwater/ internally drained (includes unnamed ponds less than one acre in size, and those sites greater than 1000 feet from any surface waters)

Cost share eligibility for barnyards draining to surface waters or to wetlands is based on analysis of the BARNY model. Watershed staff determined that because the soils in the watershed are extremely sandy, a new model was needed to determine eligibility for internally drained barnyards. Therefore, eligibility for barnyards draining to groundwater is based on soil types, animal numbers and time spent on the lot.

Note: manure from livestock operations are assumed to contribute roughly equal amounts of nutrients to groundwater as does irrigated agriculture in this watershed. This assumption is based on the following calculations:

1. Pounds of nitrogen contributed by livestock operations:

   The average farm is a 60 cow herd, producing 17,566 pounds of N/yr (*Midwest Plan Service, 1985 Livestock waste facilities handbook, 2nd Ed.* MWPS-18, Iowa State University, Ames, Iowa). There are 140 dairy operations in the watershed. Assume that 40% of the nitrogen produced has the potential to leach to groundwater. (The other 60% is used by crops or is volatilized.)

   Total potential to be leached: 1.0 million pounds/year

2. Pounds of nitrates contributed by irrigated vegetable production:

There are a total of 20,000 irrigated cropland acres in watershed. Assuming a four year vegetable rotation, based on the work of Bill Ebert (NRCS) and the NLEAP model, assume 80 pounds/acre/year has the potential to be leached to groundwater.

Total potential to be leached: 1.6 million pounds/year

Limitations

Current cost-sharing and BMPs in NR 120 more easily address livestock operations than irrigated vegetable operations. Alternative BMPs may be needed to address the nonpoint source pollution problems associated with irrigated agriculture. If alternative BMPs are proposed for irrigated vegetable agriculture, they need to be approved by the DNR.

The Port Edwards Groundwater Protection Project studied and evaluated groundwater quality in relation to land use. There are many similarities between topography and agriculture in that project and in this watershed project. Therefore, the conclusions drawn there are likely to be relevant here. Vegetable producers in the Port Edwards Groundwater Project were found to be using only the amount of nitrogen necessary to meet crop needs. However, even the use of these conventional BMPs were found to be inadequate for meeting groundwater quality nitrogen standards. The options still being evaluated for additional groundwater control include taking lands out of vegetable production, and biotechnology.

A landowner survey, Farm Practices Inventory (FPI), was conducted to determine landowner behaviors in the watershed. Part of the survey estimates nutrient loading rates in an effort to locate areas needing the most attention. It appears, on average, that around 200 pounds of N are applied by livestock producers. However, in both the Almond and the Waupaca Groundwater protection areas, it appears that much higher rates are being applied. (See map 4-1). For more details see Chapter 6, the information and education chapter.
Note: Groundwater contamination is less likely on those animal lots where soil is compacted than on those that are uncompacted. Clean water diversions around animal lots would prevent loss of nitrogen from animal lots to infiltration areas that are susceptible to groundwater contamination. Additionally, where filter strips would be utilized, there is a need to provide sufficient fine materials, as filter strips constructed on coarse materials would be much less effective in controlling potential groundwater contamination.

For those barnyard sites eligible for cost sharing only for clean water diversions, if LCD staff determine that diversions are not possible (due to land topography) or are not effective at protecting water quality (site specific) then with DNR approval on a case by case basis, those sites may be eligible for complete barnyard systems.

Barnyard Inventory — draining to surface waters and wetlands contiguous to surface waters

The LCD staff found that 2284 pounds of phosphorus were being delivered to streams, by roughly 90 barnyards. See tables 4-7 through 4-9.

1. Eligibility (cost-effective loading cutoff)

   Watershed staff and the Department determined that any barnyard delivering greater than 30 pounds of phosphorus could receive consideration for eligibility for cost sharing for clean water diversions. Those sites unable to reduce the level of runoff to 30 pounds of phosphorus or less, could receive consideration for eligibility for additional BMPs. Any barnyard delivering greater than 10 pounds of phosphorus directly to a lake could receive consideration for eligibility for cost sharing for a complete barnyard system. The degree of control appropriate for each site will be determined by field staff. For sites delivering fewer nutrients than these, it is not cost effective to consider eligibility for cost sharing.

2. Water Resource Objectives (from *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995), and the "Waupaca County Lake and Stream Priority Watershed Appraisal for the Tomorrow/Waupaca Watershed", February, 1995)

   Given the nature of the watershed and potential for improvement, the project team determined that the water resource objectives of the watershed project should be as follows:

   a. Maintain and improve aquatic life habitat and water quality.

   With the completion of the water resource objectives, project staff can now determine the reduction of phosphorus needed to meet objectives. As a first step, project staff, in consultation with water resource biologists, determine that a 10% reduction of phosphorus is desirable to meet water resource objectives. In this watershed a total reduction of 228 pounds is needed.

3. Setting of Eligibility Criteria

   Project staff determine that 228 pounds of phosphorus need to be controlled to meet water resource objectives. Project staff determined that in the Tomorrow/Waupaca Watershed, 50% of the load reduction can be achieved solely from voluntary participation. Therefore, 114 pounds need to be controlled through critical sites. This correlates to all sites loading greater than 120 pounds being "critical sites". See tables 4-10 through 4-12.

   Those sites contributing greater than 30 pounds of phosphorus per year are eligible for clean water diversions. (28 sites)

Those sites unable to reduce runoff to 30 pounds of phosphorus or less are eligible for additional barnyard BMPs. (6 sites)

Those sites contributing more than 10 pounds of phosphorus per year and draining directly to a lake are eligible for additional barnyard BMPs (1 site). Furthermore, the use of NRCS standard 590 including technical note #1 is encouraged on lands draining to lakes.

Those sites contributing greater than 120 pounds of phosphorus per year are critical. (1 site)

One site would receive notification as a Critical Site. (1 landowner)

Although there were no critical barnyards draining to lakes, should such a site exist, and contribute more than 50 pounds of phosphorus per year, it would be critical.

4. Notification of Critical Sites

Presently proposed critical sites language requires that the highest 25% (57 pounds) of the pollution reduction goal (228 pounds) will receive initial notification as a Critical Site. The project staff will notify and send notification letters to the one site that contributes the top 57 pounds.

Table 4-7. Animal Lot Runoff Eligibility Criteria — Tomorrow/Waupaca Watershed — draining to surface waters and wetlands contiguous to surface waters, including lakes

Management Category	Phosphorus Load per Barnyard	Number of Barnyard Segments[1]	Pounds Reduced[2]	Percent Reduction
Critical	greater than 120 pounds	one	105	5
Eligible[3]	between 30 and 120 pounds	27	854	37
Not Eligible	less than 30 pounds	62	0	0

[1] Some barnyards have more than one "segment" because part of the lot drains one direction and part drains another. Therefore, the number of barnyard segments does not equal the number of barnyards.
[2] Assumes clean water practices have been installed.
[3] Sites are eligible only for clean water practices. If clean water practices are unable to reduce runoff to 30 pounds or less, the site is eligible for additional barnyard BMPs.

Table 4-8. Animal Lot Runoff Eligibility Criteria — Tomorrow/Waupaca Watershed — draining to wetlands (no outlets to surface waters)

Management Category	Phosphorus Load per Barnyard	Number of Barnyard Segments[1]	Pounds Reduced[2]	Percent Reduction
Critical	none	none	0	0
Eligible[3]	greater than 75 pounds	1	50	20
Not Eligible	less than or equal to 75 pounds	10	0	0

[1] Some barnyards have more than one "segment" because part of the lot drains one direction and part drains another. Therefore, the number of barnyard segments does not equal the number of barnyards.
[2] Assumes clean water practices have been installed.
[3] Sites are eligible only for clean water practices. If clean water practices are unable to reduce runoff to 30 pounds or less, the site is eligible for additional barnyard BMPs.

Table 4-9. Animal Lot Runoff Eligibility Criteria — Tomorrow/Waupaca Watershed — draining directly to groundwater

Management Category	Potential Nitrogen Load per Barnyard	Number of Barnyards	Pounds Reduced[2]	Percent Reduction
Critical	none	none	0	0
Eligible[2]	greater than 2000 pounds OR on soils with very high + permeability rates	26	n.a.	n.a.
Not Eligible	less than 2000 pounds	approximately 100	0	0

[1] Assumes clean water practices have been installed.
[2] Sites are eligible only for clean water practices. If clean water practices are unable to reduce runoff to 30 pounds or less, the site is eligible for additional barnyard BMPs.
+ Very high permeability rates means greater than 6 inches per hour.
++ High permeability rates means between 2 and 6 inches per hour.

Table 4-10. Barnyards Critical Sites (draining to surface waters and wetlands contiguous to surface waters, including lakes)

Site	Inventoried P (lbs/yr)	Planned P (clean water div.)	Controlled P (lbs/yr)	Cumulative P controlled	Percent of P load controlled	Percent of goal (228)
1 [critical*]	130.7	25.2	105.6	105.6	4.62	46
2 [eligible[1]]	111.7	91.8	19.9	125.5	5.49	55
3 [eligible[1]]	100.9	50.1	50.3	175.8	7.70	77
4 [eligible[1]]	83.6	40.9	42.7	218.5	9.57	96
5 [eligible]	76.8	9.9	66.9	285.4	12.5	125
6 [eligible[1]]	68.3	46.7	21.5	306.9	13.44	134
7 [eligible]	63.2	27.5	35.6	342.5	15.	150
8 [eligible]	61.2	18.2	4.	385.5	16.88	169
9 [eligible[1]]	60.8	60.8	0.00	385.5	16.88	169
10 [eligible]	57.6	28.8	28.8	414.3	18.14	181
11 [eligible]	56.5	20.6	35.9	450.2	19.71	197
12 [eligible]	55.8	18.0	37.8	488.0	21.37	214
13 [eligible]	54.4	18.4	36.0	524.0	22.94	230
14 [eligible]	52.3	16.6	35.8	559.8	24.51	245
15 [eligible]	52.1	23.5	28.6	588.4	25.76	258
16 [eligible]	47.6	24.9	22.6	611.0	26.75	268
17 [eligible]	46.2	7.2	39.0	650.0	28.45	284
18 [eligible]	44.0	6.0	38.1	688.1	30.13	301
19 [eligible]	42.8	16.1	26.7	714.8	31.30	313
20 [eligible]	40.0	19.7	20.3	735.1	32.18	322
21 [eligible]	39.2	18.9	20.3	755.4	33.07	331
22 [eligible]	38.8	24.5	14.2	769.6	33.70	337
23 [eligible[1]]	36.2	34.6	1.6	771.2	33.77	338
24 [eligible]	35.4	22.1	13.3	784.5	34.35	344
25 [eligible]	34.8	5.5	29.3	813.8	35.63	356
26 [eligible]	34.3	13.4	20.9	834.7	36.55	366
27 [eligible]	31.8	23.9	7.9	842.6	36.89	369
28 [eligible]	31.2	19.9	11.3	853.9	37.39	374

Table 4-10. Barnyards Critical Sites (draining to surface waters and wetlands contiguous to surface waters, including lakes)

Site	Inventoried P (lbs/yr)	Planned P (clean water div.)	Controlled P (lbs/yr)	Cumulative P controlled	Percent of P load controlled	Percent of goal (228)
29 [not eligible]	29.3	15.9	13.4	867.3	37.97	380
30 [not eligible]	28.4	7.2	21.2	888.5	38.9	389
31 [not eligible]	27.8	19.8	8.1	896.6	39.26	393
32 [not eligible]	24.6	6.0	18.7	915.3	40.07	401
33 +[not eligible]	23.1	6.9	16.2	931.5	40.78	408
34 [not eligible]	21.7	5.9	15.7	947.2	41.47	415
...						
86 [not eligible]	0	0	0	n.a.	n.a.	n.a

Note: [critical*] — site is critical. Landowner would receive notification at beginning of project
[eligible] — site is eligible only for clean water diversions.
[eligible[1]] — site is eligible for barnyard, including filter system (those sites for which clean water diversions will not bring them below the 30 pound eligibility cutoff).
[not el.] — site is not eligible for cost sharing.
+ only barnyard number 33 drains to a lake and is eligible for cost-sharing because it contributes more than 10 pounds of phosphorus.

Barnyard Inventory — draining to wetlands (no outlets to surface waters)

The LCD staff found that 250 pounds of phosphorus were being loaded to wetlands, by roughly 11 barnyards.

1. Eligibility (cost-effective loading cutoff)

   Watershed staff and the Department determined that any barnyard delivering greater than 75 pounds of phosphorus could receive consideration for eligibility for cost sharing for clean water diversions. Any barnyard delivering greater than 10 pounds of phosphorus directly to a lake could receive consideration for eligibility for cost sharing for a complete barnyard system. For sites delivering fewer nutrients than these, it is not cost effective to consider eligibility for cost sharing.

2. Water Resource Objectives (from *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995), and the "*Waupaca County Lake and Stream Priority Watershed Appraisal for the Tomorrow/Waupaca Watershed*", February, 1995)

Given the nature of the watershed and potential for improvement, the project team determined that the water resource objectives of the watershed project should be as follows:

a. Maintain and improve aquatic life habitat and water quality.
b. Reduce the level of nitrates in groundwater.

With the completion of the water resource objectives, project staff can now determine the reduction of phosphorus needed to meet objectives. As a first step, project staff, in consultation with water resource biologists, determine that a 5% reduction of phosphorus is desirable to meet water resource objectives. In this watershed a total reduction of 12 pounds is needed.

3. Setting of Eligibility Criteria

Project staff determine that 12 pounds of phosphorus need to be controlled to meet water resource objectives. Project staff determined that in the Tomorrow/Waupaca Watershed, 100% of the load reduction can be achieved solely from voluntary participation. Therefore, no critical sites are needed.

Those sites contributing greater than 75 pounds of phosphorus per year are eligible for clean water diversions. (1 site)

Table 4-11. Barnyards Critical Sites (draining to wetlands)

Site	Inventoried P (lbs/yr)	Planned P (clean water div.)	Controlled P (lbs/yr)	Cumulative P controlled	Percent of P load controlled	Percent of goal (no goal)
1[eligible]	100.9	50.5	50.3	50.3	20.12	
2[not eligible]	44	6	38.1	88.1	35.36	
3	24.6	6	18.7	107.1	42.84	
4	21.7	5.9	15.7	122.8	49.12	
5	19.2	9.4	9.9	132.7	53.08	
...						
13	0	0	0	n.a.	n.a.	

