Nonpoint Source Control Plan for the Neenah Creek Priority Watershed Project

Prepared by the **Wisconsin Department of Natural Resources and Department of Agriculture, Trade, and Consumer Protection** in cooperation with the **Adams, Marquette, and Columbia County Land Conservation Departments**.

Watershed Plan Organization Information

Natural Resources Board
1994

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Dave Jelinski, Director, Bureau of Land and Water Resources
Keith Foye, Chief, Soil and Water Section

A NONPOINT SOURCE CONTROL PLAN FOR THE NEENAH CREEK PRIORITY WATERSHED PROJECT

The Wisconsin Nonpoint Source Water Pollution Abatement Program

July, 1994

This Plan Was Cooperatively Prepared By:

The Wisconsin Department of Natural Resources and
The Department of Agriculture, Trade, and Consumer Protection
In cooperation with
The Adams, Marquette and Columbia County Land Conservation Departments

Publication WR-370-94

For copies of this document please contact:

Wisconsin Department of Natural Resources
Bureau of Water Resources Management
Nonpoint Source and Land Management Section
P.O. Box 7291
Madison, WI 53707

The Wisconsin 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.

WATERSHED PLAN ACKNOWLEDGEMENTS

Author

Karen Rahmeier, Wisconsin Department of Natural Resources, Project Coordinator

Principal Contributors

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Donn Wright, Marquette County Land Conservation Department
Bill Buckley, Columbia County Land Conservation Department
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Scot Ironside, Fisheries Manager, DNR, Adams-Friendship

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ACKNOWLEDGEMENTS

In addition to the people listed on the inside front cover of this plan, the author and principal contributors would like to acknowledge the contributions of the following people:

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Rodney Walter, DNR Property Management
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Drew Zelle, DATCP engineering technician, Beaver Dam

State of Wisconsin
Department of Agriculture, Trade and Consumer Protection

Alan T. Tracy, Secretary

801 West Badger Road • PO Box 8911
Madison, WI 53708-8911

December 21, 1993

Mr. Bruce Baker, Director
Bureau of Water Resources Management
Wisconsin Department of Natural Resources
Box 7921
Madison, WI 53707

Dear Mr. Baker:

The Department of Agriculture, Trade, and Consumer Protection has reviewed the document titled Neenah Creek Priority Watershed Project: A Nonpoint Source Control Plan. Our comments had earlier been transmitted to your staff and our review reveals that these comments have been incorporated.

We look forward to assisting the Department of Natural Resources and the Land Conservation Committees and staff in Adams, Columbia, and Marquette Counties in implementing the project.

Please contact Lynne Hess (273-6206) if we can be of any further assistance in moving the project to implementation.

Sincerely,

Dave Jelinski, Director
Bureau of Land and Water Resources
DIVISION OF AGRICULTURAL RESOURCE MANAGEMENT
(608) 273-6411

cc: Becky Wallace, DNR, WR/2
Mark Klish, Adams County Conservationist
Kyle Kidney, Columbia County Conservationist
Donn Wright, Marquette County Conservationist
Keith Foye, DATCP

WISCONSIN
DEPT. OF NATURAL RESOURCES
George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
TELEFAX 608-267-3579
TDD 608-267-6897

April 8, 1994

George Dixon, County Board Chair
Adams County
Box 287, Courthouse
Friendship, WI 53934

George

Dear Mr. Dixon:

I am pleased to approve the Neenah Creek Priority Watershed Plan prepared through the Wisconsin Nonpoint Source Water Pollution Abatement Program. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120, Wisconsin Administrative Code. I am also approving this plan as an amendment to the Upper Fox River Areawide Water Quality Management Plan.

I would like to express the Department's appreciation to the Adams County staff that participated in preparing this plan. We look forward to assisting Adams County and the cities and villages in the watershed in the implementation of the Neenah Creek Priority Watershed Plan.

Sincerely,

George

George E. Meyer
Secretary

cc: Mark Klish - Adams County LCD
Andy Morton - SD
Dave Jelinski - DATCP
Becky Wallace - WR/2
Cindy Hoffland - CA/8
Karen Rahmeier - WR/2

WISCONSIN
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101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
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April 8, 1994

Paul Wade, County Board Chair
Marquette County
480 Underwood Avenue
PO Box 147
Montello, WI 53949

Dear Mr. Wade:

I am pleased to approve the Neenah Creek Priority Watershed Plan prepared through the Wisconsin Nonpoint Source Water Pollution Abatement Program. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120, Wisconsin Administrative Code. I am also approving this plan as an amendment to the Upper Fox River Areawide Water Quality Management Plan.

I would like to express the Department's appreciation to the Marquette County staff that participated in preparing this plan. We look forward to assisting Marquette County and the cities and villages in the watershed in the implementation of the Neenah Creek Priority Watershed Plan.

Sincerely,

George E. Meyer
Secretary

cc: Donn Wright - Marquette County LCD
Andy Morton - SD
Dave Jelinski - DATCP
Becky Wallace - WR/2
Cindy Hoffland - CA/8
Karen Rahmeier - WR/2

WISCONSIN
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101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
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TDD 608-267-6897

April 8, 1994

John H. Tramburg, County Board Chair
Carl Frederick Administration Building
400 DeWitt Street
Portage, WI 53901

Dear Mr. Tramburg:

I am pleased to approve the Neenah Creek Priority Watershed Plan prepared through the Wisconsin Nonpoint Source Water Pollution Abatement Program. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120, Wisconsin Administrative Code. I am also approving this plan as an amendment to the Upper Fox River Areawide Water Quality Management Plan.

I would like to express the Department's appreciation to the Columbia County staff that participated in preparing this plan. We look forward to assisting Columbia County and the cities and villages in the watershed in the implementation of the Neenah Creek Priority Watershed Plan.

Sincerely,

George E. Meyer
Secretary

cc: Robert J. Stoltenberg - LCC Chair
Kyle Kidney - Columbia County LCD
Andy Morton - SD
Dave Jelinski - DATCP
Becky Wallace - WR/2
Cindy Hoffland - CA/8
Karen Rahmeier - WR/2

Adams COUNTY

Department of Land Conservation
Box 287, Courthouse, Friendship, WI 53934 (608) 339-4268

December 22, 1993

Karen Rahmeier
WI D.N.R. WR/2
P O Box 7921
Madison, WI 53707

Dear Karen:

The Adams County Land Conservation Committee and Board of Supervisors has approved the Neenah Creek Priority Watershed Plan. The original signed resolution is attached.

$110,568 KR

At this time, we are requesting our Nonpoint Source Grant for the amount of ~~$304,894.00~~ to begin our first year of implementation. We would like to begin signing cost-share agreements by March 1, 1994. We understand that we cannot begin signing cost-share agreements until we have received the proper paperwork from the Department of Natural Resources.

If you need additional information, please contact us.

Sincerely,

Kerrie J. Wheeler
Neenah Creek Watershed

Mark J. Klish
County Conservationist

Resolution No. 109 1993

INTRODUCED BY: Land Conservation Committee

INTENT & SYNOPSIS: To adopt the Nonpoint Source Control Plan for the Neenah Creek Priority Watershed Project.

WHEREAS: the Neenah Creek Watershed was designated by the Department of Natural Resources in 1991 under the Wisconsin Nonpoint Source Water Pollution Abatement Program, and

WHEREAS: the Adams County Land Conservation Committee and County Board of Supervisors had previously approved the project in 1991, and

WHEREAS: the County Land Conservation Department in cooperation with the Wisconsin Department of Natural Resources and the Wisconsin department of Agriculture, Trade and Consumer Protection conducted a detailed inventory of the land use within the watershed in 1992 and 1993, and

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

WHEREAS: a number of public informational meetings have been conducted throughout the watershed, 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 Neenah Creek Watershed Plan.

NOW, THEREFORE, BE IT RESOLVED; By the Adams County Board of Supervisors that the Neenah Creek Watershed Nonpoint Source Priority Watershed Plan be adopted and the implementation of the plan begin as soon as possible.

FISCAL IMPACT: Costs to the County for implementation of this watershed plan are reimbursed 100% by the State.

Land Conservation Committee

Dated this 7 day of December, 1993

Glenn Licitar

Earl Taylor

Jerry Kotlowski

Larry Babcock

Roger Hilliard

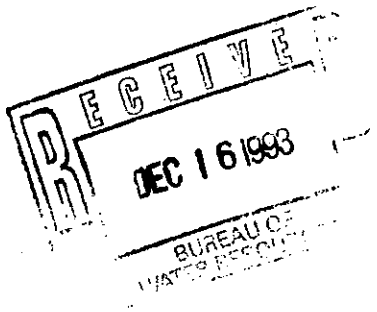
Adopted ✓
Defeated ____ by the County Board of Adams County this 21 day of December, 1993.

County Board Chairman

County Clerk

State of Wisconsin
County of Adams
This document is a full, true and correct copy of the original on file and of record in my office and has been compared by me
Attest _____ 19____
County Clerk

Land Conservation Department
480 Underwood Avenue
PO Box 147
Montello, WI 53949



16 December 1993

Karen Rahmeier
Nonpoint Source Section
Bureau of Water Resources Management
Department of Natural Resources
101 S. Webster Street
PO Box 7921
Madison, WI 537070-7921

Karen,

The Land Conservation Committee passed a resolution recommending the Neenah Creek Priority Watershed Plan to the county board on 7 December 1993.

The County Board passed a resolution accepting the Neenah Creek Priority Watershed Plan as drafted on 14 December 1993.

A signed and notarized resolution is enclosed.

I am requesting that the Marquette LCD be allowed at begin making cost-share agreements as soon as possible. I could start as early as 4 January 1994. Processing at the state level will probably require more time. Watershed staff are hoping to commence cost-share agreements no later than 1 March 1994.

I am also requesting that funds for financing watershed best management practices - as per tables 5-3b and 5-5b in the plan - be released for use as soon as possible.

$100,466 HR

Sincerely,

Donn R. Wright

Donn R. Wright
County Conservationist

ROLL CALL - COUNTY BOARD OF SUPERVISORS
MARQUETTE COUNTY, WISCONSIN

	ROLL CALL Yes	No
Borzick		✓
Cacic		absent
Doege	✓	
Ebert	✓	
Furman	✓	
Gohlke	✓	
Goldsmith	✓	
Johnston	✓	
Lloyd	✓	
Lueder	✓	
Polk	✓	
Sorenson		✓
Sprain	✓	
Wade	✓	
Westphal		✓
Zellmer, H.		✓
Zellmer, R.	✓	
TOTAL	12	4

ADOPTED LOST 1 absent

DECEMBER Session, 199 3

Resolution No. 67-93

First Reading December, 199 3

Second Reading _____, 199___

WHEREAS, the Neenah Creek Watershed was designated by the Department of Natural Resources in 1991 under the Wisconsin Nonpoint Source Water Pollution Abatement Program, and

WHEREAS, the County Land Conservation Department in cooperation with the Wisconsin Department of Natural Resources and the Wisconsin Department of Agriculture, Trade and Consumer Protection conducted a detailed inventory of the land use within the watershed in 1992, and

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

WHEREAS, a number of public informational meetings have been conducted through the watershed, and an official public hearing was conducted on November 11, 1993, and

WHEREAS, pertinent comments and corrections 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 Neenah Creek Watershed Plan.

NOW, THEREFORE BE IT RESOLVED, by the Board of Supervisors of the County of Marquette that the Neenah Creek Nonpoint Source Priority Watershed Plan be adopted and the implementation of the plan begin as soon as possible.

Introduced by:

Marvin Doege

Kathryn Johnston

OFFICE OF THE COUNTY CLERK

Montello, Wis. December 16, 1993

I HEREBY CERTIFY that the attached is a true and correct copy of a resolution adopted by the Board of Supervisors of Marquette County, Wisconsin at a regular meeting of said Board held on the 14th day of December, 1993

Mary L. Sorenson
County Clerk

Columbia County
Land Conservation Department

Columbia County Agricultural Center - Box 485 - Portage, WI 53901
Phone (608) 742-2191

January 10, 1994

Karen Rahmeier
State of Wisconsin
Department of Natural Resources
Box 7921
Madison, WI 53707

Dear Karen:

Please find enclosed a certified resolution from Columbia County approving the Neenah Creek Priority Watershed Project Plan for implementation.

We are also requesting funding for implementation of best management practices listed in the plan. The request is for the full amount of $65,918.00 listed in the plan. This is a very firm request. We can not function efficiently or effectively with only a portion of the allocation as has transpired with other watershed projects.

Thank you for your attention and please call if you have any questions.

Sincerely,

Kyle Kidney

Kyle Kidney
Land Conservation Director

KK/kh

Enc.

RESOLUTION NO. 81-93

TO THE HONORABLE BOARD OF SUPERVISORS OF COLUMBIA COUNTY:

WHEREAS, the Neenah Creek Watershed has been selected by the State Department of Natural Resources for priority funding to control nonpoint sources of water pollution, and

WHEREAS, Adams County, Marquette County, and Columbia County Land Conservation Departments have inventoried the Neenah Creek Watershed for animal waste and soil erosion pollution sources, and

WHEREAS, using the inventory results, an implementation plan has been developed in cooperation with the Wisconsin Department of Natural Resources (DNR) and the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), and

WHEREAS, the watershed plan sets procedures for providing technical and financial assistance to eligible landowners who install various best management practices that reduce nonpoint sources of pollution in the Neenah Creek Watershed, and

WHEREAS, Columbia County, through its Land Conservation Committee (LCC), is responsible for implementation of control strategies in the unincorporated areas, which would include providing technical assistance to landowners who volunteer to participate, administering cost sharing agreements with rural landowners, and

WHEREAS, the draft watershed plan has been reviewed by the public during a public information hearing which was held on November 11, 1993, and

WHEREAS, the Land Conservation Committee has reviewed the Neenah Creek Priority Watershed Project final draft plan and recommends approval of the plan by the Board.

NOW, THEREFORE, BE IT RESOLVED that the Columbia County Board of Supervisors hereby approves the Nonpoint Source Control Plan for the Neenah Creek Priority Watershed Project.

BE IT FURTHER RESOLVED that the Land Conservation Committee is hereby authorized to enter into a Nonpoint Source Grant Agreement with the DNR for the purpose of administering cost sharing dollars to rural landowners with the understanding that there be no direct costs for cost-sharing funding to the county.

BE IT FURTHER RESOLVED that Columbia County reserves the right to request future amendments to the watershed plan in order to incorporate new cost sharing opportunities for landowners, to facilitate needed changes in technical standards and specifications, to extend sign-up periods, or to include other changes that may occur in future revisions to Administrative Rules NR-120.

Reuben Damm

Robert J. Stoltenberg

Kathleen M. Taylor

James R. Humphrey

Oluf Gunderson

AGRICULTURE AND LAND
CONSERVATION COMMITTEE

STATE OF WISCONSIN
ss
COUNTY OF COLUMBIA

I, Cathleen M. Lathrop, County Clerk in and for said County, do HEREBY CERTIFY that the above and foregoing is a true and correct copy of a Resolution adopted by the Columbia County Board of Supervisors at the meeting held on December 15, 1993.

Dated at Portage, Wisconsin, this 20th day of December, 1993.

County Clerk

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SUMMARY

Introduction

The Neenah Creek Watershed Project plan assesses the nonpoint sources of pollution in the Neenah Creek Watershed and guides the implementation of nonpoint source control measures. These control measures are needed to meet specific water resource objectives for Neenah Creek Watershed and its tributaries. The primary objective of the project is to reduce nonpoint source pollution delivered to the twenty-one lakes and to enhance and protect the water quality of streams in the Neenah Creek Watershed.

Nonpoint sources of pollution most commonly found in this watershed include: polluted runoff from barnyards and feedlots; sediment from cropland erosion, wind erosion, streambank and lakeshore erosion; runoff from winterspread manure, and infiltration of pollutants to groundwater. The purpose of this project is to reduce the amount of pollutants originating from nonpoint sources that reach surface water and groundwater within the Neenah Creek Watershed Project area.

This plan was prepared by the Wisconsin Department of Natural Resources (DNR), the Department of Agriculture, Trade, and Consumer Protection (DATCP), and the Adams, Marquette and Columbia County LCDs. The DNR selected the Neenah Creek Watershed as a priority watershed project through the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1992. It joined approximately 60 similar watershed projects statewide in which nonpoint source control measures are being planned and implemented. The Nonpoint Source Water Pollution Abatement Program was created in 1978 by the Wisconsin State Legislature. The program provides financial and technical assistance to landowners and local governments to reduce nonpoint source pollution.

The project is administered on the state level by the DNR and DATCP. The Adams, Marquette and Columbia County Land Conservation Departments will administer the project on the local level with assistance from the University of Wisconsin-Extension and the Soil Conservation Service (U.S. Department of Agriculture).

General Watershed Characteristics

The Neenah Creek Watershed (map 2-1) drains 169 square miles of land in Adams, Marquette and Columbia Counties in South Central Wisconsin. The watershed is part of the Upper Fox River Sub Basin (map 2-2). The Neenah Creek Watershed drains to the Fox River, which drains to Lake Michigan. The Neenah Creek Watershed was divided into 10 smaller drainage areas, called subwatersheds, for this planning effort.

Land use in the watershed, as shown in table S-1, is mainly agricultural and is currently dominated by dairy farming. The watershed population is stable — approximately 7,000 people. Most of the watershed population lives outside incorporated areas around lakes, in small enclaves of residential development or on farmsteads.

Table S-1. Land Use in the Neenah Creek Watershed

Land Use	Percent of Watershed
Agricultural	(42)
pasture	8
cropland	34
Grassland	
Woodlots	27
Developed	6
Wetlands[1]	14
Lakes	2
Roads, ditches, etc.	9

[1] These are estimates of wetland acres based on WINHUSLE inventory data. See wetland section in Chapter Two for a more comprehensive estimate of wetland acreage.
Source: DNR

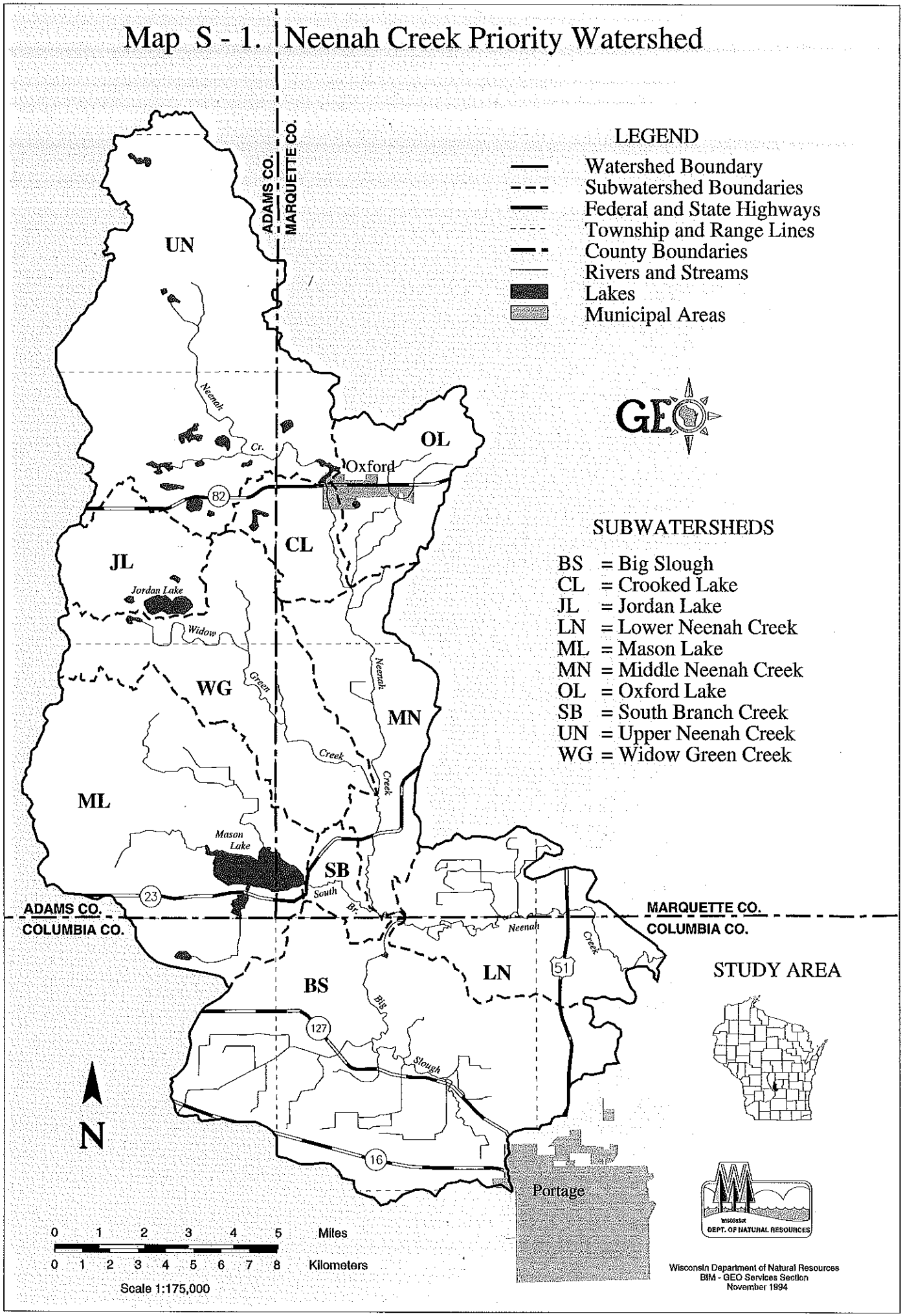
Water Quality

The Neenah Creek Watershed reservoir supports a warm and cold water sport fishery. The streams and lakes of the watershed are not reaching their highest potential use due to pollution from point and nonpoint sources. Eroding croplands, wind erosion, eroding streambanks, and improperly managed livestock operations are the major sources of nonpoint pollution in the watershed.

Segments of Neenah Creek were identified as currently supporting good quality Class III cold water trout fisheries with potential for improvement to Class II trout fisheries. The details of these assessments are discussed later in this watershed plan.

An assessment of groundwater quality was completed by sampling private wells for nitrate + nitrite and triazine. Results show that of the well samples collected, 11 percent had nitrate levels over the enforcement standard (health advisory level) of 10 milligrams per liter (mg/L), and 43 percent had nitrate levels between 2 mg/L, the preventative action limit, and 10 mg/L. Nitrate + Nitrite levels greater than the 2 mg/L preventative action limit show that human activities are affecting groundwater quality.

Map S - 1. Neenah Creek Priority Watershed



Well sampling for triazine showed that 2 percent of the samples collected had triazine levels over 3.0 micrograms per liter μg/L, which is the enforcement standard for atrazine plus its breakdown components, called metabolites. Triazines are a family of herbicides which include atrazine and its metabolites which when present in groundwater indicates groundwater contamination. Eighteen percent of the samples collected had triazine levels between 0.3 and 3.0 μg/L. The preventative action limit for triazine is 0.3 μg/L.

Sources of Water Pollution

The Adams, Marquette and Columbia County Land Conservation Departments collected data on all agricultural lands, barnyards, manure storage sites, 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 Neenah Creek Watershed, about 92 percent of the sediment deposited in streams annually is derived from agricultural upland erosion. Four percent of the sediment reaching streams originates from streambank erosion. Approximately 4 percent of the total sediment is contributed from shoreline erosion.

The results of the investigations of nonpoint sources are summarized below:

Barnyard Runoff Inventory Results:

- 58 barnyards were assessed.
- These barnyards were found to contribute 1,964 pounds of phosphorus to surface waters, annually.

Streambank Erosion Inventory Results:

- 117 stream miles were inventoried
- 762 tons of sediment reach streams from eroding sites (4 percent of total sediment)
- There are 4.6 miles of eroding sites (4 percent of streambanks inventoried).

Shoreline Erosion Inventory Results:

- Four miles of lake shoreline were found to have either severe, moderate, or mild erosion from eroding sites.
- 698 tons of sediment are delivered to lakes, annually.
- 129 landowners have mild, moderate, or severe erosion sites.

Upland Sediment Inventory Results:

- 97,538 acres were inventoried.
- 15,637 tons of sediment are delivered to streams (92 percent of total sediment).
- 95 percent from cropland.

Wetland Inventory Results:

- 14,676 acres of wetlands inventoried.
- 8,575 acres of converted but restorable wetlands.

Pollutant Reduction Goals

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 40 percent. To meet this goal, the following is needed:

- 40 percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- 75 percent reduction in streambank sediment delivered to all streams and a 100 percent overall repair of streambank habitat in all subwatersheds.
- 75 percent reduction in shoreline sediment delivered to lakes.

Phosphorus and Organic Pollutant Goal: Reduce overall phosphorus load by 40 percent. To meet this goal, the following is needed:

- 75 percent reduction in organic pollutants from barnyards in all subwatersheds.
- 40 percent reduction in organic pollutants from winterspread manure on "unsuitable" acres in all subwatersheds.
- 30 percent reduction in phosphorus reaching lakes and streams from agriculture uplands in all subwatersheds.

Groundwater Goal:

- Proper abandonment of private wells no longer in use where other NPS control measures are implemented and cost-shared.
- Implementation of Nutrient and Pest Management practices on irrigated vegetable crops.

In addition, this plan calls for a restoration of 10 percent of degraded or prior converted wetlands.

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. As shown in table S-2, cost-share rates range from 50 to 70 percent.

The Adams, Marquette and Columbia County Land Conservation Departments will contact all landowners who are eligible to receive cost-share funds during the project's implementation. All Category I sources of nonpoint pollutants must be controlled if a landowner wishes to participate in any aspect of the program. Category I represents the level of pollution control needed to achieve water quality goals in the watershed. Nonpoint sources in Category II contribute less of the pollutant load than those in Category I. They are included in cost sharing eligibility to further insure that water quality goals are met. Controlling sources in this category is not mandatory for a landowner to be funded for controlling other sources.

The Adams, Marquette and Columbia County Land Conservation Departments 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.While the initial stages of this project are voluntary, it is important to understand that as of the late summer of 1993, an enforcement component to the Nonpoint Source Water Pollution Abatement Program has been authorized by the Wisconsin Legislature. This provides for regulatory actions at sites within project boundaries whose participation is critical to achieving water quality improvement goals of projects.

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

Agricultural Lands

All agricultural lands having soil loss rates greater than "T" or contributing sediment to streams at a rate greater than 0.4 tons per acre per year will be classified as Category I for cost sharing and must be brought down to "T" and/or to a sediment delivery rate of 0.4 tons per acre per year. This involves an estimated 4,700 critical acres of cropland, or 39 percent of the upland sediment load in the watershed. Category II will include all lands contributing sediment to streams at a rate between 0.2 and 0.4 tons per acre per year. This involves 3 percent of the upland sediment in the watershed.

The BMPs identified by the Adams, Marquette and Columbia County Land Conservation Departments emphasize both improving farm management and controlling pollutants. Table S-2 shows the eligible practices and cost-share rates.

Animal Lots

The manure from barnyards that is carried in runoff needs to be controlled at about 13 of the 58 livestock operations. All barnyards contributing more than 50 pounds of phosphorus will be classified as Category I for cost sharing and need to be reduced to 15 pounds annually or less.

Table S-2. Best Management Practices Eligible for Cost Sharing Through the Neenah Creek Watershed Project

Best Management Practices	State Cost-Share Rate
Contour Farming	50% (flat rate: $6/acre)
Strip Cropping	50% (flat rate: $12/acre)
Field Diversions and Terraces	70%
Grassed Waterways	70%
Reduced Tillage (No Till)	$15/acre
Critical Area Stabilization	70% [1, 2]
Grade Stabilization Structures	70% [2]
Agricultural Sediment Basins	70%
Shoreline and Streambank Stabilization	70% [2]
Shoreline Buffers	70% [1, 2]
Barnyard Runoff Management	70%
Animal Lot Relocation	70% [2]
Manure Storage Facilities	70% [3]
Proper Abandonment of Manure Storage Pits	50%
Livestock Exclusion From Woodlots	50%
Wetland Restoration*	70%
Nutrient and Pesticide Management	50%

[1] Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See "Management Actions" in this summary for areas where easements may apply.

[2] With a matching local share, the state share cost sharing level may be increased up to 80 percent.

[3] Maximum cost-share amount is $20,000 including no more than $15,000 for manure transfer equipment.

* Wetland restoration may include destruction of tile lines, construction of berms, and other practices as listed in NR120.

Category II barnyards, those which contribute between 15 and 50 pounds of phosphorus annually, will be eligible for cost sharing and will need to be reduced to 15 pounds annually, or less.

Manure Spreading

Approximately 500 acres of "unsuitable" land will be targeted as Category I for winterspread manure control measures (BMPs). These landowners have "suitability" ratios indicating that they are unlikely to have enough land to safely spread manure in the winter and are required to implement and adhere to a Soil Conservation Service (SCS) "590 Nutrient Management" plan. Category II landowners are those who are more likely to have enough land to spread their manure, but may still pose a threat to water quality. There are 6,000 acres in Category II. In this project "unsuitable" lands for winter manure spreading are those lands with greater than six percent slope or which are prone to flooding. The Adams, Marquette and Columbia County Land Conservation Departments will assist farm operators in preparing a management plan for proper manure spreading. A manure management plan identifies the proper spreading periods, application rates, and acceptable fields for manure spreading. A number of the manure management plans may identify the need for manure storage facilities to prevent winter manure spreading on unsuitable lands.

Streambanks

Project participants with identified sites eroding at greater than 60 tons per year per landowner will be Category I. Those with sites eroding between 18 and 60 tons per year per landowner, will be Category II. Overall, approximately 525 tons of sediment from streambanks are eligible for control in the Neenah Creek Watershed.

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

Shoreline

Shoreline erosion on the lakes in the Neenah Creek Watershed contributes 4 percent of the overall sediment delivered in the watershed.

Category I sites are those with severe shoreline erosion. Severe sites are those eroding at rates greater than 7 tons per year per landowner.

Category II sites are those with moderate erosion. Moderate sites are those eroding at rates between 3 and 7 tons per year per landowner.

Category III sites are those with mild erosion. Mild erosion sites are those eroding at rates less than 3 tons per year per landowner.

Funds Needed for Cost Sharing, Staffing, and Educational Activities

Grants will be awarded to Adams, Marquette and Columbia Counties by the DNR for cost sharing, staff support and educational activities. Table S-3 includes estimates of the financial assistance needed to implement needed nonpoint source controls in the Neenah Creek Watershed, assuming a 75 percent participation rate of eligible landowners.

Table S-3. Cost Estimates for the Neenah Creek Watershed Project

Eligible Activity	Total Cost[1]	State Share[1]
Cost Sharing	$1,935,255	$1,384,756
Easements	450,000	450,000
County Staffing	1,117,620	1,117,620
Educational Activities	31,020	31,020
Totals	$3,533,895	$2,983,396

[1] Estimates based on 75% participation.

Project Implementation

Project implementation is scheduled to begin in 1994. The first three years of implementation is the period for participants to sign cost-share agreements. There is a five-year period for practice installation. While an eligible landowner or operator has three years to determine whether to participate in the program, the installation of BMPs can usually begin as soon as a landowner has signed a cost-share agreement with the Adams, Marquette or Columbia County Land Conservation Departments.

Information and Education

An information and education program will be conducted throughout the project period with the Adams, Marquette and Columbia County Land Conservation Departments having overall responsibility for the program with Adams County taking the lead role. University of Wisconsin–Extension staff will provide assistance. This program will be most intensive

during the first three years of the project as landowners and local governments sign up for state cost sharing for pollution control. The program includes:

- A media campaign to inform the public about nonpoint source pollution and activities the public can do to reduce this type of pollution.