Barnyard Inventory — draining directly to groundwater

The LCD staff estimated that 120,000 pounds of nitrogen were produced by livestock at approximately 130 operations in the watershed, which has the potential to be delivered to groundwater.

1. Eligibility (cost-effective loading cutoff)

Watershed staff and the Department determined that any barnyard having the potential to deliver greater than 2000 pounds of nitrogen, or those sites having the potential to deliver at least 500 pounds of nitrogen and located on soils with a very high permeability rate (greater than 6 inches per hour) could receive consideration for eligibility for cost sharing for clean water diversions. For sites having the potential to deliver fewer nutrients than these, it is not cost effective to consider eligibility for cost sharing. (There are no lakes in this category; they are included in the barnyard surface water section.)

2. Water Resource Objectives (from *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995), and the "*Waupaca County Lake and Stream Priority Watershed Appraisal for the Tomorrow/Waupaca Watershed*", February, 1995)

Given the nature of the watershed and potential for improvement, the project team determined that the water resource objectives of the watershed project should be as follows:

a. Reduce the level of nitrates in groundwater.

Given the limited understanding of livestock barnyard nitrogen loses to groundwater, no specific objectives were set.

3. Setting of Eligibility Criteria

Project staff determined that use of low cost practices will provide some protection of groundwater. Therefore, those sites contributing greater than 2,000 pounds of nitrogen are eligible for clean water diversions.

Those sites contributing greater than 2,000 pounds of nitrogen per year or located on soils with very high permeability rates (greater than 6 inches per hour) are eligible for clean water diversions. (26 sites)

There are no critical sites.

Table 4-12. Barnyards Critical Sites (draining directly to groundwater)

Site	Soil permeability (in/hr)	N produced (lbs/yr)	Cumulative N produced (lbs/yr)
1 [eligible]	H	4933	4933
2	H	3104	8037
3	M	2933	10970
4	M	2670	13640
5	VH	2480	16120
6	M	2354	18474
7	M	2272	20746
8	H	2172	22918
9	VH	2154	25072
10	VH	2045	27117
11	VH	2027	29144
12	VH	2000	31144
13	VH	1928	33072
14	VH	1864	34936
15	VH	1593	36529
16	VH	1548	38077
17	VH	1538	39615
18	VH	1294	40909
19	VH	1285	42194
20	VH	1267	43461
21	VH	1249	44710
22	VH	1113	45823
23	VH	1032	46855
24	VH	806	47661
25	VH	733	48394
26 [eligible]	VH	507	48901
27 [not eligible]	VH	425	49326
...			
125	M	63	120863

Note: Very High (VH) soils have permeability rates greater than 6 inches/hour.
High (H) soils have permeability rates between 2 and 6 inches/hour.
Medium (M) soils have permeability rates between 0.6 and 2 inches/hour.

[1] Based on number of animals and time on lot (assumes 20% on lot).

Nutrient and Pesticide Management Inventory

The LCD staff found that there are roughly 20,000 acres of irrigated agriculture and 90,000 acres of non-irrigated agriculture in this watershed. Rough estimates assume that nutrient contributions are roughly equal from livestock operations and from irrigated agriculture.

A nutrient management pilot project was conducted from October 1994 to June 1995. Results as of May, 1995 indicate that 12,000 acres of cropland in the watershed have had nutrient management plans written as part of this project. These management plans were written mostly by crop consultants from agricultural cooperatives. Conclusions show that nutrient credits for legumes and manure are not being consistently taken by producers.

Information on nutrient management was also collected as part of the FPI survey. Preliminary FPI data for dairy livestock operations is shown in map 4-1. See Chapter 6 for more information.

1. Eligibility (cost-effective loading cutoff)

   Watershed staff and the Department determined that all farmers (producers of livestock, cash crop, irrigated vegetables) are eligible for nutrient and pesticide management planning. See table 4-13.

Table 4-13. Nutrient Management Eligibility Criteria

Management Category	Criteria	Estimated number
Critical	more than twice the nitrogen needed by the crop[1] is applied	unknown
Eligible	all farmers (producers of livestock, cash crops, irrigated vegetables)	400

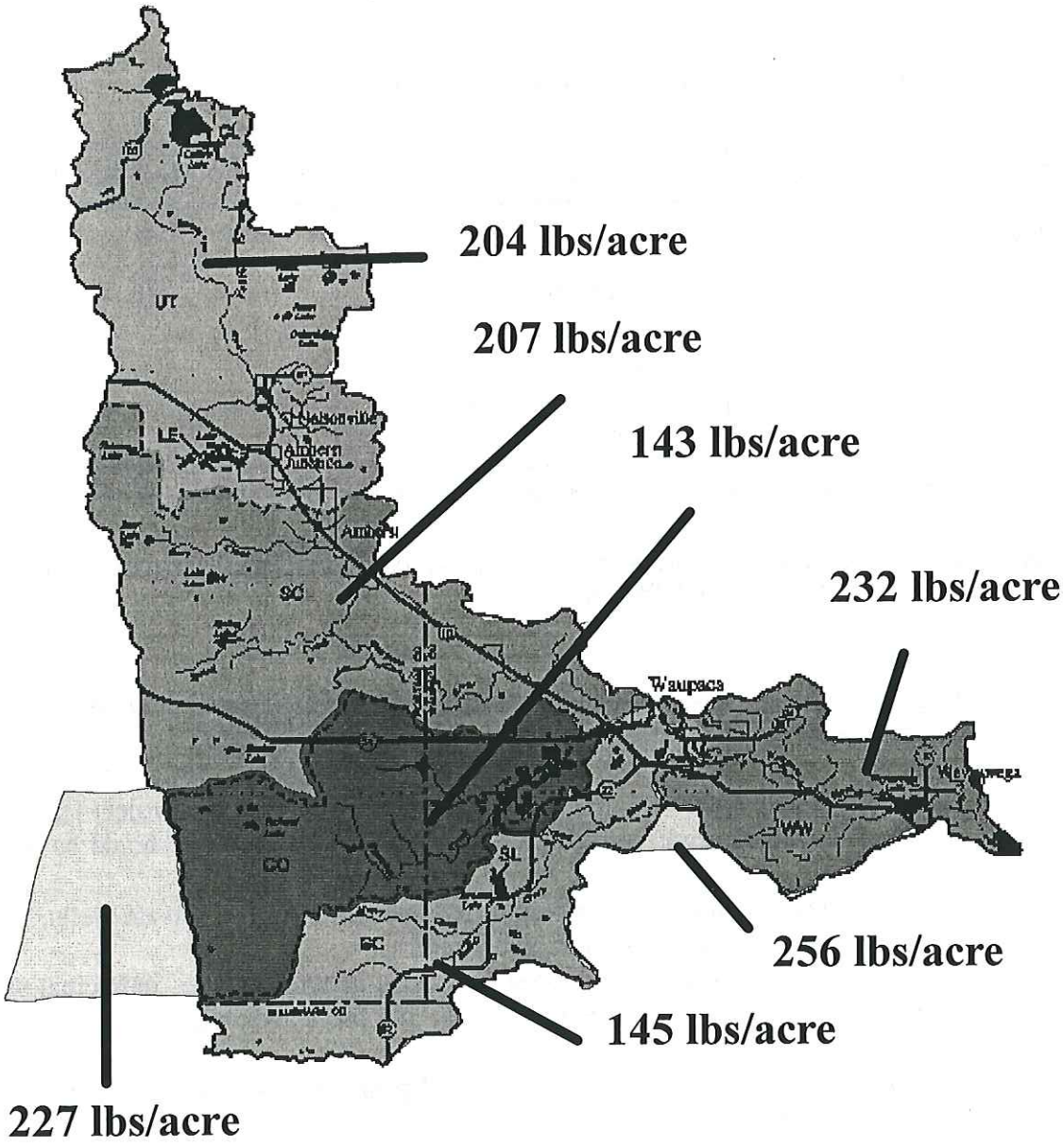
[1] Based on UW Recommendations

Pesticide Mixing and Loading Sites

Several years ago, agricultural suppliers storing and/or selling liquid nitrogen fertilizer were required to build containment in the event of leakage or spillage. Most sold their storage tanks at that time to avoid this regulation. Producers purchased these tanks and currently store large quantities of liquid fertilizer at the farmstead. The potential for a very serious groundwater contamination problem exists if there should be a natural or man-made leakage of these tanks.

Map 4-1: Farm Practices Inventory

Nitrogen Application Rates for Corn



The Tomorrow/Waupaca River Priority Watershed Project is encouraging producers to fertilize in small amounts throughout the growing season to reduce leaching to groundwater. The best way to accomplish this is to inject the fertilizer through the irrigation system. To do this, the producer parks a "nurse tank" containing the fertilizer (28% N) at the irrigation pivot point and injects the N into the system. Oftentimes, the high capacity well is also located at this point. There is the possibility of a large amount of nitrogen entering the groundwater if there should be a problem with the injection system or storage tank. To prevent such a problem, pesticide mixing and loading sites, also known as liquid containment facilities, are eligible for cost-sharing if the following criteria are met. See table 4-14.

Table 4-14. Pesticide Mixing and Loading Site Criteria

Management Category	Criteria	Estimated Number
Critical	none	0
Eligible	Producers who handle more than 500 lbs of active ingredient (pesticides) in one growing season[1].	25

[1] Assuming an average of 2 lbs of herbicide and 1 lb of insecticide applied per growing season, this equates to approximately 200 acres of field corn

Note: Administrative Codes NR 120, ATCP 162 and ATCP 163 must be followed. Cost-sharing through NR 120 is prohibited for spill control basins regulated through other programs (NR 120.10(2)(s)).

2. Water Resource Objectives (*Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995).

   Given the nature of the watershed and potential for improvement, the project team determined that the water resource objectives of the watershed project should be as follows:

   a. Reduce the level of nitrates in groundwater, municipal wells, private wells, high capacity irrigation wells, and lakes and streams.
   b. Reduce the level of atrazine and other pesticides in groundwater, municipal wells, private wells, high capacity irrigation wells, and lakes and streams.

   Given the limited understanding of nutrient and pesticide losses to groundwater, no specific objectives were set.

3. Setting of Eligibility Criteria

Project staff determine that some protection of groundwater is likely from installation nutrient and pesticide management plans. Therefore, all farm operations are eligible for nutrient and pesticide management plans.

4. Critical Site Criteria

Watershed staff, groundwater experts, and the Department have determined that any site applying greater than twice the nutrients needed by the crop is a critical site for nutrients.

Manure Storage

Eligibility for a grant for manure storage practices will be based on the Nutrient Management Plan, developed in compliance with SCS standard 590. An operation is eligible if the nutrient management plan demonstrates that manure cannot be feasibly 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. See table 4-15.

Table 4-15. Manure Storage — Tomorrow/Waupaca Watershed

Management Category	Eligibility Criteria
Critical	None
Eligible	Exceeds 590 Standard
Not Eligible	Do Not Exceed SCS Std. 590

The eligibility for storage facilities will be based on the least cost system that will satisfy the Std. 590 specifications. These options may include manure stacks (in accordance with Std. 312), short term storage (capacity for 30 to 100 days production in accordance with Std. 313), and long term storage (capacity for up to 210 days production in accordance with Std. 313 or 425).

Landowners receiving cost-sharing funds for storage practices or nutrient management are required to adopt a nutrient management plan (Std.590). Additionally, manure removed from cost-shared storage facilities designed to hold greater than 6 months, shall not be spread on frozen, snowcovered, or saturated ground (as stated in NR 120).

7) Streambank and Lakeshore Inventory

The Portage and Waupaca County Land Conservation Department conducted a comprehensive inventory of all streambanks in the watershed. The LCD staff found that 1663 tons of sediment were being loaded to streams. Only 3% of the streambanks were degraded (eroded or trampled). Note: streambanks are generally considered to be in excellent condition if less than 10% is degraded. Only the Waupaca (WA) and Weyauwega (WE) subwatersheds have more than 3% degraded (both have roughly 10%). No erosion due to livestock access was found in either the WA or WE subwatersheds. In those subwatersheds, steep (30-40 foot) sandy banks are typical. Also, water level fluctuations are common along the Waupaca River.

1. Eligibility (cost-effective loading cutoff)

   Watershed staff and the Department determined that any streambank site eroding at a rate greater than 25 tons/year could receive consideration for eligibility for cost sharing. Any lakeshore sites eroding at a rate greater than 10 tons/year could receive consideration for eligibility for cost sharing. For sites eroding at rates lower than these, it is not cost effective to consider eligibility for cost sharing. See table 4-16.

   Furthermore, low cost streambank and lakeshore habitat practices, such as fencing, are eligible for cost sharing with the approval of the DNR fish manager.

Table 4-16. Streambank Eligibility Criteria for the Tomorrow/Waupaca Watershed

Management Category	Criteria	Number of Landowners
Streambank Erosion		
Critical	greater than 250 tons per year per site	1
Eligible	between 25 and 250 tons per year per site	8
Not Eligible	all others	approximately 300
Streambank Habitat		
Eligible	any livestock trampling	6
Not Eligible	no livestock trampling	approximately 300

Sources: Portage and Waupaca County LCD(s), DNR and DATCP

2. Water Resource Objectives (from *Tomorrow/Waupaca River Surface Water and Groundwater Appraisal Report* (DNR, Klosiewski, Rasman, Weister, April 1995), and

the "*Waupaca County Lake and Stream Priority Watershed Appraisal for the Tomorrow/Waupaca Watershed*", February, 1995)

Given the nature of the watershed and potential for improvement, the project team determined that the water resource objectives of the watershed project should be as follows:

a. Maintain and improve aquatic life habitat and water quality.
b. Maintain and improve wildlife habitat.
c. Reduce nutrient and sediment loading from shoreline development.
d. Promote shorescaping practices, including buffer strips or vegetative buffer zones and erosion control practices on steep slopes.
e. Reduce trampling in wetland headwater areas, especially in Bear Creek and Mack Creek.

With the completion of the water resource objectives, project staff can now determine the reduction of sediment needed to meet objectives. As a first step, project staff, in consultation with water resource biologists, determine that a 15% reduction of streambank and lakeshore sediment is desirable to meet water resource objectives. In this watershed a total reduction of 166 tons is needed.