- More intensive educational activities, such as meetings, workshops, tours, and demonstration projects for landowners and local government officials who must adopt new pollution control techniques.

- Water quality newsletters that will inform farmers, local government officials, community groups, and concerned citizens about watershed activities, implementation processes, and pollution control methods.

- Educational activities and service projects to inform youth about water resource issues and help them develop a conservation ethic.

Further Information

If you want more information about the Neenah Creek Watershed Project, or a copy of the watershed plan, contact one of the following:

Andy Morton, Coordinator
Wisconsin Department of Natural Resources
Southern District Headquarters
Fitchburg, WI
275-3311 or 695-2764

Additional contact if needed

Peggy Armstrong
Adams County Land Conservation Department
Friendship, WI
339-4268

Donn Wright
Marquette County Land Conservation Department
Montello, WI
297-9175

Bill Buckley
Columbia County Land Conservation Department
Portage, WI
742-2191

Project Evaluation and Monitoring

The evaluation strategy for the project involves the collection, analysis, and reporting of information so that progress may be tracked 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 LCDs will track the progress in this area and report to the DNR and DATCP quarterly.

2. **Pollutant Reduction Levels**: The LCDs 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 water quality, habitat, and water resource characteristics periodically during the project and at the end of the project period.

CHAPTER ONE
Introduction, Purpose and Legal Status

Wisconsin Nonpoint Source Water Pollution Abatement Program

The Wisconsin State Legislature created the Wisconsin Nonpoint Source Water Pollution Abatement Program (NPS) in 1978. The goal of the NPS Program is to improve and protect the water quality of streams, lakes, wetlands, and groundwater by reducing pollutants from and residential nonpoint sources. The 169-square mile Neenah Creek Watershed, located in Adams, Marquette and Columbia Counties, was designated a "priority watershed" in 1991 (map 1-1). The primary objective of this project is to reduce the amount of pollutants originating from nonpoint sources that reach surface water and groundwater within the Neenah Creek Watershed Project area.

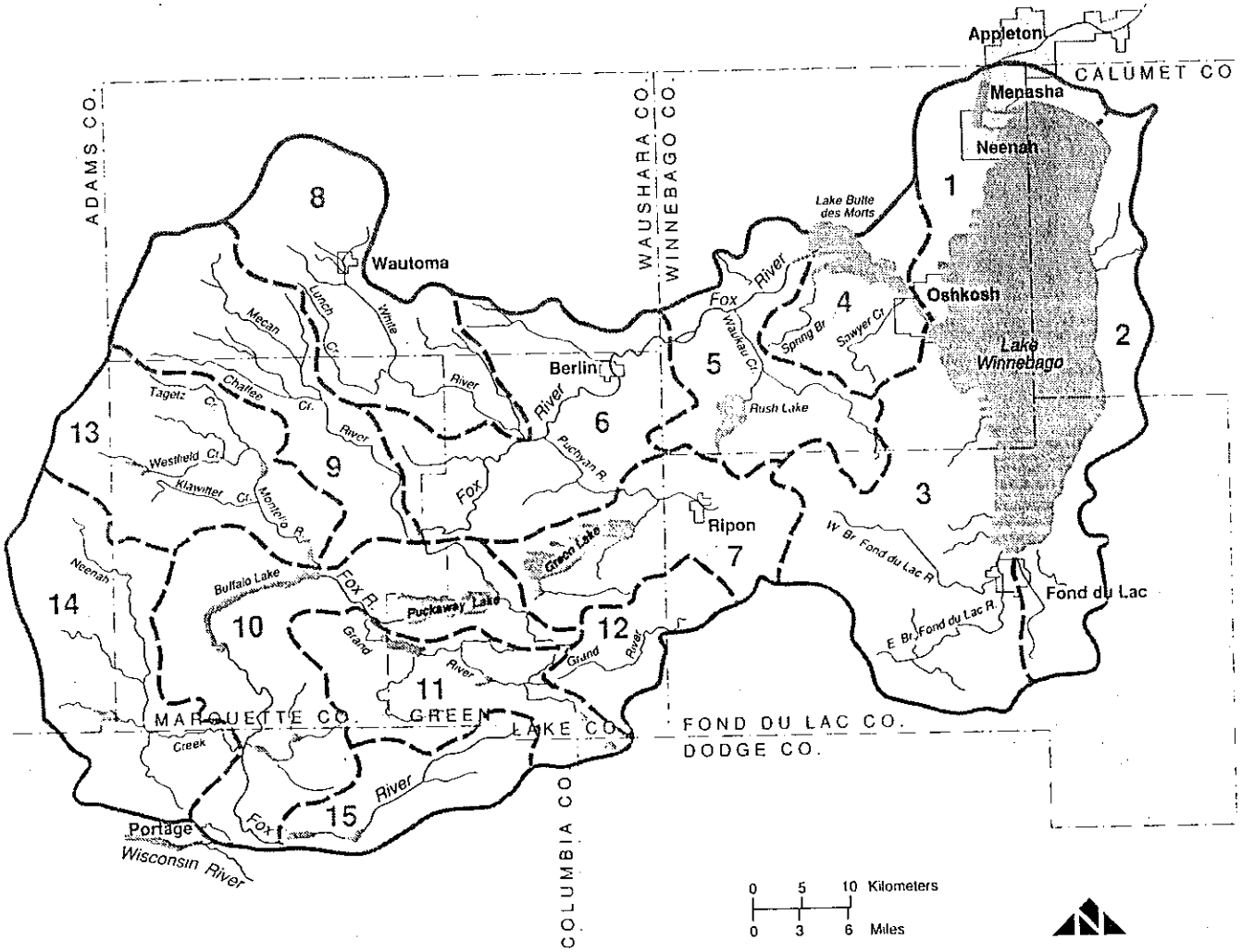
Nonpoint sources of pollution include eroding agricultural lands, streambanks, roadsides and developing residential areas, field application of manure, fertilizers and pesticides and runoff from livestock wastes and gullies. Pollutants from nonpoint sources are carried to the surface water or groundwater through the action of rainfall runoff, snowmelt, infiltration and wind erosion.

The following is an overview of the NPS Program:

- The DNR and DATCP administer the program which focuses on critical hydrologic units called priority watersheds. The program is implemented through priority watershed projects for which a plan is prepared.

- Local units of government implement the watershed project. Water quality improvement is achieved through implementation of nonpoint source controls (best management practices or BMPs) and adoption of ordinances. Landowners, land renters, counties, cities, villages, towns, metropolitan Sewerage Districts, sanitary districts, lake districts, and regional planning commissions are eligible to participate. While the initial stages of this project are voluntary, it is important to understand that as of the late summer of 1993, an enforcement component to the Nonpoint Source Water Pollution Abatement Program has been authorized by the Wisconsin Legislature. This provides for regulatory actions at sites within project boundaries whose participation is critical to achieving water quality improvement goals of projects.

Map 1-1. Location of the Neenah Creek Watershed in the Upper Fox River Basin



Watersheds

1. UF01 Lake Winnebago North and West
2. UF02 Lake Winnebago East
3. UF03 Fond Du Lac River
4. UF04 Lac Butte Des Morts South
5. UF05 Fox River/Rush Lake
6. UF06 Fox River/Berlin
7. UF07 Big Green Lake
8. UF08 White River
9. UF09 Mecan River
10. UF10 Buffalo and Puckaway Lakes
11. UF11 Lower Grand River
12. UF12 Upper Grand River
13. UF13 Montello Creek
14. UF14 Neenah Creek
15. UF15 Swan Lake

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- Technical assistance is provided to aid in the design of BMPs. State level cost-share assistance is available to help offset the cost of installing these practices.

- Informational and educational activities are employed to encourage participation.

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

Priority Watershed Project Planning and Implementation Phases

Planning Phase

The planning phase of the project began in 1992 and included the following information-gathering and evaluation steps:

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

2. Inventory types of land uses and severity of nonpoint sources impacting streams and lakes.

3. Evaluate the types and severity of other factors which may be affecting water quality. Examples include discharges from municipal wastewater treatment plants and natural or endemic stream conditions. This will be accomplished through the ongoing integrated resource management planning efforts in the Upper Fox River Basin.

4. Determine levels of nonpoint source pollution control and measures necessary to improve and/or protect water quality.

5. Prepare and gain approval for a priority watershed plan documenting the above evaluations, implementation procedures and costs.

Implementation Phase

The implementation phase begins following review of the priority watershed plan by the Neenah Creek Citizens Advisory Committee, the project team, a public informational hearing and approval by the DNR, the DATCP, and the Board of Supervisors for Adams, Marquette and Columbia Counties. This phase is characterized below:

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

- In the rural portions of the watershed, the Adams, Marquette and Columbia County Land Conservation Departments contact eligible landowners to determine their interest in voluntarily installing BMPs identified in the plan.

  In the urban portions of the watershed (Oxford and Briggsville), the DNR or its designee will contact local units of government to discuss actions to implement plan recommendations.

- For rural practices, the landowner and the county sign cost-share agreements outlining the practices, costs, cost-share amounts and a schedule for installation of BMPs. All practices are scheduled for installation up to five years from the date the agreement is signed. The DNR and local units of government sign similar agreements for urban practices.

Legal Status of the Nonpoint Source Control Plan

The Neenah Creek 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. This plan is subject to the amendment process under NR 120.08 (e) for substantive changes. The Department of Natural Resources will make determination if a proposed change will require a plan amendment. This plan was prepared under the cooperative efforts of the DNR, DATCP, the Adams, Marquette and Columbia County Land Conservation Departments, and the Neenah Creek Citizens Advisory Committee.

This plan is the basis for the DNR to enter into cost-share and local assistance grants and is used as a guide to implement measures to achieve desired water quality conditions. In the event that a discrepancy occurs between this plan and the statutes or the administrative rules, or if the statutes or rules change during implementation, the statutes and rules will supersede the plan.

Relationship Of The Nonpoint Source Control Plan To The Integrated Basin Management Plan

The Upper Fox River Basin is comprised of fifteen watersheds: Lake Winnebago North and West, Lake Winnebago East, Fond du Lac River, Lake Butte des Morts/South, Fox

River/Rush Lake, Fox River/Berlin, Big Green Lake, White River, Mecan River, Buffalo and Puckaway Lakes, Lower Grant River, Upper Grant River, Montello Creek, Neenah Creek, and Swan Lake. The basin drains portions of Waushara, Adams, Marquette, Columbia, Green Lake, Fond du Lac, Winnebago, Calumet and Dodge counties.

Recommendations contained in the Upper Fox River Basin Management Plan are incorporated in this priority watershed plan. Consequently, this nonpoint plan meets the requirements of Section 144.25 of the Wisconsin statutes requiring the DNR to develop loan integrated resource management strategy to protect or enhance fish and wildlife habitat, aesthetics, and other natural resources" for priority watersheds.

Relationship Of The Nonpoint Source Control Plan To The Stormwater Discharge Permit Program

Although the Neenah Creek Watershed has no large municipalities, there may be industrial sites or construction sites that fall under the Stormwater Discharge Permit Program.

The Stormwater Discharge Permit Program is a result of the 1987 amendments to the federal Clean Water Act. These amendments require permits for discharges of stormwater from municipalities with populations of 100,000 or more, certain industrial sites, and construction sites with ground disturbances of 5 or more acres.

Phase 1 of the program, which began in October, 1992, requires permits for municipalities with populations of 100,000 or more. Phase 2 of the program has yet to begin. In phase 2, it is likely that stormwater discharge permits will be required for municipalities with populations of less than 100,000. The EPA has not determined the population size of municipalities that will be required to be included in the next phase of the stormwater permit program, nor has it established a starting date for the next permitting phase. It is not known when a decision on these issues will be made, or when phase 2 win be implemented.

Some of the required activities of the municipal permit program are: to identify and locate existing stormsewer outfalls, check for illicite connections, develop a stormwater plan to deal with identified pollution problems, adopt a stormwater ordinance, and to monitor designated sites. Many of the activities that will be required as part of the EPA municipal permit are eligible for state funding through the Nonpoint Source Program.

Industrial permits will be required for those industries that are likely to introduce pollutants to stormwater runoff. Generally, industries that have outside material storage will be required to apply for industrial permits. Industries that fall under this requirement will be directed to submit a permit application to the Bureau of Waste Water in the DNR. Most of these industries have been notified of this permit requirement.

To deal with the issue of construction site erosion control on ground disturbances of 5 acres or more, a Memorandum of Understanding, or MOU, is being developed by the DNR, and the Department of Industry Labor and Human Relations, (DILHR). The agency responsibility for activities and types of construction has not been decided at this is time. The DNR, and the Department of Industry Labor and Human Relations are expected to have a final agreement on the Memorandum of Understanding some time in 1993 to resolve agency differences.

In order to fulfill the EPA permit requirements, as part of the MOU agreement, contractors will be directed to follow the erosion control guidance in the Wisconsin Construction Site Best Management Practice Handbook published by the DNR. Some of the other MOU conditions that satisfy the EPA requirements for the construction site erosion control permit program are: to provide an existing and planned future site map indicating planned erosion control practices that will be implemented on the site, a description of the type of development and construction that will occur on the site, a written description of the erosion control plan for the site, a description of the construction sequence, a maintenance schedule for erosion control devices on the site, the location of the site, and identification of the owner and developer of the construction site.

It is likely that ground disturbances of less than 5 acres will require permits . The EPA has not made a determination of size area of disturbance, or a date of initiating these requirements. In the future the EPA is likely to require stormwater management for new developments. As a part of the watershed plan, communities are strongly advised to devise stormwater management plans in developing areas.

Plan Organization

The remainder of this plan is divided into nine chapters. The contents of each chapter are described below:

Chapter Two. "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 Resource Conditions, Nonpoint Sources and Water Resource Objectives" characterizes the existing and potential biological and recreational uses of surface waters. The results of the nonpoint source inventories and evaluations and water resource objectives are discussed.

Chapter Four. "Nonpoint Source Pollution Control Strategy" identifies the level of urban and rural nonpoint source control needed to meet the water resource objectives and identifies the decision criteria and the nonpoint sources eligible for funding under the priority watershed project.

Chapter Five. "Detailed Program for Implementation" describes the means in which the 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.

Chapter Seven. "Integrated Resource Management Program" presents the strategy for involving DNR resource management programs (fisheries management, wildlife, etc.) in the nonpoint source pollution abatement efforts in the Neenah Creek Watershed.

Chapter Eight. "Project Tracking" discusses the means for assessing the amount of nonpoint source control gained through installation of best management practices.

Chapter Nine. "Water Quality Monitoring and Evaluation" presents strategy and a schedule for monitoring streams and lakes to determine the water quality impacts of implementing nonpoint source controls.

CHAPTER TWO
General Watershed Characteristics

Location

The Neenah Creek Watershed is a 169-square-mile (108,000 acres) drainage basin located immediately northwest of the city of Portage in South Central Wisconsin (map 2-1). The city of Portage is at a major hydrologic divide, with everything south and west flowing to the Mississippi River, out to the Gulf of Mexico and everything east flowing north to Lake Michigan, out the St. Lawrence River to the Atlantic Ocean. Hence, Neenah Creek Watershed is one of the western-most watersheds that drains east to the Atlantic Ocean.

The following is a brief overview of the watershed's cultural and natural resource features.

Cultural Features

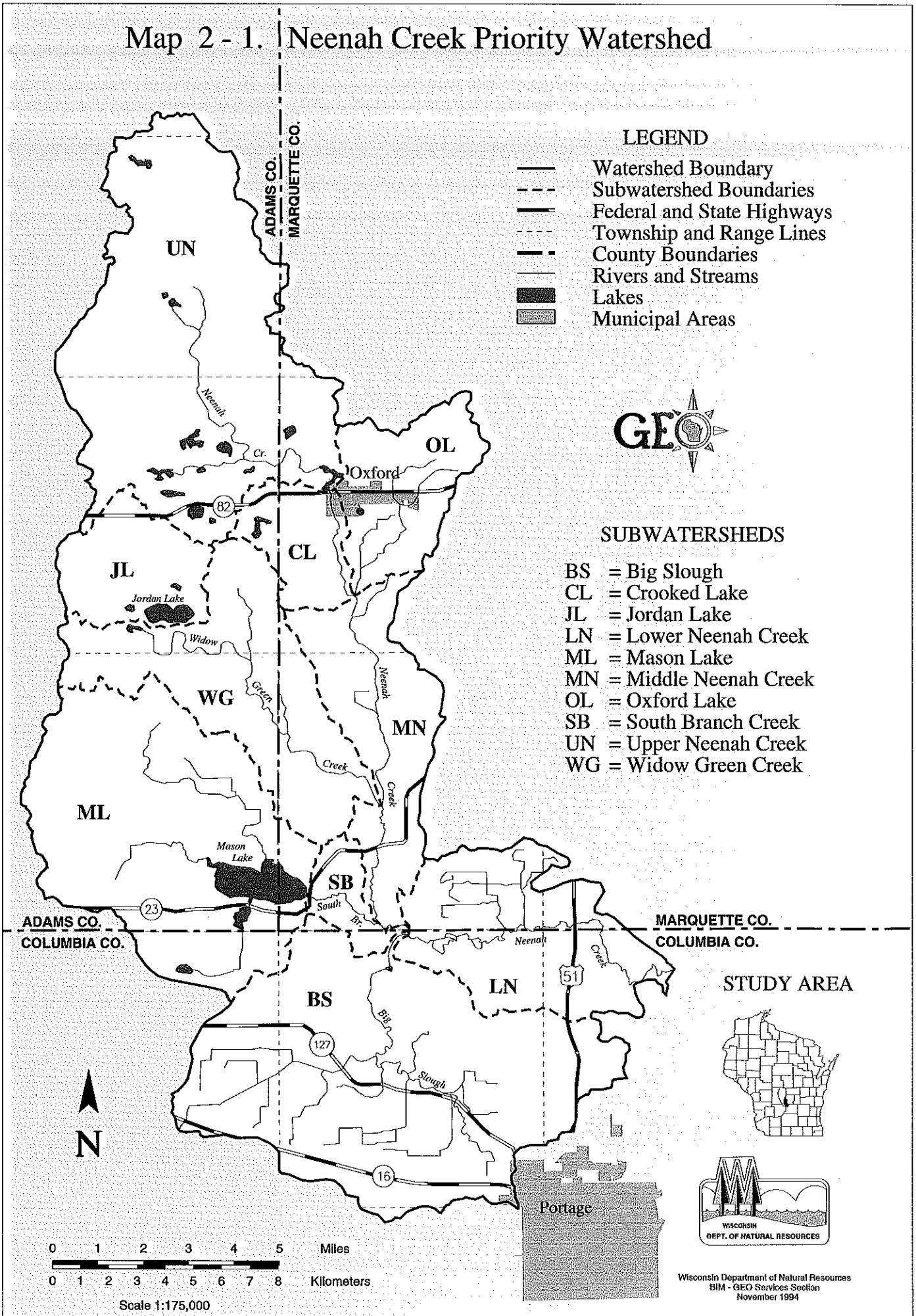
Civil Divisions

The Neenah Creek Watershed lies within Adams (45%), Marquette (25%) and Columbia (30%) Counties. Incorporated areas in the watershed include the village of Oxford and the unincorporated community of Briggsville. The main public land within the watershed is the DNR owned Neenah Creek Fishery Area. There are also three County Parks, on Deep Lake, Lake Mason and Patrick Lake, as well as three public campgrounds.

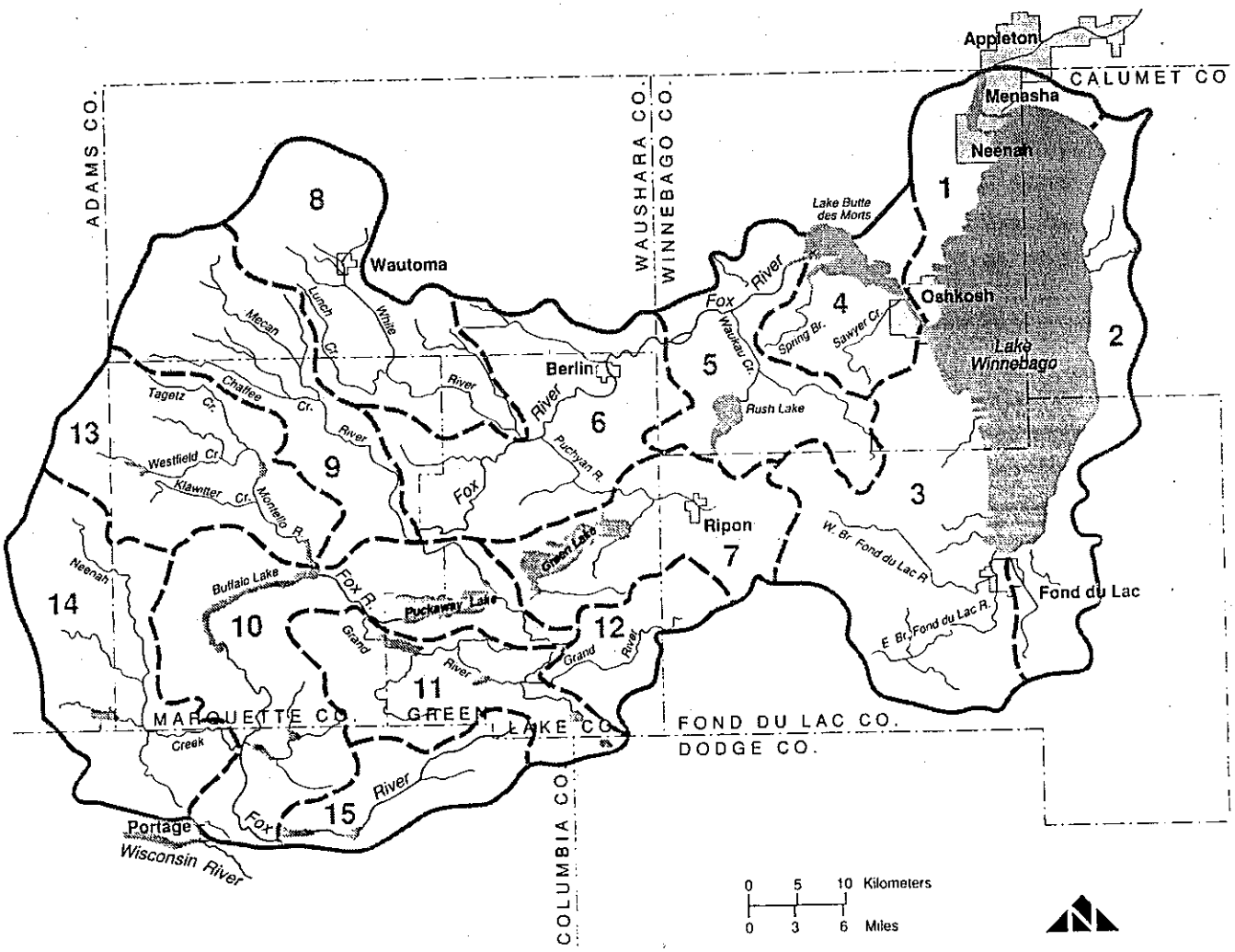
Population Size and Distribution

The Neenah Creek Watershed population is estimated to be about 7,000 persons. Most of the watershed population lives around the lakes and in rural unincorporated areas. Current population growth rates in the area are relatively stable with growth in Adams County, a slight decline in Marquette County and no significant change in Columbia County. Taken watershed-wide, however, the population has increased by 7% over the past ten years.

Map 2 - 1. Neenah Creek Priority Watershed



Map 2-2. Upper Fox River, Central Sub Basin



Watersheds

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12. UF12 Upper Grand River
13. UF13 Montello Creek
14. UF14 Neenah Creek
15. UF15 Swan Lake

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Land Uses

Rural Land Uses predominate in the watershed with pockets of moderately dense residential areas around most of the 21 lakes. Agriculture is the most important land use, comprising 42 percent. Woodlands are abundant and cover 27 percent of the land area. Developed land uses occupy less than 6 percent of the watershed (table 2-1).

Table 2-1. Summary of Land Uses in the Neenah Creek Watershed

Land Uses	Acres	Percent
Agricultural	(45,553)	(42)
pasture	8,327	8
cropland	37,226	34
Woodland	29,444	27
Developed[1]	5,538	6
Wetlands[2]	15,102	14
Lakes	1,635	2
Roads, ditches, etc.	9,718	9

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

Source: DNR & LCD

Irrigated vegetable crop production is widespread in the southern portion of the watershed with 21percent of the cropland acres being artificially drained. Groundwater is near the surface in much of the watershed, including numerous natural springs.

Sanitary Sewer Service

Sanitary sewer service is available only in the village of Oxford. Wastewater generated by the remainder of the watershed residents is disposed of through private on-site systems.

Water Supply Service

Water supplies used in the Neenah Creek Watershed are obtained from groundwater sources. There are two principal aquifers lying beneath the watershed from which groundwater is obtained. Water obtained from these aquifers is pumped from individual private wells.

Natural Resource Features

Climate and Precipitation

The frequency, duration and amount of precipitation influences surface and groundwater quality and quantity, soil moisture content, runoff characteristics, and the physical condition of waterways. The Neenah Creek Watershed lies in the continental zone which is characterized by winters which are long and relatively cold and snowy and summers which are mostly warm with periods of hot humid conditions. Mean annual precipitation for the region is about 33 inches of rain and melted snow; the majority falls in the form of rain during thunderstorms during the growing season (May-September). Most runoff occurs in February, March, and April when the land surface is frozen and soil moisture is highest.

Topography

The relief in the region is largely controlled by glacial features. Much of the Neenah Creek Watershed is located within the central plains region. The glacial drift in this area formed a belt of terminal moraine having irregular hills that rise 50 to 75 feet above the general level of the plain, and basins which are today swamps and natural lakes.

Geology and Soils

The geology of the Neenah Creek watershed consists of Precambrian age (4.5 billion to 600 million years) granite overlain by a thick, flat Cambrian age (600 to 500 million years) sandstone layer. The bedrock is covered with sand and gravel deposited by glaciers approximately 1 million years ago during the Pleistocene age. The effect of the glaciers moving across the area and reworking sediment is reflected in the varied topography of the area. The western boundary of the watershed is a high ridge of unsorted sand and gravel deposited at the furthest extent of the glacier. This end moraine, named the Johnstown moraine, is a surface water and groundwater divide. Water flowing east off the moraine flows into the Fox River; water flowing off the moraine to the west flows into the Wisconsin River.

During the Pleistocene, glacial meltwater accumulated in Lewiston Lake which had it's outlet through the Baraboo Hills to the south. Around 25,000 years ago, the outlet was dammed by

ice and glacial Lake Wisconsin was formed west of the Johnstown moraine and the Neenah Creek watershed. Meltwater from glaciers deposited more sand east of the moraine in former Lewiston Lake which became a bay to Lake Wisconsin. After the glacier retreated and the ice dam at the east end of Devil's Lake melted, the water in Lake Wisconsin and Lewiston Bay drained and the Wisconsin River was created about 8,000 years ago. The thick sands which accumulated in the lake during this time form the Central Sand plain.

Soils along Neenah Creek are deep, well-drained to poorly drained sands over silty clay and silty clay loam subsoils over lake-laid sand, silt and clay. West of Neenah Creek in the area of the Johnstown end moraine, soils are well drained with sandy subsoils over glacial till. Along Widow Green tributary and near Lake Mason and Big Springs, the soils are deep, very poorly drained, over organic subsoils and sand.

Surface Water Resources

Land drainage patterns in the Neenah Creek Watershed are delineated as 10 individual subwatersheds. All convey surface water directly or via tributaries to the Neenah Creek Watershed. Major tributaries, associated streams, wetlands, lakes and subwatershed divides are shown in map 2-1.

Subwatersheds in the Neenah Creek Watershed

Upper Neenah	(UN)
Oxford Lake	(OL)
Crooked Lake	(CL)
Jordan Lake	(JL)
Widow Green	(WG)
Middle Neenah	(MN)
Mason Lake	(ML)
South Branch	(SB)
Lower Neenah	(LN)
Big Slough	(BS)

Neenah Creek Watershed Lakes

There are 21 lakes in the Neenah Creek Watershed. The shallow lakes and the human-made flowage lakes suffer from dense aquatic vegetation and some have also experienced winterkills in the past. Winterkills are no longer a problem due to aeration systems which have been installed. Mason Lake is the largest. Both Mason Lake and Jordan Lake are heavily used.

The lakes offer a diverse recreational resource, including picnicking, boating (weeds permitting) and year-round fishing and vacationing.

Streams

Perennial streams, which have a combined length of about 117 miles, maintain at least a small continuous flow throughout most of the year. The Neenah Creek is the longest perennial stream in the watershed, with Widow Green Creek (also known as O'Keefe) Big Slough and Peppermill Creek being other named streams.

The floodwaters and wetlands surrounding the Big Slough offer excellent wildlife habitat, and are frequently used for waterfowl hunting.

While the Neenah Creek supports a warm water sport fishery, several subwatersheds contain cold water streams including classified trout waters. Many sections of the streams are not reaching their highest potential use due to pollution from nonpoint sources. Eroding croplands and streambanks and improperly managed livestock operations are the major sources of nonpoint pollution in the watershed.

Intermittent streams flow only when there is runoff or when groundwater discharge is highest. Intermittent waterways are the headwaters of many of the larger perennial streams. Their small size makes them particularly susceptible to nonpoint source pollution. If pollution sources are reduced, however, their dynamic nature does allow rapid improvement.

Wetlands

Wetlands are valuable natural resources. They provide wildlife habitat, fish spawning and rearing areas, recreation, storage of runoff and flood flows and removal of pollutants. Wetlands in the watershed are mainly in the Neenah Creek floodplain. Floodplain wetlands support furbearers and water fowl populations and may provide seasonal habitat for sport fish.

A wetland and wildlife habitat inventory was done to identify existing and modified or converted wetlands for the purpose of protection from degradation or potential restoration. The focus of the inventory was on wetlands that are presently in, or have been in the past, degraded through drainage, grazing, cropping, or other activities causing water storage loss, build up of sediments, and drainage to vegetation. Appendix A describes methods used in the inventory. Data were gathered from Soil Conservation Service maps, air photos, and the DNR wetland inventory maps. Guidelines for wetland restoration, which will be a component of this project, are outlined in Chapter Four.

Groundwater Resources

Groundwater pumped from aquifers in the watershed meets most of the domestic, livestock, and irrigation needs in Adams, Marquette and Columbia Counties.

Regional Aquifers

Groundwater is the main source of drinking water in the Neenah Creek Watershed. Groundwater is stored underground in pore spaces and cracks in soil and rock layers. Soil and rock layers which hold groundwater are called aquifers. In an aquifer, all the pore spaces and cracks are filled or saturated with groundwater. A municipal or private well is a pipe through which groundwater is pumped from an aquifer to the land surface.

Since 1936, the State of Wisconsin has required well drillers to document well construction and rock and soil layers encountered during well installation. Information from geologic logs, driller construction reports and Wisconsin Geological and Natural History Survey (WGNHS) reports for Adams (Clayton, 1987) Marquette (Lippelt and Hennings, (1981) and Columbia (Harr et. al., 1978) counties is summarized below. Principle aquifers within the watershed are the glacially deposited sand and gravel which is underlain by the Cambrian sandstone aquifer. There are a few wells which reach the Precambrian granite although it is not used as a supply of groundwater.

Private wells in the Cambrian sandstone aquifer range from 64 to 416 feet in depth and yield between 10 and 1,000 gallons per minute. Wells in the sand and gravel aquifer range in depth from 33 to 325 feet. Depth to water ranges from 10 feet above the land surface (artesian or flowing wells) to 210 feet below the surface. Artesian wells and springs are present in areas where the groundwater is confined by a low permeability layer such as a clay lens. The clay lenses occur throughout the glacially deposited sediments. Wells installed in the sand and gravel yield between 5 and 500 gallons per minute.