Table 4-17. Streambank Critical Sites

Site	Sediment load (tons/year)	Load after control (assumes 90% effective)	Cumulative tons controlled	Percent of goal reached (250 tons)
1 [critical]	300	270	270	108
2 [eligible]	200	180	450	180
3 [eligible]	200	180	630	252
4 [eligible]	150	135	765	306
5 [eligible]	50	45	810	324
6 [eligible]	40	36	846	338.4
7 [eligible]	30	27	873	349.2
8 [eligible]	25	22	895	358
9 [not eligible]	22	20	915	366
10 ...				
127	0.3	n.a.	n.a.	n.a.

3. Setting of Eligibility Criteria

Project staff determine that 250 tons of sediment need to be controlled to meet water resource objectives. Project staff determined that in the Tomorrow/Waupaca Watershed, 50% of the load reduction can be achieved solely from voluntary participation. Therefore, 125 tons need to be controlled through critical sites. This correlates to all sites loading greater than 250 tons/year being "critical sites". See table 4-17.

In addition, the other eligible sites will provide sediment reduction and broader riparian zone benefits, such as habitat improvements.

Those sites contributing greater than 25 tons/year are eligible. (8 sites)

Those sites contributing greater than 250 tons/year are critical. (1 site)

One site would receive notification as a Critical Site. (see next paragraph)

4. Notification of Critical Sites

Presently proposed critical sites language requires that the highest 25% (62 tons) of the pollution reduction goal (250 tons) will receive initial notification as a Critical Site. The project staff will notify and send notification letters to the one site that is contributing the 62 tons.

8) Gully Inventory

Gullies were not formally inventoried in this watershed. They are not perceived to be a major problem.

1. Eligibility (cost-effectiveness)

Those sites with a) bare soils and evidence of active erosion, b) direct connection to surface waters via channelized flow, and c) reasonable access to machinery necessary for installing BMPs are eligible for cost sharing.

2. Water Resource Objectives

There were no specific goals set for sediment coming from gullies.

3. Critical Sites

There are no critical sites for gullies.

Wetland Restoration

There will be no critical sites for wetland restoration. All wetlands will be eligible for restoration if the sites meet the criteria below.

Wetland restoration is an eligible best management practice for the purpose of controlling nonpoint sources of pollution. Secondary benefits of wetland restoration may be enhancement of fish and wildlife habitat.

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.

Wetland restoration is an eligible practice when applied to 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 eligible upland sediment sources.

   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
- Critical Area Stabilization
- Wetland Restoration
- Groundwater Protection Areas or Municipal Wellhead Recharge Areas.

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.

Within the priority watershed easements should be considered in the following situations:

1. To protect groundwater.

   Research done by the Central Wisconsin Groundwater Center suggests that traditional BMPs may be inadequate in protecting groundwater. The groundwater objectives listed in Chapter 3 identify easements or land purchase as the best method of protecting municipal wellhead recharge areas. Land easements or land purchase are strongly encouraged in this watershed. Eligibility for land easements or purchase will be determined by DNR, in consultation with county staff, on a case-by-case basis.

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

   - there is any grazing of wetlands.
   - livestock density is so great that areas of unvegetated soil are within 60 feet of streams or intermittent streams.
   - channel erosion is exacerbated by livestock grazing such that unvegetated streambanks are two feet or more in height.

3. 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%.

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

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

5. 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

Animal Waste Storage Ordinance

Portage and Waupaca County both have an animal manure storage ordinance. The technical standards developed by the Natural Resource Conservation Service are used to provide for effective, practical, and environmentally safe methods of storing and utilizing animal manure.

Construction Site Erosion Control Ordinance

The significance of nonpoint source pollution from construction site erosion in the Tomorrow/Waupaca Watershed has been researched. Population trends over the past decade were reviewed and the population in almost all of the cities, villages, and towns has increased slightly (10-20 percent) over the past decade. The only exception are the villages of Almond and Nelsonville which has decreased in population at a rate of 5 and 16 percent respectively over the last decade.

The Village of Amherst is presently working on a Stormwater Management Plan. Furthermore, Portage County Planning and Zoning staff recommend a Construction Site Erosion Control Ordinance be included as part of the Plan.

The DNR may require the county to submit an annual review of building permits and population trends. If these data indicate water quality impacts have the potential to interfere with the goals of this plan, a construction site erosion control ordinance will be required at that time.

The DNR suggests that the Wisconsin Construction Site Erosion Best Management Handbook (DNR Publication WR-222-89) be used as a reference for any development that occurs in the Lower Big Eau Pleine River Project.

Urban Stormwater Practice Eligibility

As explained in Chapter Three, urban land use affects water quality. The City of Waupaca, the City of Weyauwega, The Village of Amherst and the other Towns and Lake Districts in the watershed are eligible for cost-sharing through the watershed project.

As described in Chapter 3, some stormwater practices have recently begun. The City of Waupaca and the surrounding Towns of Dayton, Farmington, and Waupaca are eligible cost-sharing for stormwater management planning. Should more urban water quality practices begin, this plan outlines eligibility for cost-sharing. Final determination of eligibility and funding for urban BMPs will be made by DNR on a case-by-case basis.

CHAPTER FIVE
Local Government's Implementation Program

Introduction

This chapter identifies the means for implementing the rural management actions for nonpoint source pollution control described in the previous chapter. See Chapter Three for information regarding other pollution sources. The success of this priority watershed project depends on the aggressive implementation of these nonpoint source pollution control strategies.

More specifically this chapter identifies:

- The best management practices (BMPs) necessary to control pollutants on the critical sites identified in Chapter Four;
- The cost-share budget;
- The cost containment policies;
- Staffing needs including total hours per year and number of staff to be hired;
- Schedules for implementing the project;
- The project budget including the expense for cost-sharing; and staffing for technical assistance, administration, and the information and education program.

Project Participants: Roles and Responsibilities

Landowners and Land Operators

Owners and operators of public and private lands are important participants in the priority watershed program. They will adopt BMPs which reduce nonpoint sources of water pollution and protect and enhance fish, wildlife and other resources. Landowners and land operators in the Tomorrow/Waupaca River Priority Watershed eligible for cost-share assistance through the priority watershed program include: 1) individuals; 2 Portage and

Waupaca Counties; 3) other governmental units described in NR 120.02(19); 4) corporations; and 5) the State of Wisconsin.

Portage and Waupaca Counties are the primary units of government responsible for implementing this plan in rural areas.

The Portage and Waupaca County Land Conservation Committees (LCC) will act for the County Boards and will be responsible contractually and financially to the State of Wisconsin for management of the project in areas with rural land uses. The County LCCs will coordinate the activities of all other agencies involved with the rural portion of the project.

The specific responsibilities for the county are defined in the Wisconsin Administrative Rules, s. NR 120.04. These responsibilities include:

1. Enter into nonpoint source cost-share agreements with eligible landowners and enforce the terms and conditions of cost-share agreements as defined in s. NR 120.13, Wisconsin Administrative Code.

2. Make sure that cost-shared BMPs are within the watershed boundaries.

3. Ensure that cost-shared BMPs are maintained 10 years.

Agricultural Best Management Practices (BMPs)

BMPs Eligible For Cost-Sharing And Their Rates

Best management practices are those practices identified in NR 120 which are determined in this watershed plan to be the most effective controls of the nonpoint sources of pollution. The practices eligible for cost-sharing and the cost share rates for each BMP are listed in tables 5-1 and 5-2 below.

Design and installation of all BMPs must meet the conditions listed in NR 120. Generally these practices use specific standard specifications included in the NRCS Field Office Technical Guide. In some cases additional specifications may apply. The applicable specifications for each BMP can be found in NR 120.14. The Department may approve alternative best management practices and design criteria based on the provisions of NR 120.15 where necessary to meet the water resource objectives. Regarding alternative agricultural BMPs, this approval is developed in consultation with DATCP.

Table 5-1a. State Cost-Share % Rates for Best Management Practices[1]

Best Management Practice	State Cost Share Rate
Nutrient and Pesticide Management	50%
Pesticide Handling Spill Control Basins	70%
Livestock Exclusion from Woodlots	50%
Intensive Grazing Management	50%[2]
Manure Storage Facilities	70%[3]
Animal Waste System Storage Abandonment	70%
Field Diversions and Terraces	70%
Grassed Waterways	70%
Critical Area Stabilization	70%[4,6]
Grade Stabilization Structures	70%[6]
Agricultural Sediment Basins	70%
Shoreline and Streambank Stabilization	70%[4,6]
Shoreline Buffers	70%[4,6]
Wetland Restoration	70%[4,6]
Barnyard Runoff Management	70%
Animal Lot Relocation	70%[6]
Roofs for Barnyard Runoff Management and Manure Storage Facilities	70%[6]
Structural Urban BMPs	70%[5]
Milking Center Waste Control	70%
Cattle Mounds	70%
Lake Sediment Treatment	70%

[1] Table 5-2 shows BMPs cost-shared at a flat rate.
[2] To a maximum of $2,000 per watering system
[3] Maximum cost share amount is $35,000 for manure storage including manure transfer equipment
[4] 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.
[5] The maximum cost-share rate for land acquisition, storm sewer rerouting, and removal of structures necessary to install structural urban BMPs is 50%.
[6] If up to an additional 10% is funded by a county or other group, DNR will match up to 10%, making the cost-share rate 90%.

Table 5-1b. State Cost-Share % Rates for Urban Local Assistance Grants

Activity	State Cost-Share Rate
Design components of stormwater plans for urban development	100%
Conduct engineering feasibility studies for existing development for urban structural practices	100%
Evaluate alternatives for local financing of stormwater management programs	100%
Other practices used in NR 120.21	

Table 5-2. Practices Using a Flat Rate for State Cost-Share Funding

Best Management Practice	Flat Rate
Contour Farming	$ 6.00/ac[1]
Contour Strip Cropping	$ 12.00/ac[1]
Field Strip Cropping	$ 10.00/ac
Reduced Tillage	$ 45.00/ac[2]
Reduced Tillage	$ 15.00/ac[3]
Cropland Protection Cover (green manure)	$ 25.00/ac[4]

[1] Wildlife habitat restoration components of this practice are cost-shared at 70%.
[2] $45 per acre over 3 years for reduced tillage on continuous row croplands.
[3] $15 per acre for one year only for reduced tillage on crop rotations involving hay.
[4] $25 per acre for up to 3 years.

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 LCD 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.

See A Planners Manual for a brief description of some of the most commonly used BMPs included in table 5-1 and 5-2. A more detailed description of these practices can be found in NR 120.14.

Alternative 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 shall 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.

The following Alternative BMPs are being considered in this project:

- Long Distance Manure Application (manure brokering)
- Low Pressure Sprinkler Heads
- Nitrogen Injection Systems for Irrigation Systems
- Wetland creation on sites where wetlands did not previously exist is proposed as an alternative BMP.
- The development of lake shore buffers is also proposed as an alternative BMP. The buffers shall extend a minimum of 15 feet from the shoreline inland. Eligibility will be based on site inspections done by the county and DNR staff.

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 5-3. The capital cost of installing the BMPs are listed in this table assuming landowner participation rates of 100% and 75%. Also included are the units of measurement and cost per unit for the various BMPs.

The capital cost of installing the Best Management Practices is approximately $8.9 million, assuming 100% participation.

- State funds necessary to cost-share this level of control would be about $ 5.9 million.
- The local share provided by landowners and other cost-share recipients would be about $3.0 million.

At a 75% level of participation, the state funds needed to cover capital installation would be about $4.5 million.

Table 5-3a. Cost-Share Budget Needs for Rural Management Practices in Portage County

Best Management Practices	Number	Cost/Unit	Total Cost[1]	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Change in Crop Rotation	ac	NA (2)	0	0	0	0	0
Contour Cropping	600 ac	$6	3,600	3,600	(3)	2,700	(3)
Contour Strip Cropping	600 ac	$12	7,200	7,200	(3)	5,400	(3)
Reduced Tillage (4)	1,500 ac	$45	67,500	67,500	(3)	50,625	(3)
Reduced Tillage (5)	1,500 ac	$15	22,500	22,500	(3)	16,875	(3)
Critical Area Stabilization	90 ac	$1,000	90,000	63,000	27,000	47,250	20,250
Tree Planting	90 ac	$150	13,500	9,450	4,050	7,088	3,038
Grass Waterways	90 ac	$4,000	360,000	252,000	108,000	189,000	81,000
Field Diversions & Terraces	15,000 ft	$4	60,000	42,000	18,000	31,500	13,500
Grade Stabilization	30 ea	$9,000	270,000	189,000	81,000	141,750	60,750
Agricultural Sediment Basin	17 ea	$20,000	340,000	238,000	102,000	178,500	76,500
Nutrient Management (7)	75,550 ac	$8	453,300	226,650	226,650	169,988	169,988
Nutrient and Pest Mgmt. (7)	75,550 ac	$10	755,500	377,750	377,750	283,313	283,313
Shoreline Buffers	350 ac	$200	70,000	49,000	21,000	36,750	15,750
Wetland Restoration	17 ea	$2,000	34,000	23,800	10,200	17,850	7,650
Livestock Exclusion, Woods	7,000 rd	$20	140,000	140,000	(3)	105,000	(3)
Spill Control Basins	15 ea	$15,000	225,000	157,500	67,500	118,125	50,625
Animal Waste Management							
Barnyard Runoff Control							
Complete System	20 ea	$30,000	600,000	420,000	180,000	315,000	135,000
Roof Gutters	20 ea	$2,000	40,000	28,000	12,000	21,000	9,000
Clean Water Diversion	20 ea	$4,000	80,000	56,000	24,000	42,000	18,000
Manure Storage Facility (6)	34 ea	$45,000	1,530,000	901,000	629,000	675,750	471,750
Animal Lot Relocation	10 ea	$40,000	200,000	140,000	60,000	105,000	45,000
Cattle Mounds	20 ea	$3,000	30,000	21,000	9,000	15,750	6,750
Roof For Barnyard	10 ea	$10,000	100,000	70,000	30,000	52,500	22,500
Streambank Erosion Control							
Shape and Seeding	1,000 ft	$10	10,000	7,000	3,000	5,250	2,250
Fencing	800 rd	$20	16,000	11,200	4,800	8,400	(3)
Riprap	1,000 ft	$27	27,000	18,900	8,100	14,175	6,075
Livestock/Machinery							
Crossing/Watering Ramp	20 ea	$5,000	120,000	84,000	36,000	63,000	27,000
Remote Watering Systems	20 ea	$2,500	50,000	35,000	15,000	26,250	11,250
Fish Structures	20 ea	$300	6,000	4,200	1,800	3,150	1,350
Spring Development	10	$3,000	30,000	21,000	9,000	15,750	6,750
Subtotal:			$5,751,100	$3,686,250	$2,064,850	$2,764,688	$1,545,038
Easements	435 ac	$1,000	435,000	435,000	0	326,250	0
Totals			$6,186,100	$4,121,250	$2,064,850	$3,090,938	$1,545,038