Direction of Groundwater Flow

Local groundwater flow in the Neenah Creek Watershed roughly mirrors the topography of the land surface and flows "downhill" or downgradient toward Neenah Creek. Regional groundwater flow in the watershed is southeast toward the Fox River. In the southern part of the watershed near the Big Slough, the groundwater is close to the land surface and the water table, the top or surface of the groundwater within the aquifer, is flat. In the Big Slough area, groundwater flow is affected by irrigation, generally flowing to the nearest ditch.

Groundwater Quality

Groundwater quality in the Neenah Creek Watershed is generally considered good. As part of the Water Quality Appraisal Report. 187 and 179 private well samples were collected and analyzed for nitrate + nitrite and atrazine, respectively. Atrazine is the most widely used pesticide in Wisconsin and is a possible human carcinogen. Nitrate contaminated groundwater is the cause of methemoglobinemia or blue baby syndrome in infants and can cause abortions in cattle at levels as low as 20 parts per million. Sources of nitrate to groundwater can include manure, fertilizer (farm and lawn), septic systems, and stormwater

runoff from streets. Samples analyzed for nitrate + nitrite showed concentrations ranging from not detected to 35.4 parts per million or (35.4 milligram per liter (mg/L)). One milligram per liter is equivalent to one drop of water in a 10-gallon fish tank. The groundwater enforcement standard (ES) for nitrate is 10 mg/L. The ES and PAL may seem like small numbers, however, groundwater standards are based on laboratory studies which show that low levels of nitrate in water cause severe health problems. 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.

Twenty-one samples (11 percent) exceeded 10 mg/L and eighty-one (43 percent) of the samples exceeded 2 mg/L. The 43percent of the samples exceeding the 2 mg/L PAL limit can not be attributed to a specific source of nitrate but are undoubtedly the result of accumulative effects of the sources listed above.

Concentrations of triazine in the Neenah Creek Watershed ranged from not detected to 4.7 micrograms per liter (μg/L) (or 4.7 parts per billion (ppb)). One microgram per liter is comparable to one drop in 10,000 gallons (a small swimming pool). Four samples (less than 2 percent) exceeded the ES (health advisory level) of 0.3 mg/L while thirty-three samples (18 percent) had detects of triazine. As with nitrate + nitrite analytical results, no specific source of contamination is indicated by the results, but they are undoubtedly the result of accumulative effects of land use practices.

In August, 1993 an Atrazine Prohibition Area was proposed for designation in the Big Slough Subwatershed. The area covers portions of 9 sections (2,560 acres) in the town of Lewiston. The use of atrazine may be prohibited in this area, if approved. Reder to table 2.2 for well sampling results.

Table 2-2. Well Sampling Results: Neenah Creek Watershed

TRIAZINE

Subwatershed	Number of Triazine Samples less than 0.3 µg/l		Number of Triazine Samples between 0.3 and 3.0 µg/l		Number of Triazine Samples greater than 3.0 µg/l	
Upper Neenah	29		6		0	
Oxford Lake	3		0		0	
Crooked Lake	3		1		0	
Jordan Lake	12		2		0	
Widow Green	16		1		0	
Middle Neenah	20		0		0	
Mason Lake	21		3		0	
South Branch	0		1		0	
Lower Neenah	9		5		0	
Big Slough	29		14		4	
Totals	142	79%	33	18%	4	2%

NITROGEN

Subwatershed	Number of Nitrogen Samples less than 2.0 mg/l		Number of Nitrogen Samples between 2.0 and 10.0 mg/l		Number of Nitrogen Samples greater than 10.0 mg/l	
Upper Neenah	25		13		6	
Oxford Lake	2		1		0	
Crooked Lake	1		2		1	
Jordan Lake	6		9		0	
Widow Green	4		5		2	
Middle Neenah	11		8		1	
Mason Lake	8		19		0	
South Branch	0		1		0	
Lower Neenah	4		8		2	
Big Slough	24		15		9	
Totals	85	45%	81	43%	21	11%

No samples were collected for coliform bacteria or hazardous substances such as volatile organic compounds. Coliform bacteria can be a drinking water problem where septic systems or barnyards are located uphill from a private well. Bacteria can enter the drinking water supply along the well casing of improperly constructed and located wells. Wells with high levels of bacteria can be rehabilitated.

Volatile organic compounds generally enter a well from nearby leaking underground gasoline or other fuel storage tanks. Once these compounds are in the groundwater they are difficult to clean up. In general, the contaminated wells have to be abandoned and a new well drilled to an uncontaminated and usually deeper aquifer.

See figure 2-1, Groundwater Schematic.

Potential Groundwater Quality Problems

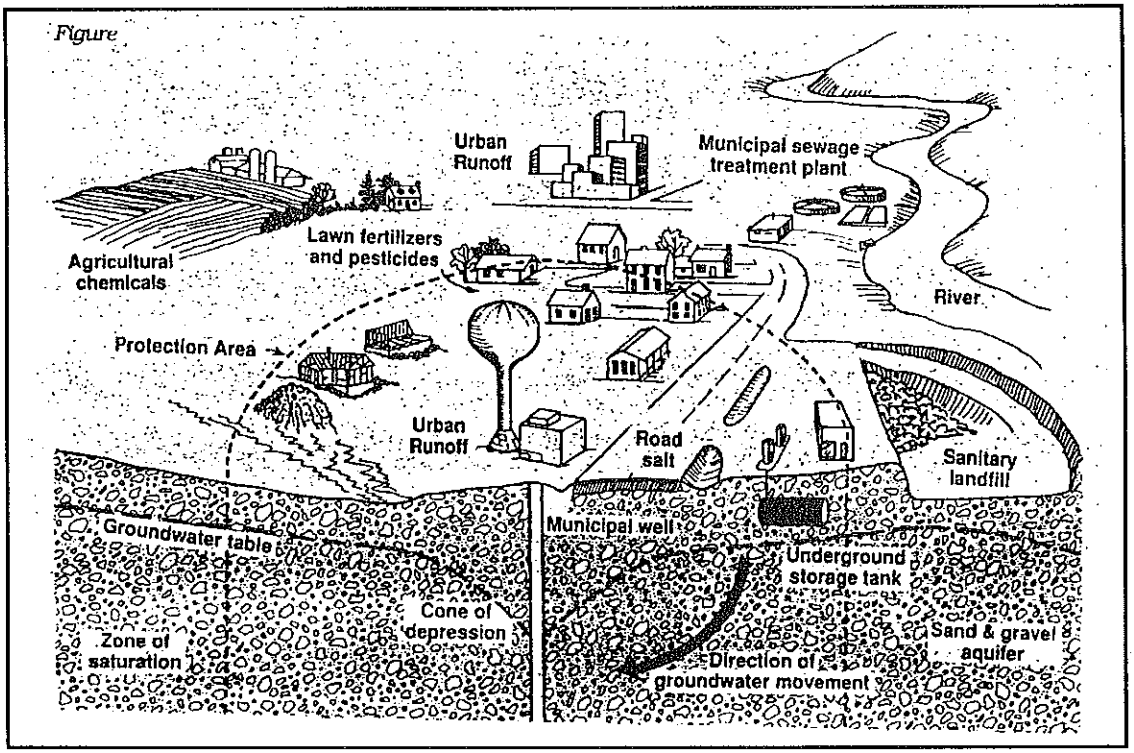
DNR Publication SW-144, The Wisconsin Remedial Response Site Evaluation Report (December 1991) lists superfund sites, solid and hazardous waste disposal sites, leaking underground storage tank sites and reported spill sites. See the section in Chapter Four that describes other pollutant sources for more detail.

Archaeological Sites: Coordination with State and Federal Historic Preservation Laws

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

There are a few known archaeological sites within the Neenah Creek Watershed. These areas will need special consideration when structural best management practices are being considered. Settling basins, manure storage structures, and streambank or shoreline shaping and riprapping are likely practices that may impact archaeological sites. As discussed above, state and federal laws require preservation of archaeological resources within the framework of the NPS Program.

Figure 2-1. Groundwater Schematic



The Neenah Creek Watershed Project will address these concerns with the following procedures:

1. Adams, Marquette and Columbia Counties will obtain inventory maps from the regional Wisconsin State Historical Society office, and will plot sites on topographic maps. Counties will also obtain a supply of landowner questionnaires from the historical society which will be used to identify additional non-inventoried sites.

2. Landowners' questionnaires will then be sent to the State Historical Society for determination of archaeological significance. In addition, landowners will have their lands evaluated by county staff for the need to conduct an archaeological survey (essentially compare property with known archaeological site locations). The historical society will determine the need for additional, extensive surveys. The counties and the DNR District NPS Program coordinator will also be involved in this determination.

3. If the inventory or questionnaire does reveal an archaeological site and the proposed best management practice may impact the site, an archaeological survey conducted by a qualified archaeologist will need to be completed. The survey will assess the potential of the practice to significantly impact the site. Alternative BMPs may need to be considered both before and after the results of the survey.

4. A cost-share agreement is signed before the survey is conducted. In certain instances a survey may reveal a significant archaeological site which precludes the installation of a particular BMP at that specific site. Cost-share agreements will contain language which nullifies or partially nullifies the cost-share agreement based on the final results of the archaeological survey. It is the responsibility of the county to include on the cost-share agreement such language.

Endangered and Threatened Resources

Information on threatened and endangered resources was obtained from the Bureau of Endangered Resources of the DNR. Endangered resources include rare species and natural communities.

It should be noted that comprehensive endangered resource surveys have not been completed for the entire Neenah Creek Watershed. The lack of additional occurrence records does not preclude the possibility that other endangered resources may be 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:

Amemone multifida var hudsoniana	Hudson Bay Anemone (plant)
Eleocharis quadrangulata	Angle-Steemed Spike-Rush (plant)
Sistrurus catenatus catenatus	Eastern Massasauga (snake)
Tyto alba	Barn Owl (bird)
Ophisaurus attenuatus	Western Slender Glass Lizard (lizard)
Plethobasus cyphyus	Bullhead (mussel)

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:

Buteo lineatus	Red-Shouldered Hawk (bird)
Vireo bellii	Bell's Vireo (bird)
Notropis anogenus	Pugnose Shiner (fish)
Opuntia fragilis	Brittle Prickly-Pear (plant)
Poa paludigena	Bog Bluegrass (plant)
Polytaenia nuttallii	Prairie Parsley (plant)
Quadrula metanevra	Monkeyface (mussel)

The following threatened species occur in the general area just outside the boundaries of the Neenah Creek watershed. If these species' preferred habitats occur within this watershed, then these species may also be present:

Carex prasina	Drooping Sedge (plant)
Clemmys insculpta	Wood Turtle (turtle)
Cypripedium candidum	White Lady's-Slipper (plant)
Lepomis megalotis	Longear Sunfish (fish)
Lythrurus umbratilis	Redfin Shiner (fish)
Macrhybopsis aestivalis	Speckled Chub (fish)
Simponaias ambigua	Salamander Mussel (mussel)
Speyeria idalia	Regal Fritillary (butterfly)
Tofieldia glutinosa	False Asphodel (plant)

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:

Notropis texanus	Weed Shiner (fish)
Cardamine pratensis var palustris	Cuckoo Flower (plant)
Scleria triglomerata	Tall Nut-Rush (plant)
Eleocharis olivacea	Capitate Spike-Rush (plant)
Erimyzon sucetta	Lake Chubsucker (fish)
Ammodramus savannarum	Grasshopper Sparrow (bird)
Dolichonyx oryzivorus	Bobolink (bird)
Lasmigona compressa	Creek Heelsplitter (mussel)
Spizella pusilla	Field Sparrow (bird)

The following rare species occur in the general area just outside the boundaries of the Neenah Creek watershed. If these species' preferred habitats occur within this watershed, then these species may also be present:

Ammocrypta clara	Western Sand Darter (fish)
Asplenium trichomanes	Maidenhair Spleenwort (plant)
Etheostoma microperca	Least Darter (fish)
Ischnura hastata	Citrine Forktail (dragonfly)
Platantherea hookeri	Hooker's Orchid (plant)
Rhexia virginica	Meadow Beauty (plant)
Pleurobema sintoxia	Round Pigtoe (mussel)
Scleria verticillata	Low Nut-Rush (plant)
Diplazium pycnocrpon	Glade Fern (plant)

Natural Areas

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

State Natural Areas

Brooks Bluff (dry prairie)
Summerton Bog (northern wet forest , southern sedge meadow, calcareous fen, southern dry forest)

Natural Areas

Armchair Lake (lake (shallow, soft seepage), northern sedge meadow, open bog, oak barrens)
Corning-Weeting Lakes and Bog (northern wet forest, southern sedge meadow, shrub-carr, alder thicket)
Crass Pond (lake (shallow, hard seepage), calcareous fen, shrub-carr, northern mesic forest)
Crooked Lake Wetlands (emergent aquatic, southern sedge meadow, calcareous fen)
Kaiser Prairie (wet-mesic prairie, mesic prairie)
Levee Road Floodplain Woods (floodplain forest)
Lewiston Sedge Meadow (southern sedge meadow)
New Chester Floating Sedges (lake (shallow, soft, seepage), northern sedge meadow)

Oxford Ridge and Kettle Complex (lake (shallow, soft, seepage), emergent aquatic, northern sedge meadow, southern dry forest, northern dry forest)
Pasque Flower Prairie (dry prairie)
Red-Pien Rock Woods (northern wet forest, southern sedge meadow, southern dry forest, northern dry-mesic forest, dry prairie, oak barrens)
Wood Duck Springs (spring pond, northern sedge meadow, springs and spring runs (hard))

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

CHAPTER THREE
Water Quality Conditions, Water Quality Objectives and Nonpoint Sources

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

Nonpoint sources of pollution are responsible for the degraded conditions of the lakes and streams in this watershed. Excessive amounts of sediment, nutrients, and bacteria degrade the water quality causing unbalanced fish communities with depressed populations and limited diversity. In this watershed the two most serious pollutants are manure and sediment. These are discussed below.

Sediment

Sediment adversely impacts the water resources in many ways. Sediment in high concentrations abrades fish gills making the fish more susceptible to disease. It also fills in pools and covers up fish spawning habitat. Further, suspended sediment causes the water to be warmer in the summer. This reduces the dissolved oxygen content, in that warm water cannot hold as much oxygen as cold water. The sources of sediment in this watershed are wind erosion, upland erosion from croplands, stream-bank erosion, and shoreline erosion. Heavy or long term sediment deposits are less problematic in upland streams of the watershed, particularly in the northern part of the watershed. This is due to the fact that the gradients and higher velocities tend to scour streams of sediment and therefore do not result

in long-term habitat destruction caused by channelization or heavy sediment deposits. Instead, stream-bank erosion is the most common form of habitat destruction.

Manure

Manure contains several components that adversely affect water quality and aquatic life. Manure entering a stream breaks down, resulting in depletion of the oxygen. Oxygen is needed by fish and other aquatic life to survive. Also, manure contains nitrogen which can form ammonia in the streams and lakes. High concentrations of ammonia are toxic to fish and other aquatic life. The nutrients in manure (including nitrogen and phosphorus) also promote nuisance algae and weed growth in the streams and lakes. Finally, the bacteria found in livestock manure is harmful to livestock drinking the water and to humans using the water for recreation. The major sources of manure in this watershed are runoff from barnyards and runoff from improperly field-spread manure.

Slopes and narrow valleys present special manure management problems, because many barnyards and manure-spreading sites are located in close proximity to streams or on slopes. In either case, organic loading to streams is often significant.

Nitrates

Groundwater with nitrate levels greater than 10 milligrams per liter (mg/l) exceed state groundwater standards. At this level it is recommended that infants not consume the water because the nitrate interferes with the ability of the blood to carry oxygen. High nitrate concentrations in the drinking water are also linked to spontaneous abortions in livestock. The most likely sources of nitrates in the groundwater in this watershed are nitrogen fertilizers and manure applied to croplands. See groundwater discussion in Chapter Two.