[1] Total cost to control identified critical pollution sources
[2] NA means that cost share funds are not available for this practice
[3] Local share consists of labor and any additional equipment costs, also see flat rates
[4] Reduced tillage on greater than three years continuous row crops
[5] Reduced tillage, including no-till, on rotations including hay
[6] Maximum cost-share is $20,000

Source: DNR; DATCP; and the Land Conservation Department of Portage County

Table 5-3b. Cost-Share Budget Needs for Rural Management Practices in Waupaca County

Best Management Practices	Number	Cost/Unit	Total Cost[1]	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Contour Cropping	400 ac	$6	2,400	2,400	0	1,800	0
Contour Strip Cropping	400 ac	$12	4,800	4,800	(3)	3,600	(3)
Reduced Tillage (4)	815 ac	$45	36,675	36,675	(3)	27,506	(3)
Reduced Tillage (5)	815 ac	$15	12,225	12,225	(3)	9,169	(3)
Critical Area Stabilization	60 ac	$1,000	60,000	42,000	18,000	31,500	13,500
Tree Planting	60 ac	$150	9,000	6,300	2,700	4,725	2,025
Grass Waterways	150 ac	$4,000	240,000	168,000	72,000	126,000	54,000
Field Diversions & Terraces	5,000 ft	$4	20,000	14,000	6,000	10,500	4,500
Grade Stabilization	10 ea	$9,000	90,000	63,000	27,000	47,250	20,250
Agricultural Sediment Basin	8 ea	$20,000	160,000	112,000	48,000	84,000	36,000
Nutrient Management (7)	48,450 ac	$6	290,700	145,350	145,350	109,013	109,013
Nutrient and Pest Mgmt. (7)	48,450 ac	$10	484,500	242,250	242,250	181,688	181,688
Shoreline Buffers	150 ac	$200	30,000	21,000	9,000	15,750	6,750
Wetland Restoration	8 ea	$2,000	16,000	11,200	4,800	8,400	3,600
Livestock Exclusion, Woods	3,000 rd	$20	60,000	60,000	(3)	45,000	(3)
Spill Control Basins	5 ea	$15,000	75,000	52,500	22,500	39,375	16,875
Animal Waste Management							
Barnyard Runoff Control							
Complete System	8 ea	$30,000	240,000	168,000	72,000	126,000	54,000
Roof Gutters	8 ea	$2,000	16,000	11,200	4,800	8,400	3,600
Clean Water Diversion	8 ea	$4,000	32,000	22,400	9,600	16,800	7,200
Manure Storage Facility (6)	6 ea	$45,000	270,000	159,000	111,000	119,250	83,250
Animal Lot Relocation	2 ea	40,000	80,000	56,000	24,000	42,000	18,000
Cattle Mounds	4 ea	3,000	12,000	8,400	3,600	6,300	2,700
Roofs For Barnyard	2 ea	10,000	20,000	14,000	6,000	10,500	4,500
Streambank Erosion Control							
Shape and Seeding	4,000 ft	$10	40,000	28,000	12,000	21,000	9,000
Fencing	200 rd	$20	4,000	2,800	1,200	2,100	(3)
Rip-Rap	4,000 ft	$27	108,000	75,600	32,400	56,700	24,300
Livestock/Machinery							
Crossing/Watering Ramp	10 ea	$6,000	60,000	42,000	18,000	31,500	13,500
Remote Watering Systems	10 ea	$2,500	25,000	17,500	7,500	13,125	5,625
Fish Structures	10 ea	$300	3,000	2,100	900	1,575	675
Spring Development	5	3000	15,000	10,500	4,500	7,875	3,375
Subtotal:			$2,516,300	$1,611,200	$905,100	$1,208,400	$677,925
Easements	215 ac	$1,000	215,000	215,000	0	161,250	0
TOTALS			$2,731,300	$1,826,200	$905,100	$1,369,650	$677,925

[1] Total cost to control identified critical pollution sources
[2] NA means that cost share funds are not available for this practice
[3] Local share consists of labor and any additional equipment costs, also see flat rates
[4] Reduced tillage on greater than three years continuous row crops
[5] Reduced tillage, including no-till, on rotations including hay
[6] Maximum cost-share is $20,000

Source: DNR; DATCP; and the Land Conservation Department of Waupaca County

Table 5-3c. Cost-Share Budget Needs for Rural Management Practices in Portage and Waupaca Counties

Best Management Practices	Number		Cost/Unit	Total Cost[1]	100% Participation		75% Participation	
					State Share	Local Share	State Share	Local Share
Upland NPS Control								
Contour Cropping	1,000	ac	$6	6,000	6,000	(3)	4,500	(3)
Contour Strip Cropping	1,000	ac	$12	12,000	12,000	(3)	9,000	(3)
Reduced Tillage (4)	2,315	ac	$45	104,175	104,175	(3)	78,131	(3)
Reduced Tillage (5)	2,315	ac	$15	34,725	34,725	(3)	26,044	(3)
Critical Area Stabilization	500	ac	$1,000	150,000	105,000	45,000	78,750	33,750
Tree Planting	400	ac	$150	22,500	15,750	6,750	11,812	5,063
Grass Waterways	500	ac	$4,000	600,000	420,000	180,000	315,000	135,000
Field Diversions & Terraces	20,000	ft	$4	80,000	56,000	24,000	42,000	18,000
Grade Stabilization	100	ea	$9,000	360,000	252,000	108,000	189,000	81,000
Agricultural Sediment Basin	25	ea	$20,000	500,000	350,000	150,000	262,500	112,500
Nutrient Management (7)	165,012	ac	$6	744,000	372,000	372,000	279,000	279,000
Nutrient and Pest Mgmt. (7)	165,012	ac	$10	1,240,000	620,000	620,000	465,000	465,000
Shoreline Buffers	500	ac	$200	100,000	70,000	30,000	52,500	22,500
Wetland Restoration	25	ea	$2,000	50,000	35,000	15,000	26,250	11,250
Livestock Exclusion, Woods	10,000	rd	$20	200,000	200,000	(3)	150,000	(3)
Spill Control Basins	20	ea	$15,000	300,000	210,000	90,000	157,500	67,500
Animal Waste Management								
Barnyard Runoff Control								
Complete System	28	ea	$30,000	840,000	588,000	252,000	441,000	189,000
Roof Gutters	28	ea	$2,000	56,000	39,200	16,800	29,400	12,600
Clean Water Diversion	28	ea	$4,000	112,000	78,400	33,600	58,800	25,200
Manure Storage Facility (6)	60	ea	$45,000	1,800,000	1,060,000	740,000	795,000	555,000
Animal Lot Relocation	7	ea	40,000	280,000	196,000	84,000	147,000	63,000
Cattle Mounds	28	ea	3,000	42,000	29,400	12,600	22,050	9,450
Roofs For Barnyard	12	ea	10,000	120,000	84,000	36,000	63,000	27,000
Streambank Erosion Control								
Shape and Seeding	5,000	ft	$10	50,000	35,000	15,000	26,250	11,250
Fencing	1,000	rd	$20	20,000	14,000	6,000	10,500	(3)
Rip-Rap	5,000	ft	$27	135,000	94,500	40,500	70,875	30,375
Livestock/Machinery								
Crossing/Watering Ramp	30	ea	$6,000	180,000	126,000	54,000	94,500	40,500
Remote Watering Systems	30	ea	$2,500	75,000	52,500	22,500	39,375	16,875
Fish Structures	30	ea	$300	9,000	6,300	2,700	4,725	2,025
Spring Development	15		3,000	45,000	31,500	13,500	23,625	10,125
Subtotal:				$8,267,400	$5,297,450	$2,969,950	$3,973,088	$2,222,963
Easements	150	ac	$1,000	650,000	650,000	0	487,500	0
TOTALS				$8,917,400	$5,947,450	$2,969,950	$4,460,588	$2,222,963

[1] Total cost to control identified critical pollution sources
[2] NA means that cost share funds are not available for this practice
[3] Local share consists of labor and any additional equipment costs, also see flat rates
[4] Reduced tillage on greater than three years continuous row crops
[5] Reduced tillage, including no-till, on rotations including hay
[6] Maximum cost-share is $35,000
[7] Nutrient and Pest Management is cost shared per ac over a three year period. Therefore, number of acres shown represents three times the eligible acres.

Source: WI Department of Natural Resources; WI Department of Agriculture, Trade and Consumer Protection; and the Land Conservation Departments of Portage and Waupaca Counties.

Easement Costs

Chapter 4 identifies where nonpoint source program funds can be used to purchase easements. The estimated cost of purchasing easements on eligible lands in Waupaca and Portage Counties is shown in table 5-3. At 100% participation, the estimated purchase price of easements on eligible lands would be $650,000. At 75% participation, the cost would be $87,500. The easement costs would be paid for entirely by the state. However, it is very difficult to determine landowner response to easements as a management tool. Easements are a relatively new tool in the priority watershed program. Therefore, it is very difficult to estimate cost.

Cost Containment

Cost Containment Procedures

Chapter NR 120 requires that cost containment procedures be identified in this plan.

Cost-share payments will be based on actual installation costs. If actual installation costs exceed the amount of cost-sharing determined by the bidding, range of costs, and average cost methods the amount paid the grantee may be increased with the approval of the County Land Conservation Committee. Appropriate documentation regarding the need for changes will be submitted to DNR.

Average costs have been determined through experience in both Portage and Waupaca Counties. The average cost list will be reviewed periodically and appropriate changes made. If changes are made, the list will be forwarded to the DNR and the DATCP for final approval before the changes are used for calculating cost share agreements and payments.

Should either county prefer to use bidding procedures or DNR's flat rates, appropriate materials should be submitted to DNR.

Landowner Contact Strategy

County staff will contact and work with all landowners who have critical sites within 6 months of watershed plan approval. After critical sites have been contacted, county staff will work with landowners having eligible sites.

Critical Sites Notification Schedule

County staff have six months from the approval of the watershed plan to field verify that sites listed as critical are actually critical sites. This six month period may be extended.

After the field verification, "notification to landowner" must occur, in accordance with s. NR 120.09. After cost sharing has been available for 3 years, cost-share rates may be reduced.

Various appeals will be available to the landowner.

In accordance with S. 144.025(2)(u), (2)(v), and (2)(w), Stats., the department may issue a notice of intent to follow through with regulations and enforcement to a landowner of a site who fails to install best management practices or who fails to reduce the pollutants contributed by the site through alternative actions, if the site has been designated as a critical site in the priority watershed plan and the pollution is not caused by animal waste.

The department shall consult the DATCP when the source of pollution from the site is agricultural.

Notification Table

Table 5-x. Critical Sites Notification Schedule

NPS Pollutant Source	Year Plan Approved	Year Inventory Completed	Pollutant Reduction Goal (percent)	Pollutant Reduction Goal (units)	Critical Site Criteria	Number of Critical Sites	Year Notification of Critical Sites Expected Complete
Uplands/ Croplands	1995	1994	10%	530 tons of sediment	greater than 2.4 tons/acre/yr delivered to surface waters	11	1996
Barnyards draining to surface waters	1995	1994	10%	228 pounds of phosphorus	greater than 120 pounds of phosphorus/yr delivered	1	1996
Excessive nutrients applied to fields	1995	1994	n.a.	n.a.	over twice the nutrient needs of the crop are applied	unknown	unknown
Streambanks	1995	1994	15%	166 tons of sediment	greater than 250 tons/site/yr delivered to surface waters	1	1996

Cost Share Agreement Sign-Up Period

Landowners will have 8 years from the watershed plan approval date to sign up for cost share agreements. All cost-shared practices must be installed before the nonpoint source grant ends.

Extension of Sign-Up Period

The sign-up period may be extended, with approval by DNR, if a number of other eligible landowners are still interested in signing cost share agreements, and if there is a reasonable likelihood that BMPs will be installed before the end of the project.

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

Table 5-4 lists the total estimated staff needed to implement the project. Figures are provided for both the 50% and 75% levels of participation. A total of about 72,093 staff hours are required to implement this plan at a 75% landowner participation rate. This includes 20,800 staff hours to carry out the information and education program.

Currently, three positions are being funded on the Tomorrow/Waupaca watershed project staff. The county and agencies will determine the need for additional staff based on the annual Workload Analysis. The county will assess the number and type of staff required for the final five years of the project based on the actual landowner participation following the three year cost-share sign-up period.

Table 5-4a. Estimated Portage County Local Assistance Staff Needs for Ten Years of Project Implementation

PORTAGE		
Activity	**75% Landowner Participation (Staff Hours)**	**50% Landowner Participation (Staff Hours)**
Project & Financial Mgmt.	5,100	5,100
Inventory, Landowner Contacts,	3,165	2,110
Conservation Planning, and		
Cost-Share Agreement Development		
Practice Design & Installation		
Upland Sediment Control	10,500	7,000
Animal Waste Management	3,810	2,540
Streambank Erosion Control	816	544
Monitoring	450	300
Information & Education	10,400	10,400
Program		
Training	2,500	2,500
Total LCD Workload	41,533	34,471
Estimated Staff Required:	2.0 per yr	1.7 per yr
hours	4,153 per yr	3,447 per yr

Source: WI Department of Natural Resources; WI Department of Agriculture, Trade and Consumer Protection and Land Conservation Department of Portage County.

Table 5-4b. Estimated Waupaca County Local Assistance Staff Needs for Ten Years of Project Implementation

WAUPACA		
Activity	**75% Landowner Participation (Staff Hours)**	**50% Landowner Participation (Staff Hours)**
Project & Financial Mgmt.	5,100	5,100
Inventory, Landowner Contacts,	953	635
Conservation Planning, and		
Cost-Share Agreement Development		
Practice Design & Installation		
Upland Sediment Control	5,676	3,784
Animal Waste Management	1,068	712
Streambank Erosion Control	1,187	791
Monitoring	135	90
Information & Education	10,400	10,400
Program		
Training	2,500	2,500
Total LCD Workload	30,542	27,144
Estimated Staff Required:	1.5 per yr	1.3 per yr
hours	3,054 per yr	2,714 per yr

Source: WI Department of Natural Resources; WI Department of Agriculture, Trade and Consumer Protection and Land Conservation Department of Waupaca County.

Table 5-4c. Estimated Portage and Waupaca County Local Assistance Staff Needs for Ten Years of Project Implementation

PORTAGE AND WAUPACA COUNTIES		
Activity	75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project & Financial Mgmt.	10,200	10,200
Inventory, Landowner Contacts,	4,118	2,745
Conservation Planning, and		
Cost-Share Agreement Development		
Practice Design & Installation		
Upland Sediment Control	16,201	10,801
Animal Waste Management	4,878	3,252
Streambank Erosion Control	1,994	1,329
Monitoring	585	390
Information & Education	20,800	20,800
Program		
Training	5,000	5,000
Total LCD Workload	72,093	61,627
Estimated Staff Required:	3.5 per yr	3.0 per yr
hours	7,209 per yr	6,163 per yr

Source: WI Department of Natural Resources; WI Department of Agriculture, Trade and Consumer Protection and Land Conservation Department of Portage County.

Staffing Costs

The estimated cost for staff at the 75% participation rate (see table 5-5) is approximately $1.3 million. These costs will be paid by the state through the Local Assistance Grant Agreement.

Table 5-5a. Grant Disbursement Schedule at 75% Landowner Participation for Portage County

Item	Project Year			
	1	2	3-10	TOTAL
Cost-Share Funds: Practices	$552,938	$1,105,875	$1,105,875	$2,764,688
Cost-Share Funds: Easements	65,250	130,500	130,500	$326,250
Local Assistance Staff Support*	72,678	72,678	581,420	$726,780
Information/Education: Direct	2,500	2,500	10,000	$15,000
Other Direct: (travel, supplies, etc.)	6,000	6,000	18,000	$30,000
Urban	7,500	7,500	15,000	$30,000
Engineering Assistance	1,333	1,333	5,333	$8,000
TOTAL	$708,198	$1,326,386	$1,866,129	$3,900,718

* Salary + Indirect = $36,400/year

Source: WI Department of Natural Resources; WI Department of Agriculture, Trade and Consumer Protection and Land Conservation Department of Portage County

Table 5-5b. Grant Disbursement Schedule at 75% Landowner Participation for Waupaca County

Item	Project Year			
	1	2	3-10	TOTAL
Cost-Share Funds: Practices	$241,680	$483,360	$483,360	$1,208,400
Cost-Share Funds: Easements	32,250	64,500	64,500	$161,250
Local Assistance Staff Support*	53,445	53,445	427,560	$534,450
Information/Education: Direct	2,500	2,500	10,000	$15,000
Other Direct: (travel, supplies, etc.)	6,000	6,000	18,000	$30,000
Urban	7,500	7,500	15,000	$30,000
Engineering Assistance	833	833	3,333	$5,000
TOTAL	$344,208	$618,138	$1,021,753	$1,984,100

* Salary + Indirect = $36,400/year

Source: WI Department of Natural Resources; WI Department of Agriculture, Trade and Consumer Protection and Land Conservation Department of Waupaca County

Table 5-5c. Grant Disbursement Schedule at 75% Landowner Participation for Portage and Waupaca Counties

Item	Project Year 1	2	3-10	TOTAL
Cost-Share Funds: Practices	$794,618	$1,589,235	$1,589,235	$3,973,088
Cost-Share Funds: Easements	97,500	195,000	195,000	$487,500
Local Assistance Staff Support*	128,573	128,573	1,028,580	$1,261,580
Information/Education: Direct	7,500	7,500	15,000	$30,000
Other Direct: (travel, supplies, etc.)	12,000	12,000	36,000	$60,000
Urban Non-Structural Practices	15,000	15,000	30,000	60,000
Engineering Assistance	3,250	3,250	6,500	$13,000
TOTAL	$1,058,440	$1,950,558	$2,900,315	$5,885,168

* Salary + Indirect = $36,400/year
Source: WI Department of Natural Resources; WI Department of Agriculture, Trade and Consumer Protection and Land Conservation Department of Portage County

Total Project Cost

The total state funding required to meet the rural nonpoint source pollution control needs at a 75% level of landowner participation is presented table 5-5. This figure includes the capital cost of practices, staff support, and easement costs presented above. The estimated cost to the state is $5.9 million and the estimated cost to landowners and others is $3 million.

This cost estimate is based on projections developed by the agency planners and Land Conservation staff. Historically, the actual expenditures for projects are less than the estimated costs. The factors affecting expenditures for this watershed project include: the time it takes to plan the project; the length of time the project is under implementation; the amount of cost sharing that is actually expended; the number of staff working on the project; the amount of support costs; and the time local assistance is necessary.

CHAPTER SIX
Information and Education Program

Goals of the Program

The goal of the Information and Education (I & E) Program is to improve water quality by maximizing landowner participation in the Tomorrow/Waupaca Watershed Project.

Groundwater protection is the primary goal of this watershed project. The information and education (I&E) plan outlines the goals and objectives that will assist the local staff in protecting groundwater and surface water through project implementation. The I&E plan will be updated by the I&E committee on an annual basis. This committee will also develop the activities and associated costs on an annual basis.

Groundwater problems are not visualized as easily as surface water problems. Before landowners will adopt Best Management Practices (BMPs) their attitudes & beliefs about BMPs need to evolve. The I&E component is critical in this watershed to illustrate to landowners what groundwater problems are, where the problems come from 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 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 rural and urban 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.

Due to the large size of the Watershed and the diverse interests, five main target audiences were selected to be surveyed. The sample size for each audience was determined from the population in order to satisfy a maximum 5% level of error. The target audiences are listed below.

Audience

The primary audience of the I & E Program are priority watershed landowners who have been classified as eligible for project participation. Secondary audiences are 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: Dairy producers (includes livestock & non-irrigated cash grain)

2. Agricultural Audience: Irrigated vegetable producers.

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

4. Rural Non-Farm Audience: Landowners that: a) live outside city limits & subdivisions, b) do not produce crops, dairy or livestock, and c) do not live on or adjacent to a lake, river or stream.

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

Delivery Team

The Waupaca County Land and Water Conservation Department (LCD) will take the lead responsibility for the delivery of the I & E Program, with the University of Wisconsin–Cooperative Extension (UWEX), the DNR and the Department of Agriculture, Trade & Consumer Protection (DATCP) providing supporting assistance. The Waupaca and Portage County UWEX Agents have been and will continue to be integrally involved in this watershed project.

Objectives

Activities

To accomplish the objectives, numerous activities will be used including: newsletters, news releases, public meetings, demonstration tours, fact sheets, slide shows, and displays.

The following are the goals and objectives for the agricultural audience (dairy, livestock, and non-irrigated cash crop producers) derived from the FPI analysis. At least forty percent of the I&E Staff person's time will be spent accomplishing the objectives below with the remaining 60% of the time devoted to the other three audiences. The I&E committee will review this document annually and develop an Annual Plan of Operation that will include an activities list and associated costs. See tables 6-1 through 6-6.

Table 6-1. I & E Goals for Agriculture

Subwatershed	Total Nitrogen Application (lbs/ac/yr)			
	UWEX N Rec (lbs/ac)	Current N Rate[4] (lbs/ac)	% Surplus	Goal
Waupaca GPA[2] (n=2)[3]	120	258	+113%	Reduce current N rate by 30% to 180#/ac
Almond GPA[2] (n=2)	120	227	+89%	Reduce current N rate by 30% to 160#/ac
Spring Creek (n=27)	120	207	+73%	Reduce current N rate by 25% to 155#/ac
Upper Tomorrow (n=33)	120	204	+70%	Reduce current N rate by 25% to 155#/ac
Waupaca/ Weyauwega (n=19)	120	232	+45%	Reduce current N rate by 20%TO 185#/ac
Chain O' Lakes (n=10)	120	143	+20%	Reduce current N rate by 10% to 130#/ac
Crystal Creek (n=8)	120	145	+20%	Reduce current N rate by 10% to 130#/ac

[1] Based on 1994 FPI results.
[2] Groundwater Protection Area.
[3] Number in parenthesis indicates sample size.
[4] UWEX rate is average N recommendation for non-irrigated fields. This rate includes commercial N applications as well as Legume and manure N.

Table 6-2. I & E Objectives for Starter Fertilizer Application

Subwatershed	N Starter (lbs/ac/yr)			
	UWEX N Rec (lbs/ac)	Current N Rate (lbs/ac)	% Surplus	Objective
** Waupaca GPA[2] (n=2)[3]	20	15	0%	1) Ninety percent (90%) of all dairy/livestock farmers will limit starter fertilizer nitrogen applications to twenty pounds per acre (20 lbs/a) or less.
** Almond GPA[2] (n=2)	20	26	30%	
* Spring Creek (n=27)	20	34	70%	
* Upper Tomorrow (n=33)	20	38	90%	
Waupaca/Weyauwega (n=19)	20	19	0%	
Chain O' Lakes (n=10)	20	25	25%	
Crystal Creek (n=8)	20	27	35%	

[1] Based on 1994 FPI results.
[2] Groundwater Protection Area.
[3] Number in parenthesis indicates sample size.
* Indicates primary subwatershed target for I&E campaign from 1996-1999.

** Due to small number of dairy/livestock farmers in groundwater protection areas (GPA), Individual I&E strategies will be developed for each farm. These are the highest priority for I & E.

Table 6-3. I & E Objectives for Manure Crediting

Subwatershed	N Manure (lbs/a)			
	% That Credit[1]	Within 10% of UWEX Recommendations[1]	Weigh Loads	Objective
** Waupaca GPA[2] (n=2)[3]	100%	N.A.	0%	1) Three-fourths (75% of all dairy/ livestock farmers will credit nitrogen from manure applications.
** Almond GPA[2] (n=2)	50%	N.A.	100%	
* Spring Creek (n=27)	48%	50%	0%	
* Upper Tomorrow (n=33)	74%	0%	6%	
* Waupaca/Weyauwega (n=19)	64%	14%	0%	2) One-half (50%) of all dairy/livestock farmers will credit nitrogen from manure within 10% of UWEX recommendations.
Chain O' Lakes (n=14)	50%	10%	10%	
Crystal Creek (n=9)	33%	11%	0%	

[1] Based on 1994 FPI results.
[2] Groundwater Protection Area.
[3] Number in parenthesis indicates sample size.
* Indicates primary subwatershed target for I&E campaign from 1996-1999.

** Due to small number of dairy/livestock farmers in groundwater protection areas (GPA), Individual I&E strategies will be developed for each farm. These are the highest priority for I & E.

Table 6-4. I & E Objectives for Legumes

Subwatershed	N Legume (lbs/a		
	% That Credit[1]	Within 10% of UWEX Recommendations[1]	Objective
** Waupaca GPA[2] (n=2)[3]	100%	0%	1) Three-fourths (75%) of all dairy/livestock farmers will credit nitrogen from legumes. 2) One-half (50%) of all dairy/livestock farmers will credit nitrogen from legumes within 10% of UWEX recommendations.
** Almond GPA[2] (n=2)	58%	0%	
* Spring Creek (n=27)	69%	0%	
* Upper Tomorrow (n=33)	58%	0%	
* Waupaca/Weyauwega (n=19)	84%	0%	
Chain O' Lakes (n=10)	80%	0%	
Crystal Creek (n=9)	88%	0%	

[1] Based on 1994 FPI results.
[2] Groundwater Protection Area.
[3] Number in parenthesis indicates sample size.
* Indicates primary subwatershed target for I&E campaign from 1996-1999.

** Due to small number of dairy/livestock farmers in groundwater protection areas (GPA), Individual I&E strategies will be developed for each farm. These are the highest priority for I & E.

Table 6-5. I & E Objectives for Soil Testing

Subwatershed	Soil Testing	
	% Using	Objective
** Waupaca GPA[2] (n=2)[3]	100%	1) Two-thirds (68%) of dairy/livestock farmers will use routine soil test results to determine nitrogen application needs.
** Almond GPA[2] (n=2)	50%	
* Spring Creek (n=27)	37%	
* Upper Tomorrow (n=33)	18%	
* Waupaca/Weyauwega (n=19)	53%	
Chain O' Lakes (n=10)	33%	
Crystal Creek (n=9)	66%	

[1] Based on 1994 FPI results.
[2] Groundwater Protection Area.
[3] Number in parenthesis indicates sample size.
* Indicates primary subwatershed target for I&E campaign from 1996-1999.

** Due to small number of dairy/livestock farmers in groundwater protection areas (GPA), Individual I&E strategies will be developed for each farm. These are the highest priority for I & E.

Table 6-6. I & E Objectives for Crop Scouting

Subwatershed	Crop Scouting	
	% Using	Objective
** Waupaca GPA[2] (n=2)[3]	0%	1) One-third of dairy/livestock farmers will implement a routine crop scouting program to avoid any unwarranted pesticide applications.
** Almond GPA[2] (n=2)	0%	
* Spring Creek (n=27)	0%	
* Upper Tomorrow (n=33)	0%	
* Waupaca/Weyauwega (n=19)	37%	
Chain O' Lakes (n=10)	0%	
Crystal Creek (n=9)	11%	

[1] Based on 1994 FPI results.
[2] Groundwater Protection Area.
[3] Number in parenthesis indicates sample size.
* Indicates primary subwatershed target for I&E campaign from 1996-1999.

** Due to small number of dairy/livestock farmers in groundwater protection areas (GPA), Individual I&E strategies will be developed for each farm. These are the highest priority for I & E.

The following are the general goals and objectives for the Urban, Rural Non-Farm and Riparian audiences. These objectives are dynamic and changing. The FPI results will not be complete until the fall of 1995. Once the FPI data for these audiences are analyzed, these objectives will be rewritten in measurable forms.

Sixty percent of the I&E Staff person's time will be spend accomplishing the objectives below. The I&E committee will review the document annually and develop an Annual Plan of Operation that will include an activities list and the associated costs. See tables 6-7 through 6-12.