Water Quality Conditions and Recreational Uses

Water Resources Summary

The Neenah Creek Priority Watershed consists of 169 square miles, or roughly 108,000 acres, distributed as follows:

48,600 acres Adams County (45%)
27,000 acres Marquette County (25%)
32,400 acres Columbia County (30%)

The Neenah Creek Priority Watershed is a sub-basin of the larger Fox River Drainage Basin. The topography of the area is characterized by little relief. Marshes and wetlands predominate with upland hardwoods common in the upper reaches of the watershed.

The watershed is mostly rural and agricultural. There is one incorporated village — Oxford — and several unincorporated communities. There are no identified point sources of pollution. Nonpoint sources are related to land use practices. Agricultural land use is primarily croplands, and use intensity varies with location.

Among the areas where nonpoint source pollution is showing its greatest effects include the Mason Lake area in Adams County where barnyards and feedlots, and subsequent stream-bank erosion, are common. Another area of concern is that part of the watershed lying in Columbia County and near the Columbia-Marquette county line. This area has a preponderance of ditched waterways. Networks of ditches lead to Lower Neenah Creek, Big Slough, and tributaries of Big Slough. Significant tracts of marsh and wetlands have been converted for agricultural use. The so-called "muck" farms are common and represent a particular concern for nutrient, pesticide, and sediment runoff.

The primary stream resource is Neenah Creek. The primary lake resource is Lake Mason. Neenah Creek is a trout fishery for the upper half its 43-mile length. The water quality and potential of Neenah Creek is influenced by the dam at Oxford and the effects of nonpoint source pollution. Nonpoint sources are also damaging the water quality of Lake Mason and other lakes which have recently experienced effects of excessive farm fertilization.

In summary, this is a watershed characterized by the preponderance of wetlands and marshlands which, in many ways, represent its greatest resource. Nonpoint source pollution is present and affects many areas of the watershed, with primary concern centered at the Columbia-Marquette county line southward, and the Adams County-Mason Lake area.

The flat, marshy nature of this watershed, particularly the southern portion, makes its water resources vulnerable to the continued effects of nonpoint source pollution and the related conversion of wetlands to farmland.

Streams

Streams are of low gradient and are susceptible to periodic flooding. Prevailing stream bottom substrate ranges from clay and sand in upper Adams and Marquette counties to a high organic content silt in Columbia County. There are six significant streams, totaling 117 stream miles with 25 miles classified as trout waters.

Named streams include: Neenah Creek, Widow Green Creek, South Branch Creek and Big Slough. Neenah Creek is the predominant stream in the watershed. This 43-mile creek runs roughly 3/4 of the length of the entire watershed and through four of the 10 subwatersheds. Streams will be described in more detail in subwatershed descriptions later in this chapter. See Appendix A for information on biotic index.

Lakes

There are 21 significant natural lakes and impoundments ranging in size from 5 to 855 acres within the Neenah Creek Priority Watershed Project area. They include: Amey Pond, Big Springs Ponds, Crooked Lake, Deep Lake, Emrick Lake, Goose Lake, Hill Lake, Jordan Lake, Mason Lake, McDougal Lake, McGinnis Lake, Neenah Lake, Oxford Pond, Patrick Lake, Peppermill Lake, Sache Lake, Weeting Lake and Wolf Lake. See map 2-1.

The lakes in the Neenah Creek Watershed are set in the Central Plain geographical province, a considerable portion of which was once a part of the glacial Lake Wisconsin (Klick and Threinen, 1966). This ancient lake bed is now a flat, sandy plain. The other major surface geological formation within the basin is pitted out-wash, which contains lakes formed by glacial ice blocks.

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

Recreational Uses

The watershed's streams, wetlands and lakes offer diverse recreational opportunities. Popular activities are fishing and canoeing on the streams and lakes. Other popular activities are wildlife observation, hiking, hunting and trapping.

The many wetlands and marshlands throughout the Neenah Creek Priority Watershed provide a valuable recreational and biological resource and buffer streams and lakes from effects of surrounding agricultural land use. The wetlands serve as stop-over sites for migratory waterfowl and sandhill cranes. Many of the lakes are home to several species of waterfowl, fish and furbearers. Trout, gamefish and panfish are present making recreational fishing possible.

Neenah Creek is a trout fishery for the upper half of its 43-mile length. The water quality and potential of Neenah Creek is influenced by the dam at Oxford and the effects of nonpoint source pollution.

Water Quality Objectives

With assistance from the Adams, Marquette and Columbia county staff and the DATCP, the DNR has developed water quality objectives. Objectives were identified for each subwatershed and are listed in the following subwatershed descriptions. Details of objective development can be found in the Neenah Creek Priority Watershed Appraisal Report (Schenck and Herman, 1992). See table 3-1.

Following are terms used for stream and lake objectives:

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

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

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

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

The lakes water quality goal for the Neenah Creek Watershed Project is to protect and improve water quality and decrease siltation. Phosphorus, one of the main nutrients in farm runoff affecting water quality, plays an important role in algal and macrophyte production. Pollutant control measures should be designed to reduce phosphorus loading to the lakes as well as to the streams. Sources of sediment loading should also be reduced, helping to establish more natural flora and macrophytes in the lakes. Landowner participation will play a major role in the reduction of silt and phosphorus in the project area.

Water quality goals for the streams involve improvements through remediation of nonpoint sources of pollution. In some areas, existing dams could possibly be removed. In others, there is a need to correct land use practices which are causing nutrient and sediment loading. Other goals include purchasing some wetlands areas to be set aside for preservation or, at the very least, limit the future channelization of some wetlands. Some streams simply need better access. All of this would help improve the fishery. Upgrading the fish habitat is more realistic in some places than in others.

Following are abbreviations for designated biological uses in the subwatershed discussions.

COLD = Cold-water Communities include surface waters capable of supporting a community of cold-water fish and other aquatic life or serving as a spawning area for cold-water fish species.
WWSF = Warm-water Sport Fish Communities include surface waters capable of supporting a community of warm-water sport fish and/or serving as a spawning area for warm-water sport fish.
WWFF = Warm-water Forage Fish Communities include surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.
LFF = Limited Forage Fish Communities

Discussions also include the "class" of trout streams based on the publication "Wisconsin Trout Streams" [DNR Publ. 6-3600(80)] and Outstanding/Exceptional Resource Waters, Wisconsin Administrative Code NR 102.20 and NR 102.11.

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

See table 3-1 for a summary of the water resource conditions and objectives for the Neenah Creek Watershed.

Table 3-1. Water Resources Conditions and Objectives for Lakes and Major Streams—Neenah Creek Watershed

Subwatershed	Waterbody	Length (mi.) or Acreage	Beneficial Uses: Existing	Beneficial Uses: Potential	Extent of Use (mi.)	Problems/Threats	Pollutant or Limiting Factor	Reduction Required
Big Slough(BS)	Big Slough	8.0 mi.	WWSF/Boating	same	all	SED,MIG Loss of Wetlands	DCH,CL,PSB Private Owner	High
	Unnamed Tribs.	~5.3 mi.	LFF	WWFF	all	HAB,NUT, SED,DO	DCH,CL	High
Crooked Lake(CL)	Crooked Lake	64 acres.				DAV		
	Neenah Cr.	3.0 mi.	Trout III	Trout II	all	TEMP,FERT, MIG	HM,CL,URB,Fox R.	Moderate
Jordan Lake(JL)	Jordan Lake	213 acres				BAC		
Lower Neenah Creek(LN)	Neenah Cr.	~9.1 mi.	WWSF/Boating	same	all	SED,FAD, MIG	CL,PSB,SB,PCB,Fox R.	Moderate
Mason Lake(ML)	Big Spring Cr.	1.8 mi.	Trout I Unclass	same WWSF	1 mi. 0.8 mi.	SED,FERT, HAB,DO	RS,BY,CL,CON,PSB,SB	High
	Mason Lake	855 acres				NPS,HAB, TURB,WK, DAV,FLOW	BY,CL,PSB,SB	High
	Unnamed Cr.	3.3 mi.	LFF	Cold	all	SED,HAB, FLOW	DCH,CL,PSB,SB	High
	Unnamed Trib.	1.0 mi.	WWFF	Trout II	all	HAB,SED,TEMP,FLOW	DCH,SB,CL,PSB,HM	Moderate
Middle Neenah Creek(MN)	Neenah Creek	~8.4 mi.	Trout III WWSF	Trout II Trout III	~4.1 mi. ~4.3 mi.	SED,TEMP, MIG	CL,SB,PSB,HM FOX R.	Moderate

Table 3-1. Continued.

Subwatershed	Waterbody	Length (mi.) or Acreage	Beneficial Uses Existing	Beneficial Uses Potential	Extent of Use (mi.)	Problems/Threats	Pollutant or Limiting Factor	Reduction Required
Oxford Lake(OL)	Oxford Lake	14 acres				unknown		
S. Branch Neenah Creek(SB)	S.Br.Neenah Cr.	3.2 mi.	WWSF	same	all	SED,MIG	CL,Fox R.	Low
Upper Neenah Creek(UN)	Deep Lake	35 acres						
	Goose Lake	81 acres				WK,FLOW DAV		
	McGinnis Lake	33 acres				DAV,WK		
	Neenah Cr.	7.4 mi.	Trout I	same	all	SED,MIG	CL,HM	High
	Parker Lake	59 acres				DAV,FLOW		
	Peppermill Cr.	1.6 mi.	WWFF	same	all	SED,TEMP, FERT	CL,HM	Moderate
	Peppermill Lake	100 acres				WK,DAV, FLOW		
Widow Green Creek(WG)	Unnamed Trib	n/a	Cold	same	all	HAB,FLOW	-	Low
	Widow Green Cr.	12.0 mi.	Trout II	same	5.3 mi.	SED,TURB, TEMP,HAB	BY,CL,PSB,SB	High
			WWSF	same	4.2 mi.	Loss of Wetlands	Private Owner	
			WWFF	same	2.5 mi.			

Table 3-1. Continued.

LEGEND—ABBREVIATIONS:

Stream Classifications

Cold= Cold water community; includes surface waters that are capable of supporting cold water fish and other aquatic life or serving as a spawning or nursery area for warm water fish.

WWSF= Warm water sport fish communities; includes surface water capable of supporting a community of warm water sport fish or serving as a spawning or nursery area for warm water sport fish.

WWFF= Warm water forage fish communities; includes surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.

LFF= Limited forage fishery; (intermediate surface waters); includes surface waters of limited capacity because of low stream flow, naturally poor water quality or poor habitat. These surface waters are capable of supporting only a limited community of tolerant forage fish and aquatic life.

LAL= Limited aquatic life; includes surface waters of limited capacity because of very low or intermittent flow and naturally poor water quality or habitat. These surface waters are capable of supporting only a limited community of aquatic life.

WATER RESOURCES SUMMARIES

Problem or Threat

BAC - Bacteriological Contamination
CL - Chlorine Toxicity
DO - Dissolved Oxygen
FAD - Fish Advisory
FLOW - Stream Flow or Water Level Fluctuations (unnatural)
HAB - Habitat (lack of cover, sediment, scouring, etc.)
HM - Heavy Metal Toxicity
MIG - Fish Migration Interference
NH^3 - Ammonia Toxicity
NUT - Nutrient Enrichment
ORG - Organic Chemical Toxicity
PCB - PCB Bioaccumulation
pH - pH (fluctuations or extreme high or low)
PST - Pesticide/Herbicide Toxicity
SED - Sedimentation
TEMP - Temperature (fluct. or extreme high or low)
TOX - General Toxicity Problems
TURB - Turbidity
DAV - Dense Aquatic Vegetation
WK - Winterkill

Cause or Limiting Factor

BDAM - Beaver Dam
CM - Cranberry Marsh
DCH - Ditched
DRDG - Dredging
Gr. Pit - Gravel Pit
HM - Hydrologic Modification
IRR - Irrigation
LF - Landfill
NMM - Non-metallic Mining
NPS - Unspecified Nonpoint Sources
BY - Barnyard Run-off
CL - Cropland Erosion
CON - Construction Site Erosion
PSB - Streambank Pasturing
SC - Sediment Contamination
PWL - Woodlot Pasturing
RS - Roadside Erosion
SB - Streambank Erosion
URB - Urban Stormwater Run-off
WD - Wind Erosion
PSM - Point Source, Municipal Discharge
PSI - Point Source, Industrial Discharge
SS - Storm Sewer

Subwatershed Discussions

Upper Neenah Subwatershed (UN) (Listed North to South)

Subwatershed Description

The Upper Neenah subwatershed is 34 square miles in New Chester, Jackson, Oxford and Westfield townships, or 20 percent of the total watershed area. The UN subwatershed contains eleven named lakes — Deep, Emrick, Hill, McDougall, Goose, McGinnis, Neenah, Patrick, Parker, Peppermill and Wolf lakes — and two creeks — Peppermill and Upper Neenah. Refer to map 3-1.

Streams

Peppermill Creek is a short (1.6 miles) creek originating from spring flow at the upper end of Peppermill Lake (T15N, R7E, S12) and flowing due east until joining Neenah Creek just north of County Highway EE. The stream averages 11 feet in width.

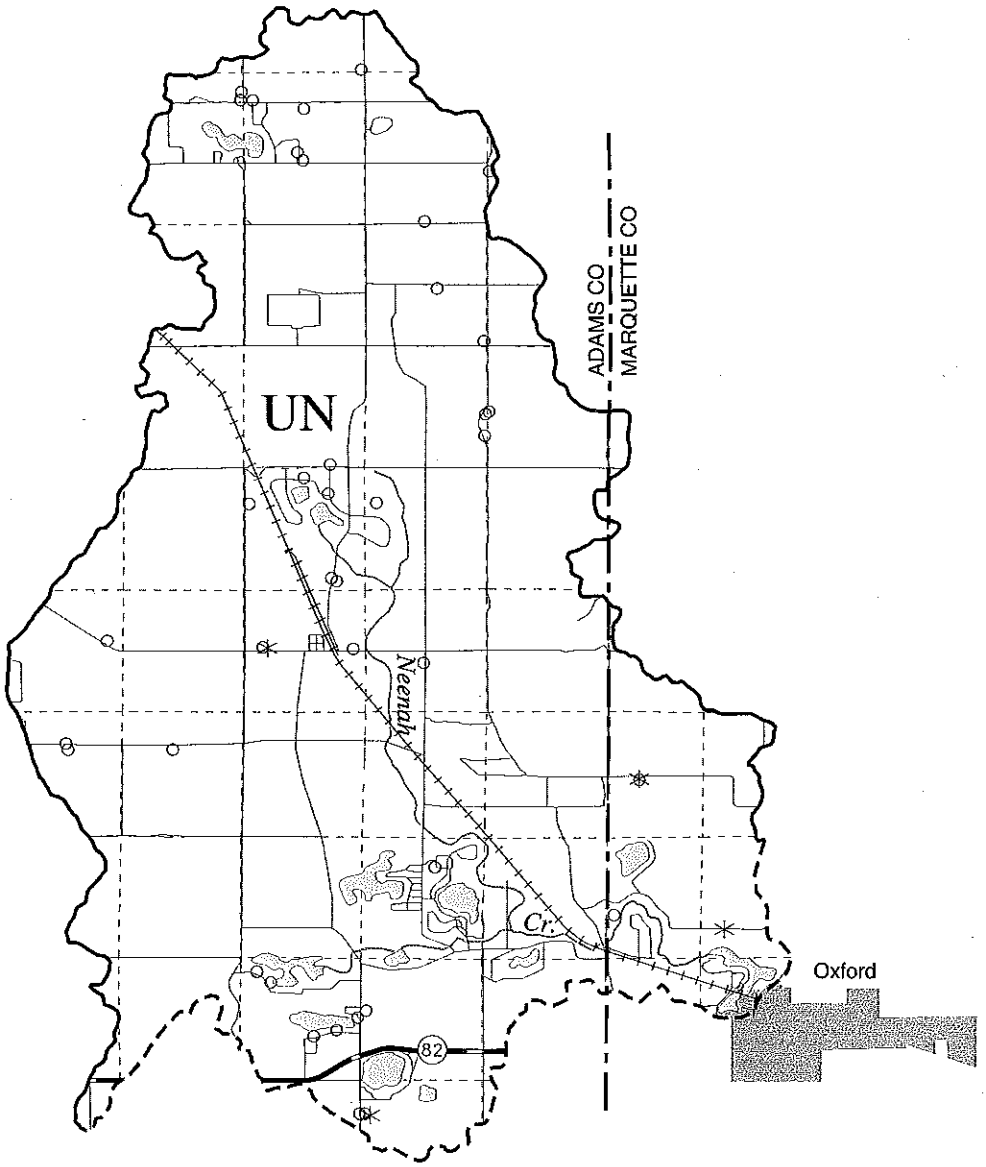
Upper Neenah Creek (T15N, R8E, S18) is delineated as that section upstream of Neenah Lake. It originates from springs and lake drainage. With its southeasterly flow, Upper Neenah Creek is joined by Peppermill Creek and then impounded at Oxford to form Neenah Lake. This section of stream averages 8.5 feet wide and is 7.4 miles long.