Table 6-7. Urban, Rural Non-Farm & Riparian Nutrient Management Objectives

Goal: Nutrient Management	Audience		
Objective	Urban	Rural Non-Farm	Riparian
Landowners will take regular lawn soil tests and fertilize by following UWEX recommendations	X	X	X
Landowners will be able to develop and maintain yard compost	X	X	X
The watershed community will recognize and select lawn care companies that apply nutrients and pesticides at UWEX recommended rates	X	X	X
The watershed community will increase their knowledge and acceptance of properly applied septic/municipal sludge spreading on farm fields		X	
Public grounds managers will implement UWEX soil fertility and integrate pest management recommendations	X	X	X

Table 6-8. Urban, Rural Non-Farm & Riparian Objectives

Goal: Well Protection	Audience		
Objectives	Urban	Rural Non-Farm	Riparian
Landowners will be able to abandon wells according to DNR guidelines		X	X
Landowners will be able to construct wells according to DILHR guidelines		X	X
Residents with private wells will conduct annual water testing for at least nitrate and coliform bacteria	X	X	X
Residents will be able to properly maintain scheduled pumping and inspection of their septic system and holding tank		X	
Homeowners will be able to describe how septic systems negatively impact groundwater		X	

Table 6-9. Urban, Rural Non-Farm & Riparian Objectives

Goal: Stormwater Management	Audience		
Objectives	Urban	Rural Non-Farm	Riparian
Residents will be able to explain the connection between storm drain runoff and surface water problems	X		X
Residents will use alternatives to salt for removal of ice and snow	X		
After new development occurs, runoff will not increase from impervious areas	X		X
Local municipalities will implement and manage stormwater safe snow and leaf removal	X		
Developers will submit and follow a stormwater management plan	X		

Table 6-10. Urban, Rural Non-Farm & Riparian Objectives

Goal: Household Hazardous Waste Reduction	Audience		
Objectives	Urban	Rural Non-Farm	Riparian
Residents will reduce consumption of hazardous household items and increase use of groundwater safe alternatives	X	X	X

Table 6-11. Urban, Rural Non-Farm & Riparian Objectives

Goal: Lakeshore/Streambank Protection	Audience		
Objectives	Urban	Rural Non-Farm	Riparian
Residents will be able to implement and maintain streambank restoration			X

Table 6-12. Urban, Rural Non-Farm & Riparian Objectives

Tomorrow/Waupaca Priority Watershed Land/ Stormwater Management Objectives	Audience		
Objectives	Urban	Rural Non-Farm	Riparian
* Public officials and local residents will increase their knowledge and understanding of the direct relationship between land use and potential surface/groundwater contamination.	X		
* Public officials will encourage growth and development to be located on lands least susceptible to potential surface/groundwater contamination.	X		
* Local elected officials, particular planning and zoning committees, will make land management decisions based on minimal potential of surface/groundwater contamination.	X		
* Developers and contractors will employ techniques to reduce or eliminate potential surface/groundwater contamination.	X		

Community Involvement

Community involvement during the development of this plan has been quite high. The Steering Committee met regularly, there were numerous public meetings, outreach was done by county staff, and feedback was received through both formal and informal processes.

For this project to be effective, community involvement needs to remain high. Local staff are dedicated to the informal gathering of feedback and regularly respond to community-generated ideas. More formal involvement will be sought through information and education programs, and at the annual watershed evaluation meeting.

Activities

To accomplish the goals and objectives numerous activities will be used including newsletters, news releases, public meetings, demonstration tours, fact sheets, slide shows and displays.

Summary of Previously Completed I & E Tasks

Several items of the I & E strategy have been completed previous to the implementation stage of this watershed project. They were paid for with previous grants. Some examples include:

- Eight demonstration projects that show area landowners the benefits of and promotes nutrient management and irrigation scheduling.
- Three urban watershed awareness signs in the City of Weyauwega.
- Monthly news releases to two area newspapers that target seasonal water quality issues for each audience.
- Promotional wind-breaker jackets with project logo given to the landowners that participated in the demonstration projects mentioned above.
- Promotional baseball style hats, pens and magnets given away at County fairs, meetings and to landowners who participate in the project.
- Project brochures explaining the project, its goals, the timeline and how to get involved.
- Introductory newsletter distributed to all audiences and an agricultural newsletter informing landowners of the types of cost-share practices available and when cost-sharing beginning.
- Complimentary information packet containing DNR, UWEX and Watershed publications on activities and practices that protect water quality to interested landowners that completed the FPI Survey.
- Stormdrain stenciling in the City of Waupaca.

Project Evaluation

The FPI survey is being used to provide baseline information on landowners attitudes and behaviors to direct the I&E plan. At the sunset of this project the FPI survey will be distributed again to each target audience to track the effectiveness of the I&E effort. In addition, evaluations will be done on an individual educational event basis to chart the effectiveness of different educational approaches and to improve programs for future use.

Costs

Costs for the educational portion of the project are difficult to separate from the entire project. Similarly it is rarely possible to identify a single event that caused a landowner to change land use behaviors. Therefore, only rough estimates of true I & E costs are possible. See table 6-13.

Table 6-13. Information and Education Budget and Staff Needs

Goal	Total Direct Cost (10 yr project)	Estimated Staff Hours[1]	
		Years 1-3	Years 4-8
Nutrient Management[2]	$20,000	2,500	1,600
Well Protection	$5,000	3,000	5,000
Stormwater Management[3]	$20,000	6,000	2,500
Household Hazardous Waste Reduction	$5,000	3,000	5,000
Lakeshore/Streambank Protection	$5,000	6,000	1,000
Citizens Advisory Committee	$5,000	3,000	5,000
Growth Management	$10,000	6,000	2,500
Totals	$60,000	6,100	11,100

[1] Staff time will come primarily from the watershed I & E staff technician, with assistance from Waupaca and Portage County UWEX Agents.

[2] Agricultural costs are listed in table 5-3. Cost listed here includes signs, tours, mailings for agricultural and urban demonstrations.

[3] An additional $200,000 is included in table 5-5 for urban practices.

CHAPTER SEVEN
Integrated Resource Management Program

Introduction

The purpose of this chapter is to define the principles and guidelines for assuring that the watershed project is coordinated with other resource management programs, organizations, and activities. Each of these activities is described below.

Fisheries

Watershed best management practices (BMPs), such as streambank protection, shoreline buffer strips, and easements, should be implemented in such a way that will enhance fishery management goals. Specifically, all streambank protection BMPs should be installed in such a way that fisheries habitat is enhanced. Large diameter-sized rock should be used below the water line. Rock riprap should be installed and sized so that the placement and size of rock will positively benefit trout habitat. The fishery manager should be consulted for input in the design of each streambank protection BMP.

Wetland Restoration

Significant amounts of restorable wetland areas exist in this watershed. The general guidelines for wetland restoration, easement acquisition, and shoreline buffers to protect existing wetlands should be followed. Wetlands that are important wildlife habitats will be identified by the U.S. Fish and Wildlife Service in consultation with the DNR private lands manager. Shoreline buffer easements may be acquired adjacent to these wetlands to better protect them from sedimentation and other nonpoint source pollution.

In addition to the normal priority watershed funding, additional cost-sharing may be available to provide for a 100 percent payment for installation of the BMP. This additional funding may be available through the DNR district private lands manager, and/or the U.S. Fish and Wildlife Service. Eligibility for this additional funding would be determined by the DNR's private lands manager or the district nonpoint source coordinator.

As described in Chapter 4, eligibility requirements for cost-sharing of barnyard practices take into consideration what type of wetland is being impacted by runoff, with the recognition that some types of wetlands utilize nutrients more effectively than others.

Riparian Zones

Where possible, riparian zones along creeks should be protected with fencing to protect them from livestock grazing and trampling. These can be acquired through easements so that they receive lasting protection. These areas are important wildlife habitats, particularly for wood ducks. This watershed also has nesting sites and habitat for Blanding's turtles which should be protected.

A frog censusing survey was conducted as part of the watershed appraisal. 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 afterward to document population changes.

- if volunteers are not reliable or available, there should be some funding made available to hire an outside party to run these surveys. The survey periods are very short, so the hours involved will be a small number as well. One option would be to coordinate with UWSP to conduct the amphibian surveys.

Upland Wildlife Habitat

In this watershed, one goal of upland BMPs is to reduce nitrogen contamination of groundwater. The options most likely to be tried include the altering of cropping patterns. As these practices may impact wildlife habitat, the DNR wildlife manager should be consulted. The following practices may meet water quality goals, while benefiting wildlife:

- remove land from vegetable production, either with fee title purchase or perpetual easements, and establish permanent cover.

- integrate a grass or hay crop in the crop rotation, providing a subsidy during those years to offset income loss.

- promote the growing of prairie grasses and forbs for seed production (there is a growing market for this) and/or fuel (developing technology).

- investigate the possibility of alternative vegetable crops which do not require as much fertilizer or pesticides.

This watershed also has nesting sites and good habitat for red shouldered hawks, which should be protected.

Stewardship

The streambank protection program under stewardship is an important additional means of protecting water quality. Under this program, the DNR could obtain an easement on both sides of the stream (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:

- Bear Creek
- Emmons Creek
- Poncho Creek
- Tomorrow River (and some tributaries)
- North Branch Radley Creek (a.k.a. Murray Creek)
- Spring Creek
- Mack Creek
- Waupaca River (and some tributaries)

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

Endangered Resources Area Sites, Threatened and Special Concern Species

Endangered, threatened, and special concern species and nine natural areas are listed in the appendix of the plan. To the best extent possible, every effort should be made to protect these species. If specific to rational or other information is needed, contact the DNR Bureau of Endangered Resources.

Cultural Resources

Procedures for coordination with state and federal historic preservation laws are outlined in A Planners Manual. Special consideration may be needed when structural best management practices are being installed. Settling basins, manure storage structures, and streambank or shoreline shaping and riprapping are practices that may impact archaeological sites.

Coordination with State and Federal Conservation Compliance Programs

The Tomorrow/Waupaca 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.

Coordination with the Federal Energy Regulatory Commission (FERC)

The dams at Waupaca and Weyauwega influence the water levels on the Tomorrow/Waupaca River. Large fluctuations (up to 4 feet in a single release) have caused concern. Both Blanding's turtles and wood turtle are known to inhabit this watershed, and they would use the exposed sandy banks as nesting areas. It may not be within the power of the watershed project to control, but damage to turtle nests should be considered as a reference point for when the dams are up for FERC relicensing.

Forest Management

Nonindustrial private forests (NIPFs) make important contributions to both the environmental quality and the wood products requirements of the United States. Changing policies on public lands have increased the need for more intensive management of natural resources on private lands. Financial Assistance is available for forest management and soil and water protection by means of the Stewardship Incentive Program (SIP) and the Managed Forest Law (MFL).

Stewardship Incentive Program

The Stewardship Incentive Program (SIP) was authorized to stimulate enhanced management of NIPF lands by cost-sharing approved management practices. SIP provides cost share funding of up to 75 percent for practices that provide soil and water protection. Practices that are cost-shared by SIP are (1) development of a landowner forest stewardship plan, (2) site preparation and tree planting, (3) timber stand improvement, (4) windbreak and hedgerow establishment, (5) soil and water protection and improvement, (6) riparian and wetland protection and improvement, (7) fisheries habitat enhancement, (8) wildlife habitat enhancement and (9) forest recreation enhancement. The SIP program applies to nonindustrial private forest land of 10 acres or more on forested or forest related (i.e., prairie, wetlands) lands.

Managed Forest Law

The goal of the Managed Forest Law (MFL) 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 landowner's 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.

For more information about financial assistance for forest management, call your local DNR forester

CHAPTER EIGHT
Project Evaluation

Introduction

This chapter briefly summarizes the plan for monitoring the progress and evaluating the effectiveness of the Tomorrow/Waupaca Priority Watershed Project. The evaluation strategy includes these components:

- Administrative review.
- Pollution reduction evaluation.

Information on these components will be collected by the Portage and Waupaca County LCDs and reported on a regular basis to the DNR (DNR) and the DATCP (DATCP). Additional information on the numbers and types of practices on cost-share agreements; funds encumbered on cost-share agreements, and funds expended will be provided by the DNR's Bureau of Community Assistance.

Fiscal Management Procedures, Reporting Requirements

Portage and Waupaca Counties are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Tomorrow/Waupaca Watershed Project. The records of all watershed transactions must be retained for 3 years after the date of final project settlement. A more detailed description of the fiscal management procedures can be found in NR 120.25 and NR 120.26. NR 120 requires quarterly reports to DATCP from the county in accordance with s. Ag. 166.40(4) accounting for staff time, expenditures, and accomplishments regarding activities funded through the watershed project. Reimbursement requests may be included with the submittal of the quarterly project reports.

Administrative Review

The first component, the administrative review, will focus on the progress of Portage and Waupaca Counties in implementing the project. The project will be evaluated with respect to accomplishments, financial expenditures, and staff time spent on project activities.

1. **Accomplishment Reporting**

The Field Office Computer System, called FOCS, is a computer data management system that has been developed by the U.S. Natural Resource Conservation Service (NRCS). The NRCS, the DNR and the DATCP use FOCS to meet the accomplishment reporting requirements of all three agencies. The County LCDs are strongly encouraged to use FOCS to collect data for administrative accomplishments, and will provide the information to the DNR and the DATCP for program evaluation.

The County LCD(s) will provide the following data to the DNR and the DATCP on an annual basis:

- Number of personal contacts made with landowners.
- Completed information and education activities.
- Number of farm conservation plans prepared for the project.
- Number of cost-share agreements signed.
- Number of farm conservation plan and cost-share agreement status reviews completed.
- Number of farms and acres of cropland checked for proper maintenance of BMPs.

In addition to annual reports, County(s) representatives will meet with the DNR and the DATCP staff annually to review progress and plan for the subsequent year.

2. **Financial Expenditures**

County(s) will provide the following financial data to the DNR and the DATCP on a annual 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 LCD staff.
- Amount of money paid for installation of BMPs, and money encumbered in cost-share agreements.

County(s) will also provide both agencies with the following financial data on an annual basis:

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

3. **Time Spent On Project Activities**

County(s) will provide time summaries to both departments for the following activities on a 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.