Water Quality Conditions - Streams

Peppermill Creek contains a diverse fishery composed of cold- and warm-water fish. During a recent water quality appraisal, numerous intolerant species were recovered. Macroinvertebrate indices ranges from good to excellent. Habitat assessments were good. It is clear with a firm bottom substrate composed primarily of sand, with gravel and rubble common. Water quality is judged excellent with the exception of possible low dissolved oxygen levels in some of the impoundments where macrophyte growth is common.

Peppermill was de-classified as trout water because numerous impoundments have increased water temperatures beyond the optimum trout range. One impoundment was created by an improperly installed culvert. Agricultural effects include siltation and increased fertilization. Thermal constraints, however, continue to be the limiting factor regarding potential trout reclassification. Due to the already high number of impoundments, the resource objectives include removing th impoundments to improve water temperature and to minimize effects of agriculture and other nonpoint sources (NPS). This would help preserve the diverse forage fishery already there.

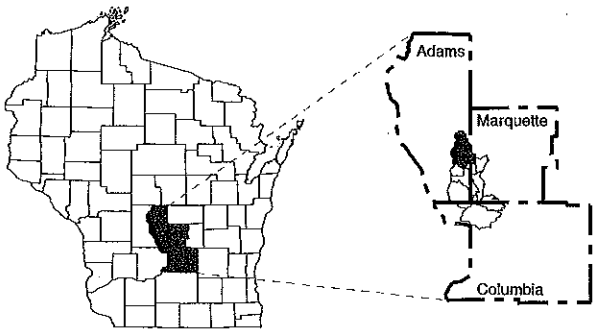
Map 3 - 1. Upper Neenah Creek (UN) Subwatershed



LEGEND

- Well
- Barnyard
- Watershed Boundary
- Subwatershed Boundary
- Federal or State Highway
- Local Road
- Railroad
- County Boundary
- Section Line
- River or Stream
- Open Water
- Municipal Area

STUDY AREA



N

0 1 2 3 4 Miles

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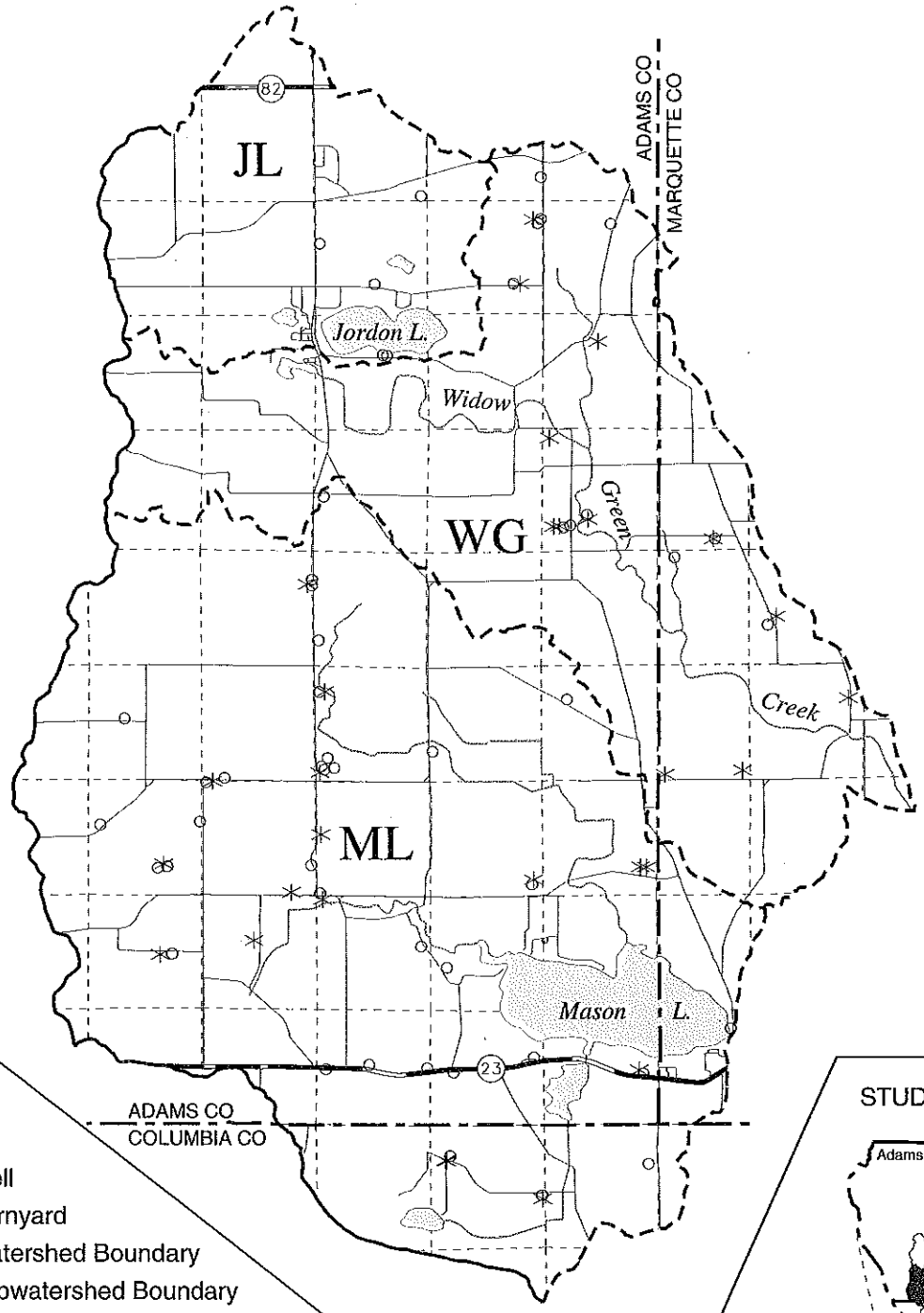
Scale 1:100,000

Wisconsin Department of Natural Resources
BIM - GEO Services Section
March 1994

Map 3 - 2. Jordon Lake (JL), Widow Green Creek (WG) and Mason Lake (ML) Subwatersheds

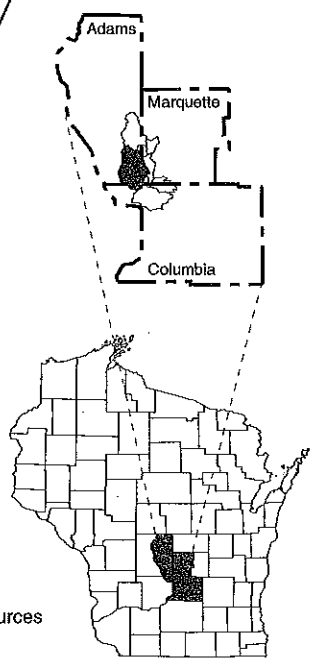


LEGEND

- Well
- Barnyard
- Watershed Boundary
- Subwatershed Boundary
- Federal or State Highway
- Local Road
- Railroad
- County Boundary
- Section Line
- River or Stream
- Open Water
- Municipal Area

N

STUDY AREA



0 1 2 3 4 Miles

0 1 2 3 4 5 6 Kilometers

Scale 1:100,000

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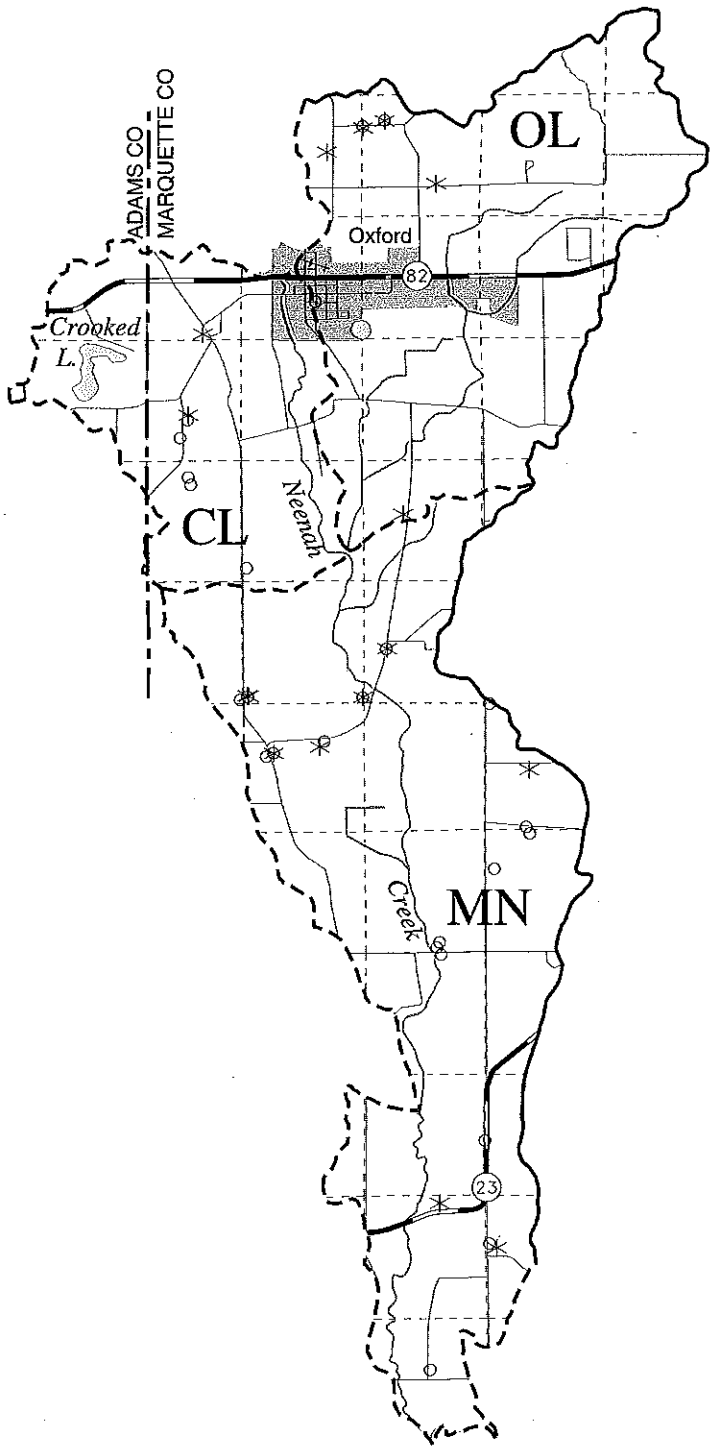
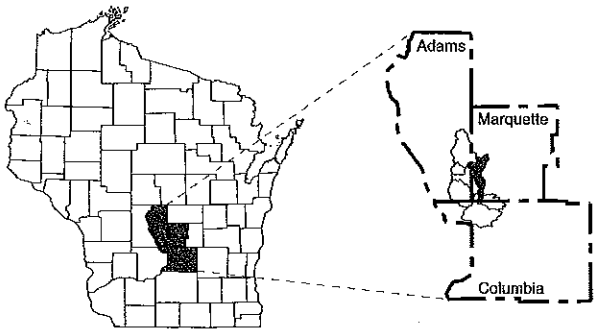
March 1994

Map 3 - 3. Oxford Lake (OL), Crooked Lake (CL) and Middle Neenah Creek (MN) Subwatersheds



STUDY AREA



LEGEND

- Well
- Barnyard
- Watershed Boundary
- Subwatershed Boundary
- Federal or State Highway
- Local Road
- Railroad
- County Boundary
- Section Line
- River or Stream
- Open Water
- Municipal Area

N

GEO

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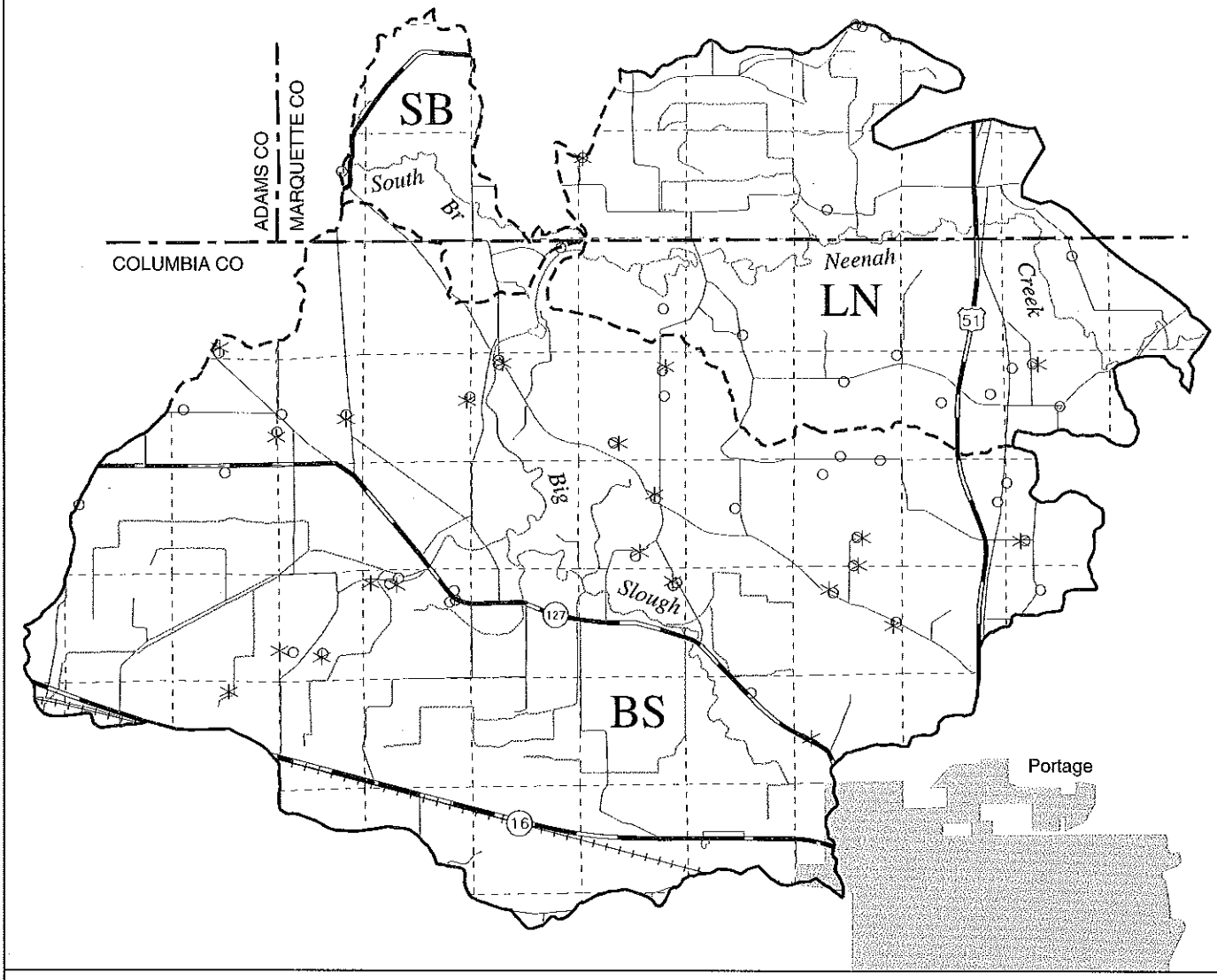
March 1994

0 1 2 3 4 Miles

0 1 2 3 4 5 6 Kilometers

Scale 1:100,000

Map 3 - 4. South Branch Creek (SB), Lower Neenah Creek (LN), and Big Slough (BS) Subwatersheds



LEGEND

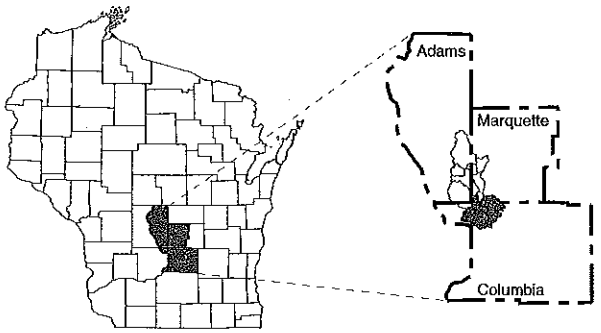
- Well
- Barnyard
- Watershed Boundary
- Subwatershed Boundary
- Federal or State Highway
- Local Road
- Railroad
- County Boundary
- Section Line
- River or Stream
- Open Water
- Municipal Area

0 1 2 3 4 Miles

0 1 2 3 4 5 6 Kilometers

Scale 1:100,000

STUDY AREA



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Upper Neenah Creek is classified as Class I trout water for its entire length in the Upper Neenah subwatershed. Fish surveys reveal a variety of species, from brown trout to tolerant warm-water species such as green sunfish. Neenah Lake serves as a source of recruitment for these warm-water species. Habitat assessment results were good. Macroinvertebrate biotic indices varied from good to excellent. Bottom substrate is mostly sand with clay, gravel and rubble common. Macrophyte growth is light. Water quality is excellent.