Pollutant Reduction Evaluation

Key Nonpoint Sources for Evaluating Pollutant Load Reductions

The purpose of the second evaluation component, pollutant load reduction, is to calculate reductions in the amount of key pollutants as a result of installing BMPs. Key sources were identified for estimating changes in pollutant loads that reach surface waters and groundwater in the Tomorrow/Waupaca Watershed; upland sediment, and runoff from barnyards and fields spread with manure, and streambank/shoreline erosion. The groundwater pollutant load reductions for nitrate nitrogen will be evaluated indirectly through the use of nutrient management plans implemented (acres).

As described in Chapter Three, this plan calls for the following pollutant reductions for all subwatersheds:

Pollutant load reductions are developed according to activities needed to achieve the water quality objectives. The following is a summary of reductions to be targeted for the entire watershed.

Sediment Goal: Reduce overall sediment delivered by 10 percent. To meet this goal, the following is needed:

- Ten percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- Fifteen percent reduction in streambank sediment delivered to all streams.

Phosphorus Goal: Reduce overall phosphorus load to surface waters by 10 percent. To meet this goal, the following is needed:

- Ten percent reduction in organic pollutants from barnyards in all subwatersheds.

Nitrogen Goal: Reduce overall nitrogen load to groundwater.

The following areas will be evaluated to determine if targeted pollutant load reductions have been achieved:

Streambanks

County (LCDs) staff will calculate changes in streambank sediment in terms of tons of sediment and length of eroding sites. A tally will be kept of landowners contacted, the amount of streambank sediment being generated at the time of contact, and changes in erosion levels estimated after installing BMPs.

Upland Sediment Sources

County(s) will use the sediment delivery spreadsheet model to estimate sediment reductions due to changes in cropping practices. The counties will provide data on an annual basis, as described above. If possible, this data will be reported through FOCs.

Barnyard Runoff

County(s) will use the BARNY (Modified ARS) model to estimate phosphorus reductions due to the installation of barnyard control practices. The county will report the information to the DNR through FOCs.

Nutrient Management

County(s) will record the number of cropland acres under a nutrient management plan (NRCS Standard 590). Also recorded, if possible, will be the number of acres having soils with permeability rates greater than 6 inches per hour where nutrient management plans have been implemented.

Critical Sites

County(s) will report to DNR when each designated critical site has been corrected. As mentioned in Chapter 4, there are 13 designated Critical Sites. See table 8-1. See Chapters 4 and 5 for additional critical sites language.

Table 8-1. Critical Sites

Pollutant Source	Number of Sites
Upland Sediment	11
Streambank Sediment	1
Barnyard Nutrients	1
Excessive Nitrogen Application	unknown

CHAPTER NINE
Watershed Resources Evaluation Monitoring

Introduction

The goal of the priority watershed evaluation monitoring program is to evaluate the progress of the nonpoint source control program toward improving the quality of water resources.

Monitoring objectives are to:

- Evaluate whether water quality "objectives" resulting from implementation of best management practices at specific sites have been attained.
- Evaluate whether pollutant load reduction goals have been met and the effectiveness of those goals in improving water quality at specific sites.
- Evaluate the BMP implementation process, and the effectiveness of BMP's in reducing the pollutants at specific sites.
- Evaluate the application of priority watershed plans to the management of water resources, and the attainment of water quality standards and beneficial uses.

Program Organization

1. Evaluation monitoring activities in priority watersheds will be planned and conducted according to monitoring program guidance in the Bureau of Water Resources, Surface Water Monitoring Strategy.

   Evaluation monitoring can be conducted at selected sites in basins on the 5-year basin assessment schedule. Or they, can be conducted at selected sites as special projects, depending on other monitoring priorities.

2. Evaluation monitoring may be conducted on selected waterbodies in priority watersheds that meet specific site selection criteria. These sites would be part of a statewide strategy designed to meet the program evaluation monitoring goal and objectives.

3. Evaluation monitoring need not be conducted in each priority watershed.

Site Selection Criteria

The following criteria are suggested for site selection in agricultural watersheds to be intensively evaluated as part of basin assessments, or as special projects:

Location

- Where BMPs are planned but yet to be implemented in priority watersheds;
- Where serious water quality, habitat or both problems exist, and a direct cause/effect relationship between problems and nonpoint sources are obvious;
- Where a high probability exists that appropriate BMPs will be installed in the site's watershed. If possible, final monitoring site selection should come after cost-share agreements have been signed. Extra effort should be made to achieve full participation by all landowners;
- Where sites are not meeting attainable uses and have a high potential to improve following management of nonpoint sources;
- Where reference sites with similar characteristics, including attainable uses, are available in the same or adjacent watersheds. A reference site can be either an impacted site that will not be managed, or preferably, a site without water quality problems and meeting attainable uses. The important consideration is that reference site conditions are not expected to change except due to climatic conditions; and
- Where sites have adequate access for sampling personnel and equipment.

Size

- Sites should be located on permanent streams large enough to support well developed fish communities. Streams should be 5 to 30 feet wide with base flows of 1 to 20 cfs; and
- Watersheds should be manageable with areas of 5 to 50 square miles.

Water Quality

- Suspected or known water quality problems should be caused by manageable nonpoint sources should not be present or not significant; and
- Point sources should not be present or not significant; and

- Potential sources of problems that cannot or are unlikely to be managed should not be present.

Habitat

- Habitat problems should be caused by poor land use practices immediately adjacent to or near sites, and in-stream habitat should have a high potential to improve following implementation of BMPs; and

- Sites should not be selected that have been ditched within 10 to 15 years.

Site Selection Process

Potential evaluation monitoring sites can be located while conducting basin assessments, or conducting appraisal monitoring in newly selected priority watersheds. Selecting potential sites during the appraisal monitoring process is recommended.

Reconnaissance surveys can be conducted to locate sites that meet evaluation monitoring criteria in on-going priority watershed projects. When potential sites are located by reconnaissance, data should be obtained to determine if site selection criteria are met. And, county staffs should be contacted to determine the potential for landowner participation.

Sites selected for evaluation should meet most of the selection criteria, including the presence of appropriate reference sites.

Evaluation Monitoring Approaches

Priority watershed evaluation monitoring projects can be conducted as part of basin assessments on a 5-year schedule, or as special projects subject to Bureau approval of annual monitoring plans. Intensive evaluation monitoring will continue to be conducted at "master monitoring" sites by the Bureau of Research, United States Geological Service and Water Resources Management staff. Basin assessments, special projects and monitoring project work planning are discussed in the Bureau's Monitoring Strategy.

The following evaluation monitoring options are provided as guidance for developing monitoring plans. Any option, or a combination of options, may be used for evaluating priority watershed projects.

Basin Assessment Approach

1. Select specific sites in priority watersheds that meet site selection criteria, including at least on reference site per treatment site. Intensively monitor these sites during the

basin assessment year to establish pre-implementation surface water conditions. Evaluation monitoring projects should be designed to fit individual site characteristics, but should generally include collection of water chemistry, habitat, fish community and macroinvertebrate data.

These same sites should be monitored again in 5 years (post-implementation) when the basin is scheduled to be reassessed. These data would be compared to pre-implementation data to evaluate site specific improvements resulting from implementation of BMPs. Monitoring on a 5-year schedule would continue if appropriate.

2. Repeat appraisal type monitoring at selected sites in priority watersheds on the 5-year basin assessment schedule.

   The general water resource conditions in all priority watersheds will be assessed by conducting appraisal monitoring for developing priority watershed management plans. Appraisal monitoring provides a general water resource quality and problems assessment that, when repeated during future basin assessments, can be used to evaluate surface water quality improvements, especially where they are significant.

   When conducted on the 5-year basin assessment schedule, pre-implementation appraisal monitoring data may be compared to watershed wide assessment (using appraisal monitoring techniques) data, to provide a general, but adequate priority watershed project evaluation.

   This approach would provide an evaluation of more surface waters in a priority watershed, and an evaluation of the overall results of a priority watershed project.

Special Project Approach

3. This approach is essentially the same as the basin assessment intensive monitoring approach (option 1), except that sites may be monitored more frequently, and would be planned as special projects. Guidance for special project planning is provided in the Bureau's Monitoring Strategy.

Watershed Evaluation

Evaluation monitoring will be conducted during the eight year implementation phase and will continue for an additional two years. Thus evaluation monitoring activities will not be completed until 2005.

North Central District staff recommends a 5-year basin assessment approach. If time and staff are available and if it is approved in the district surface water monitoring plan, a special

project monitoring approach will also be considered at selected sites which meet the site selection criteria.

Basin Assessment Approach

- Watershed Streams

  Currently no streams are scheduled for evaluation monitoring.

- Watershed Groundwater

  As described in Chapter Three, watershed staff recommend on-going evaluation of groundwater. The funding and workload associated with this will be determined by District Staff priorities.

Special Projects Approach

District staff may propose more intensive/frequent monitoring at selected sites. Again this is optional and its implementation is based on available staff time and approval in the districts surface water monitoring plan.

It is proposed that each site will be monitored on an annual basis prior to and after installation of management practices. The reference site will be evaluated to account for natural variation.

1. Signs of Success (SOS)

   Sites likely to show rapid visual improvement may be eligible to be an SOS site. District staff will make the determination.

2. Groundwater monitoring

   Chapter 3 describes several monitoring options. DNR will fund those projects as funding is available. Of particular interest are the high capacity irrigation wells, which may have the best potential to show water quality improvements over the 10 year watershed project.

APPENDIX A

Endangered Resources

List of Endangered Species

It should be noted that comprehensive endangered resource surveys have not been completed for the entire Tomorrow/Waupaca 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 so are not in the lists below.

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

Any species 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:

Lycaeides melissa samuelis, purple milkweed
Oxytropis campestris var chartacea, fassett's locoweed[1]
Tyto alba, barn owl

[1]This species is also on the Federal Endangered Species list as threatened.

Wisconsin Threatened Species

Any species which appears likely, within the foreseeable future, on the basis of scientific evidence, to become endangered. Wisconsin threatened species within the watershed are:

Psilocarya scirpoides, bald rush (plant)
Tritogonia verrucosa, buckhorn
Buteolineatus, red-shouldered hawk
Valeriana sitchensis ssp uliginosa, marsh valerian (plant)
Emydoidea blandingii, blanding's turtle
Notropis anogenus, pugnose shiner
Lythrurus umbratilis, redfin shiner
Clemmys insculpta, wood turtle
Moxostoma valenciennesi, greater redhorse (fish)
Pandion haliaetus, osprey
Haliaeetus leucocephalus, bald eagle[2]

Wisconsin Special Concern Species

Any species about 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:

Lycaeides melissa samuelis, karner blue butterfly
Carex sychnocephala, many-headed sedge
Bartonia virginica, screwstem
Eleocharis quinqueflora, few-flowered spike-rush
Pleurobema sintoxia, round pigtoe (mussel)
Etheostoma microperca, least darter
Cardamine pratensis var palustris, cuckoo flower
Arethusa bulbosa, dragon's mouth
Enallagma anna, river bluet
Etheostoma microperca, least darter
Notropis texanus, weed shiner
Ammocrypta clara, western sand darter
Opsopoeodus emiliae, pugnose minnow
Ammocrypta clara, western sand darter
Notropis texanus, weed shiner
Erimyzon sucetta, lake chubsucker
Acipenser fulvescens, lake sturgeon
Viburwum cassinoides, withe rod (plant)
Cypripedium reginae, showy lady's slipper
Myriophyllum farwellii, farwell's water-milfoil (plant)

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

Natural Areas

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

Dry prairie, dry prairie
Northern dry-mesic forest, northern dry-mesic forest
Spring pond, spring pond
Emergent aquatic, emergent aquatic
Springs and spring runs, hard, springs and spring runs, hard
Northern mesic forest, northern mesic forest
Northern wet forest, northern wet forest
Southern sedge meadow, southern sedge meadow
Alder thicket, alder thicket
Lake—shallow, soft, seepage, lake—shallow, soft, seepage
Coastal plain marsh, coastal plain marsh
Sand prairie, sand prairie
Oak barrens, oak barrens
Lake—deep, hard, drainage, lake—deep, hard, drainage
Southern dry-mesic forest, southern dry-mesic forest
Lake—shallow, hard, seepage, lake—shallow, hard, seepage
Dry prairie, dry prairie
Pine barrens, pine barrens
Lake—oxbow, lake—oxbow
Shrub-carr, shrub-carr
Shrub-carr, shrub-carr
Lake—shallow, hard, drainage, lake—shallow, hard, drainage
Floodplain forest, floodplain forest
Calcareous fen, calcareous fen
Stream—slow, hard, cold, stream—slow, hard, cold
Northern dry forest, northern dry forest
Northern sedge meadow, northern sedge meadow
Lake—deep, hard, seepage, lake—deep, hard, seepage
Northern wet-mesic forest, northern wet-mesic forest
Lake—soft bog, lake—soft bog
Open bog, open bog

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 distributed documents.

APPENDIX B

Solid Waste Disposal Sites in the Tomorrow/Waupaca Watershed

Facility Name	City
Village of Almond	Almond
Town of Amherst	Amherst
Village of Amherst	Amherst
Village of Amherst Municipal Waste	Amherst
City of Waupaca	Waupaca
City of Waupaca	Waupaca
David Shambeau	Waupaca
Edsel Huntoon	Waupaca
Pehlman Landfill	Waupaca
Waupaca Foundry	Waupaca
Waupaca Foundry Company	Waupaca
Waupaca Foundry Inc.	Waupaca
Waupaca Foundry LF #2	Waupaca
Wisc. Public Ser. Comm (wood)	Waupaca
City of Weyauwega	Weyauwega
Mr. Lenard (wood)	Weyauwega
Strver Lumber Co. (wood)	Weyauwega
Weyauwega Brush Disposal	Weyauwega
Weyauwega Landfill Weyauwega	

Petroleum Storage: Leaking Underground Storage Tank (LUST) Sites in the Tomorrow/Waupaca Watershed.

The Wisconsin Remedial Response Site Evaluation Report (PUBL-SW-144-91) lists the sites identified through the LUST program.

Site Name	City
Blaine Store	Almond
Pagel Construction Company, Inc.	Almond
Amherst Telephone Company	Amherst
Chadzick Residence	Amherst
Helbach Farm (Robert)	Amherst
Rosz, William	Amherst
Tomorrow Valley Coop Services	Amherst

Site Name	City
Farm Credit Services	Amherst Junction
Slickers Store	Amherst Junction
Lake Emily County Park	Amherst Junction
Custer Repair	Custer
Former Valley View Garage Site	Custer
Griffith Residence (Dean)	Custer
Phillips 66 Station (Former)	Nelsonville
Nelson Farms—North	Sheridan
Auto Stop Self—Service Station	Waupaca
Bowlby Candy Company	Waupaca
Clark Oil Station #123	Waupaca
Hansen Auto Exchange	Waupaca
Hanson, Lillian	Waupaca
Hetzel Marine	Waupaca
Kwik Trip Store #625	Waupaca
Mills Fleet Farm	Waupaca
Prell's Boat Livery	Waupaca
Spanbauer	Waupaca
Spencer Lake Bible Camp	Waupaca
Stiebs Jeep Eagle	Waupaca
Superamerica #4225	Waupaca
Tomorrow Valley Coop	Waupaca
Trading Post	Waupaca
Trans-Star Inc	Waupaca
Waupaca Airport	Waupaca
Waupaca Country Club	Waupaca
Waupaca Foundry—Plant 2/3	Waupaca
Waupaca Foundry Jet Hangar	Waupaca
Waupaca Motor Sales	Waupaca
Waupaca Municipal Garage	Waupaca
Waupaca Shell Station (Former)	Waupaca
Waupaca Shop—City Garage	Waupaca
Wendt Motors	Waupaca
Zwicker Knitting Mills	Waupaca
Behn, Dennis—WDOT	Weyauwega
Clark Implement	Weyauwega
Coonen Oil	Weyauwega
Miller Auto Body & Trucking—WDOT	Weyauwega
Peterson Petro Station (Former)	Weyauwega
Stillman (William E.) Estate	Weyauwega
Sunset Curve Oil Company	Weyauwega
Weyauwega Milk Products	Weyauwega
Weyauwega Union Coop (Former)	Weyauwega
Weyauwega-Fremont Schools/Bus Garag	Weyauwega

Other Contaminated Sites

The Wisconsin Remedial Response Site Evaluation Report also has the Inventory of Sites or Facilities Which May Cause or Threaten to Cause Environmental Pollution and the Spills Program List which includes sites or facilities identified under the Hazardous Substance Spill Law.

Spill City	Destination	Substance
	Surface Water	Motor Oil
	Surface Water	Fuel Oil
	Contained/Recovered	Diesel Fuel
	Groundwater	Diesel Fuel
	Groundwater	Diesel Fuel
	Soil	Herbicides
Almond	Soil	Pesticides
Almond	Soil	Fuel Oil
Almond	Soil	Trilin At
Amherst	Contained/Recovered	Unleaded Gasoline
Amherst	Groundwater	1 Diesel Fuel
Amherst	Groundwater	Kerosene (Comb)
Amherst	Air	Gasoline
Amherst	Soil	1 Fuel Oil
Amherst	Contained/Recovered	Transformer Oil w/ PCB
Amherst	Contained/Recovered	Atrazine
Amherst	Soil	Hydraulic Fluid
Amherst Junction	Soil	Pesticides
Amherst Junction	Contained/Recovered	Lasso Herbicide
Amherst Junction	Contained/Recovered	Endosulfan -(Combined)
Amherst Junction	Soil	Gasoline
Custer	Soil	Waste Drain Oil
King	Surface Water	Hydraulic Fluid
King	Surface Water	Hydraulic Oil
Waupaca	Soil	Liquid Nitrogen
Waupaca	Surface Water	Drain Oil
Waupaca	Surface Water	Diesel Fuel
Waupaca	Storm Sewer	Liquid Nitrogen
Waupaca	Soil	Diesel Fuel
Waupaca	Soil	Fuel Oil
Waupaca	Contained/Recovered	Diesel Fuel
Waupaca	Contained/Recovered	Hydraulic Oil (Comb)
Waupaca	Groundwater	Gasoline
Waupaca	Surface Water	Diesel Fuel
Waupaca	Surface Water	Hydraulic Oil
Waupaca	Contained/Recovered	Diesel Fuel
Waupaca	Contained/Recovered	2 Fuel Oil

Spill City	Destination	Substance
Waupaca	Air	Anhydrous Ammonia
Waupaca	Soil	Cattle Blood
Waupaca	Soil	Molasses
Waupaca	Contained/Recovered	Drain Oil
Waupaca	Contained/Recovered	Hydraulic Oil
Waupaca	Contained/Recovered	Gasoline
Waupaca	Surface Water	Potash
Waupaca	Soil	Diesel Fuel
Waupaca	Contained/Recovered	Sodium Hydroxide
Waupaca	Contained/Recovered	Water (Comb)
Waupaca	Storm Sewer	Caustic Soda
Waupaca	Storm Sewer	Water (Comb)
Waupaca	Soil	2 Fuel Oil
Waupaca	Surface Water	Isopropyl Alcohol
Waupaca	Soil	Nitrogen Liquid Fert.
Waupaca	Soil	#2 Diesel Fuel
Waupaca	Soil	Engine Oil
Waupaca	Soil	Hydraulic Fluid
Weyauwega	Contained/Recovered	Hydraulic Oil
Weyauwega	Soil	LP Gas
Weyauwega	Soil	Gasoline
Weyauwega	Soil	Nitrate Fertilizer
Weyauwega	Air	Ammonia
Weyauwega	Soil	Diesel Fuel
Weyauwega	Contained/Recovered	Motor Oil
Weyauwega	Contained/Recovered	2 Fuel Oil
Weyauwega	Air	Anhydrous Ammonia

APPENDIX C
Bibliography

References:

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Priority Watershed Projects in Wisconsin — Selected as of 1994

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
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	Springbrook Creek	Langlade, Marathon
94-6	Sugar/Honey Creeks	Walworth, Racine

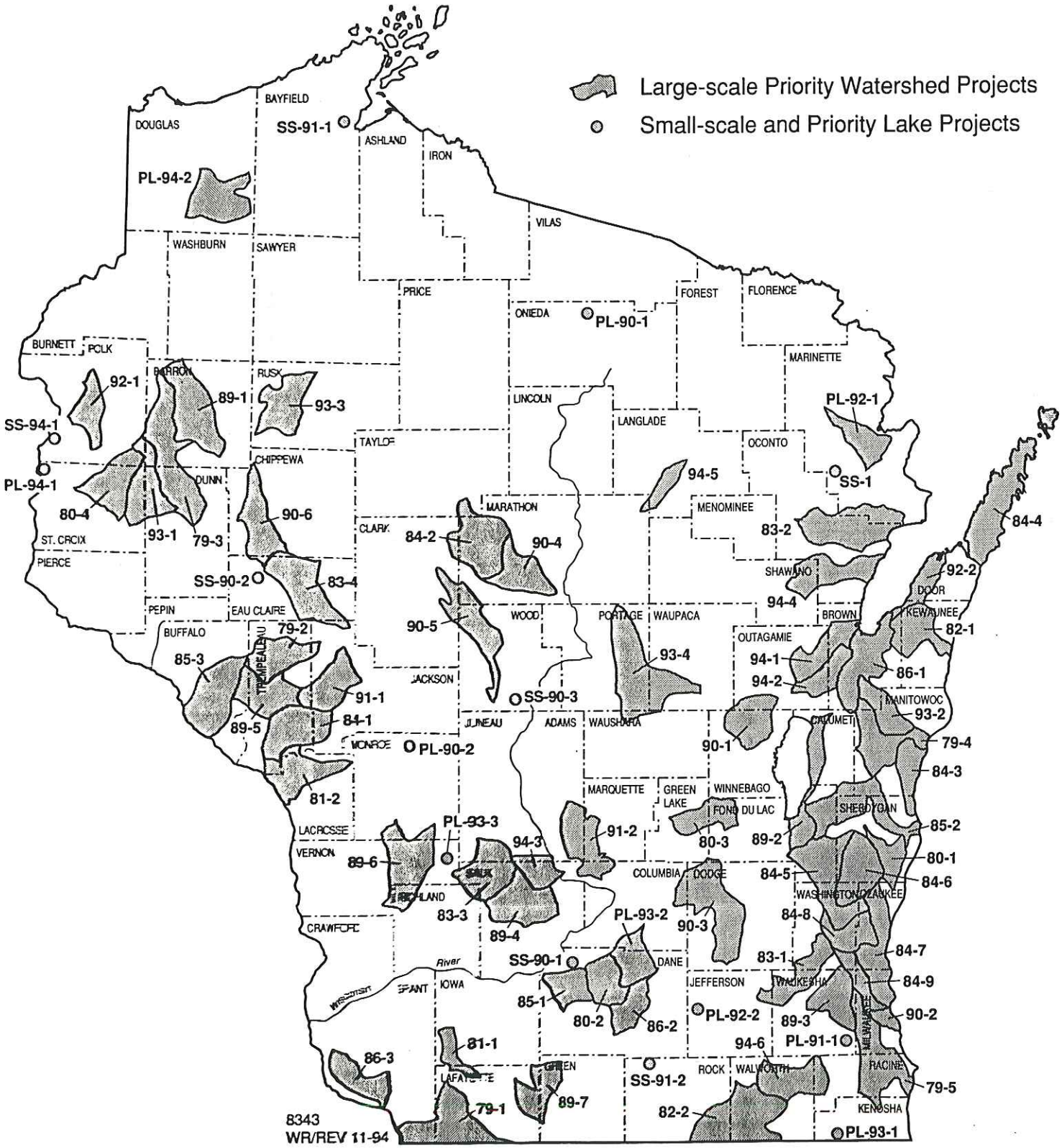
Year Selected-Map Number	Small-scale Priority Watershed Project	County(ies)
SS-1	Bass Lake*	Marinette
SS-90-1	Dunlap Creek	Dane
SS-90-2	Lowes Creek	Eau Claire
SS-90-3	Port Edwards - Groundwater Prototype	Wood
SS-91-1	Whittlesey Creek	Bayfield
SS-91-2	Spring Creek	Rock
SS-94-1	Osceola Creek	Polk

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 Lake	Vernon
PL-94-1	Pine/Squaw/Bass/Perch Lakes Cluster	St. Croix
PL-94-2	Upper St. Croix Lake/Flowage	Douglas

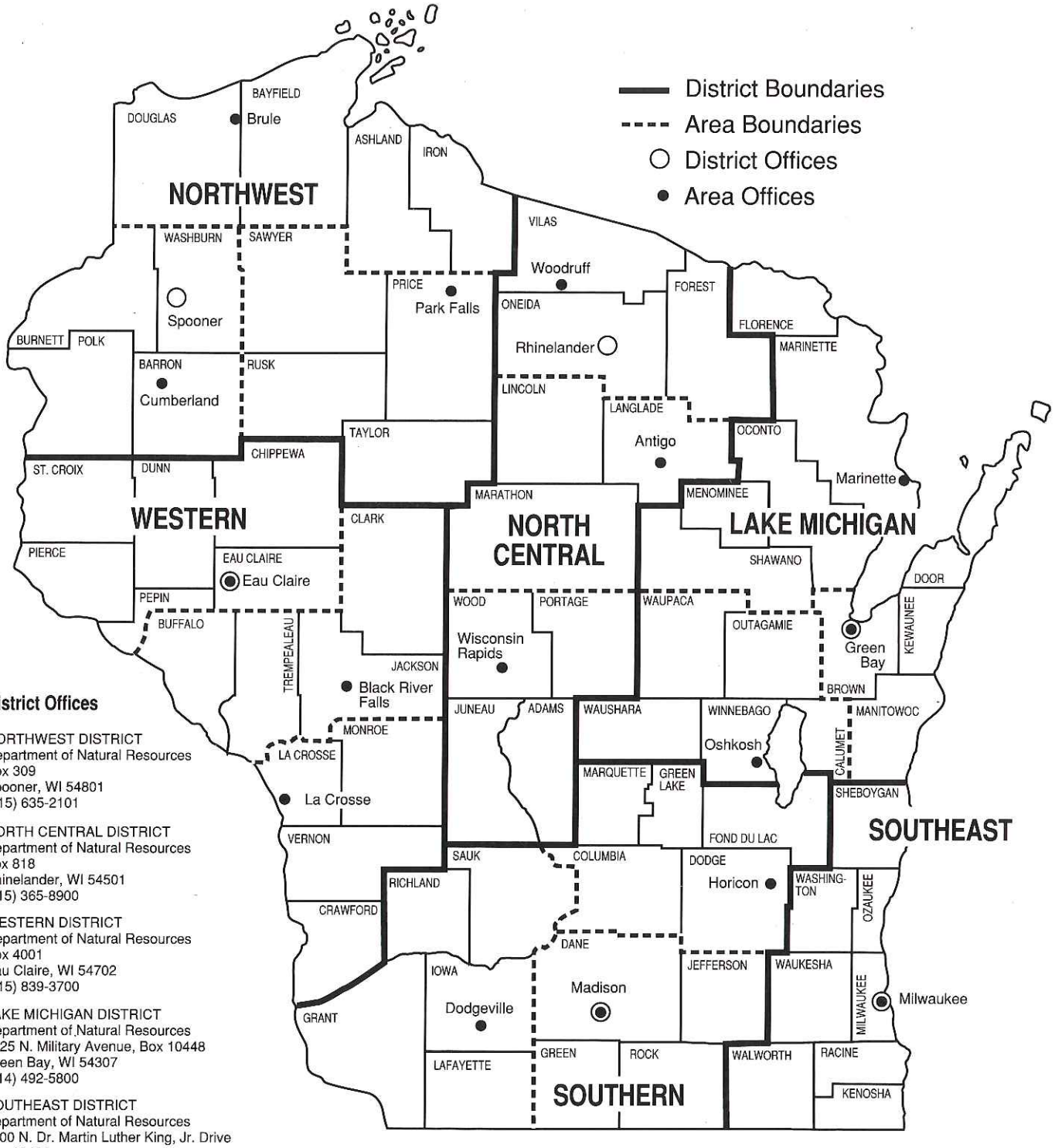
** Project completed*

Priority Watershed Projects in Wisconsin

Selected as of 1994



DNR Field Districts and Areas



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REV 7/95

Our Mission:

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

To provide a clean environment
and a full range of outdoor opportunities.

To insure the right of all Wisconsin citizens
to use and enjoy these resources in
their work and leisure.

And in cooperation with all our citizens
to consider the future
and those who will follow us.

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