Agricultural land use of this portion of the stream, compared to others, is low. The majority of the basin is in marsh or upland hardwoods. Regarding agricultural impacts, two areas of concern are temperatures in Peppermill Creek and NPS pollution. This is considered the finest brown trout stream of Adams County. Although less affected by NPS pollution than other areas of the watershed, it has perhaps more to lose and is more susceptible if those effects are not reduced. There are already numerous species of tolerant warm-water fish which compete with the trout for resources. If trout habitat is degraded, even slightly in areas with siltation and increased ambient temperatures, trout recruitment and subsequent survival may decline until other species come to dominate.

Lakes

This subwatershed contains Deep Lake, Goose Lake, McGinnis Lake, Neenah Lake, Parker Lake, Patrick Lake, McDougall Lake, Emrick Lake, Hill Lake, Peppermill Lake and Wolf Lake. See descriptions below.

Water Quality Conditions - Lakes

Deep Lake (T15N, R7E, S15) is a 35-acre lake with a maximum depth of 47 feet. Largemouth bass, bluegills, pumpkinseed, rock bass, green sunfish, yellow perch, rainbow trout and brown trout make up the fishery. Mallards and teal use this area for nesting. Eurasian water milfoil has been found at the boat landing on this lake, but plants still need to be verified.

Emrick Lake (T15N, R8E, S7) is a 37-acre lake with a maximum depth of 79 feet. This is a small, deep, landlocked kettle lake in the terminal moraine northwest of Oxford. Largemouth bass and panfish constitute the fishery. Water quality is suitable to sustain trout. Waterfowl make moderate use of the lake in spring and fall with fair numbers of geese among the visitors (DNR, 1963).

Goose Lake (T15N, R7E, S10, 11) is an 81-acre lake with a maximum depth of 18 feet. Northern pike, largemouth bass, bluegills, pumpkinseed, and bullheads make up the fishery. Periodic winterkills have occurred on this lake but are now prevented, due to an aeration system. Abundant aquatic vegetation causes recreational use problems. Marsh furbearers are present. Waterfowl use the lake during the migration periods and mallard and blue-winged teal nesting have been reported (DNR, 1966). Eurasian water milfoil has been found on this lake, with other plants still needing verification.

McDougall Lake (T15N, R7E, S11, 14) is a human-made 8.5 acre lake with a maximum depth of 8 feet. Largemouth bass, bluegills, pumpkinseed, rockbass and bullheads make up

the fishery. Marsh furbearers are present and waterfowl use the lake during the migration periods (DNR, 1966).

McGinnis Lake (T16N, R7E, S27) is 33 acres with a maximum depth of 25 feet. Largemouth bass, bluegills, pumpkinseed, and yellow perch make up the fishery (DNR, 1966). Excessive plant growth and algae blooms limit fishing and recreation potential. Eurasian water milfoil has been found on this lake. Winterkills have taken place on McGinnis Lake. An aeration system has been installed to help alleviate the low oxygen winter situations.

Neenah Lake (T15N, R8E, S8, 17) is also known as Oxford Mill Pond. It covers 61 acres and is 15 feet deep at the maximum. Neenah Lake is an irregular impoundment of Neenah Creek at Oxford. Bass, panfish, northern pike and rainbow trout make up the fishery. Weeds in shallow bays present a problem to fishing and boating. Waterfowl frequent the lake in spring and fall and at least three species have been observed nesting there (DNR, 1963).

Parker Lake (T15N, R7E, S14, 23) is 59 acres with a maximum depth of 30 feet. Largemouth bass, bluegills, pumpkinseed, black crappie, yellow perch, bullheads make up the fishery. A carp eradication project took place in 1965. A fluctuating water level and excessive vegetation appear to be the major use problems. Ducks may use this lake during spring and fall migrations (DNR, 1966).

Patrick Lake (T16N, R7E, S9, 10) is 50 acres with a maximum depth of 10 feet. It supports northern, largemouth bass and panfish.

Peppermill Lake (T15N, R7E, S15) is a 100-acre impoundment of Peppermill Creek. It has a maximum depth of 9 feet. The fishery consists of northern pike, largemouth bass, bluegills, crappies, pumpkinseed, rock bass, bullheads and forage minnows (DNR, 1966). Winterkill situations have taken place on Peppermill Lake. An aeration system has been designed and should be installed in 1993.

Wolf Lake (T15N, R7E, S11) is 49 acres and 47 feet deep at its deepest point. Brown trout (planted), largemouth bass, bluegills, pumpkinseed, green sunfish, yellow sunfish, yellow perch, rock bass and black crappie, make up the fishery. Mallards reportedly raise broods at the lake and other waterfowl use this lake during spring and fall migrations (DNR, 1966). The state DNR owns 32 acres adjoining this lake. This includes roughly 1,320 feet of shoreline frontage.

Nonpoint Source Pollutants

- The Upper Neenah subwatershed contains 4 (inventoried) animal lots which contribute 133 pounds of phosphorus, annually. This represents 7 percent of the barnyard-related phosphorus for the entire watershed.

- The upland sediment delivery in the Upper Neenah Subwatershed is 10 tons, annually, or less than one percent of the entire upland sediment load. Lakeshore erosion is the major source of sediment in this subwatershed, contributing 60 percent of the sediment load in the subwatershed.

- Sediment delivered from streambanks and lakeshores in the Upper Neenah subwatershed is 487 tons, annually, or 34 percent of the entire streambank/lakeshore load.

Water Resource Objectives

Minimize effects of agriculture and other nonpoint sources. Maintain trout habitat.

Oxford Lake Subwatershed (OL)

Subwatershed Description

The Oxford Lake subwatershed is 9 square miles located centrally in eastern Oxford Township. It makes up roughly 5 percent of the total priority watershed area. The subwatershed contains one lake, Oxford, and a few unnamed tributaries of Neenah Creek. Refer to map 3-2.

Streams

There was no stream monitoring conducted in OL. Much of the stream is channelized.

Lakes

Oxford Lake (T15N, R8E, S16,17) covers 13.6 acres and is 49 feet deep maximum.

Water Quality Conditions - Lakes

Oxford Lake is a small, deep, landlocked kettle lake, possibly a remnant of the old glacial lake, the bed of which it occupies. Largemouth bass and panfish compose the fishery.

Water Resource Objectives

There are no major use problems on this lake. The lake has some aesthetic value and harbors waterfowl in spring and fall (DNR, 1963).

Nonpoint Source Pollutants

- The Oxford Lake subwatershed contains 5 (inventoried) animal lots which contribute 29 pounds of phosphorus, annually. This represents 1 percent of the barnyard-related phosphorus for the entire watershed.

- The upland sediment delivery in the Oxford Lake subwatershed is 2432 tons, annually, or 16 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 100 percent of the sediment load in the subwatershed.

- Sediment delivered from streambanks and lakeshores in the Oxford Lake subwatershed is 4 tons, annually, or less than 1 percent of the entire streambank/lakeshore load.

Crooked Lake Subwatershed (CL)

Subwatershed Description

The Crooked Lake subwatershed is 5 square miles in eastern Jackson and western Oxford townships. Crooked Lake subwatershed represents 3 percent of the total priority watershed area. The subwatershed contains one lake, Crooked, and a 2.5-mile stretch of Neenah Creek. Refer to map 3-2.

Streams

The portion of Neenah Creek in this subwatershed (T15N, R8E, S29) includes that section between the outlet at Neenah Lake, just north of the County Highway A intersection. Direction of flow is due south. Average stream width is 31 feet. A series of drainage ditches are tributary at the southernmost boundary of the subwatershed.

Water Quality Conditions - Streams

This entire section of Neenah Creek is classified as Trout III. Carp eradication has taken place in the past. Fish surveys indicate a highly diverse fishery ranging from intolerant cold water species to very tolerant warm-water species. Macroinvertebrate biotic indices range from poor to fair, likely due to increased temperatures, siltation, and decreased habitat. Habitat assessments were fair and good. Water quality is good, except for high average temperatures (for trout). Macrophyte growth is common and increased over that of the upper creek.

Neenah Creek is impounded in Oxford, forming Neenah Lake (a.k.a. Oxford Mill Pond, see lake description in Upper Neenah subwatershed). This is the only dam on the creek and is owned by White Coal Company. It is apparent that this impoundment has a substantial effect on trout habitat and potential. Above it, Neenah Creek is Class I and considered the premier trout water of the area. Below it, Neenah Creek is considered marginal Class III. Clearly,

temperature is limiting trout below the dam. Also observed were siltation and increased macrophyte growth. These may be attributed to the combined effects of more agricultural intensity and possible urban runoff from the village of Oxford.

Improving from trout Class III to Class II is a realistic and obtainable improvement through remediation of nonpoint sources of pollution. With dam removal, restoration to Class I may ultimately be achieved. Resource objectives include: 1) consider removing the dam, and 2) remediate agricultural practices contributing to nutrient and sediment loading (NPS).

Lakes

Crooked Lake (T15N, R7E, S24) is a 48-acre lake with a maximum depth of 56 feet.

Water Quality - Lakes

Crooked Lake's fishery includes northern pike, largemouth bass, bluegills, pumpkinseed, green sunfish, black crappies, yellow perch and bullheads. Waterfowl use this area for reproduction (DNR, 1966).

Excessive aquatic vegetation has been a concern in recent years (NCD DNR water quality files). Wetland restoration may help water quality of Crooked Lake.

Nonpoint Source Pollutants

- Crooked Lake subwatershed contains 1 (inventoried) animal lot which contributes 16 pounds of phosphorus, annually. This represents 1 percent of the barnyard-related phosphorus for the entire watershed.

- The upland sediment delivery in the Crooked Lake subwatershed is 460 tons, annually, or 3 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 96 percent of the sediment load in the subwatershed.

- Sediment delivered from streambanks and lakeshores in the Crooked Lake subwatershed is 20 tons, annually, or 1 percent of the entire streambank/lakeshore load.

Water Resource Objectives

Consider removing the dam at Oxford. Remediate agricultural practices contributing to nutrient and sediment loading.

Jordan Lake Subwatershed (JL)

Subwatershed Description

The Jordan Lake subwatershed is 7 square miles and is located entirely in Jackson Township. Its area is roughly 4 percent of the total watershed area. The JL subwatershed contains one named lake, Jordan Lake, and no major streams. Refer to map 3-3.

Lakes

Jordan Lake (T15N, R7E, S34)is a 213 acre lake, the second largest in the watershed. It has a maximum depth of 82 feet.

Water Quality Conditions - Lakes

Jordan Lake's fishery is made up of brown trout (stocked), northern pike, largemouth bass,. bluegills, pumpkinseed, black crappie, yellow perch and bullheads. Marsh furbearers are present. Ducks and common loons are present during the migration periods, and dabbler species nest at the lake (DNR, 1966). This lake has a natural water level fluctuation of several feet.

Wetlands, particularly on the eastern shore, need to be protected to help improve northern pike spawning. An easement on the currently undeveloped eastern shore is recommended to protect the lake. Runoff from lawn fertilizers is believed to be a problem on this lake. Shoreline buffers are recommended to help reduce the amount of fertilizers reaching the lake. A lake protection plan would help address this issue.

Nonpoint Source Pollutants

- The Jordan Lake subwatershed contains no (inventoried) animal lots.
- The upland sediment delivery in the Jordan Lake subwatershed is 372 tons, annually, or 2 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 94 percent of the sediment load in the subwatershed.
- Sediment delivered from streambanks and lakeshores in the Jordan Lake subwatershed is 22 tons, annually, or 2 percent of the entire streambank/lakeshore load.

Water Resource Objectives

Reduce runoff from lawn fertilizers. Install shoreline buffers. Develop and implement a lake protection plan. Consider purchasing an easement on the undeveloped east shore to protect northern pike spawning area on east shore.

Widow Green Creek Subwatershed (WG)

Subwatershed Description

The Widow Green Creek (also known as O'Keefe Creek) subwatershed is 18 square miles, or 11 percent of the total priority watershed area. WG contains parts of Jackson, New Haven, Oxford and Douglas townships, with the subwatershed's center located just south of where the four townships meet. It spreads across parts of Marquette and Adams counties. The subwatershed contains almost no lakes (none are named) and one creek, Widow Green. It does, however, contain Widow Green Marsh as well as several other large tracts of marsh and wetland. Refer to map 3-3.

Streams

Widow Green Creek is a tributary to Neenah Creek. It originates south of Jordan Lake and flows southeasterly 12 miles before joining Neenah Creek in Marquette County. Average width is 8 feet in Adams and 17 feet in Marquette County.

Water Quality Conditions - Streams

Widow Green Creek has bottom substrate primarily of sand and silt, with gravel, rubble and cobble. The upper 5.3 miles are classified as Class II trout water. The lower half contains warm-water forage and sport species. Fish surveys indicate trout are present but limited to areas of springs. The remainder of the fishery is composed mostly of tolerant warm-water species such as green sunfish. Macroinvertebrate ratings are variable due to nonpoint effects and the presence of spring water flow.

During a recent ecological appraisal, habitat assessments ranged from fair to good. Water quality is characterized as average with conductivity and total phosphorus up slightly from surrounding waters.

The trout potential of this creek has likely been realized due to thermal limitation. The surrounding marsh and wetlands serve to buffer stream temperatures (as well as water quality). Therefore, a significant water temperature reduction from improved farming practices will probably not be seen. However, areas of trampled banks and general stream-bank erosion are common and as severe as any place in the watershed. Their remediation would improve the class II fishery. The majority of these situations are located at Gale Avenue, downstream 1-2 miles.

It is apparent that the most beneficial water resource of this subwatershed are the extensive marshes and wetlands. Though the fishery may be improved, the greatest overall benefit is derived from the aesthetic and biological importance of the wetlands.

The resource objectives are to 1) purchase wetlands and marshlands to be set aside for preservation (WM), and 2) remediate farming practices contributing to nutrient and sediment loading (NPS).

The DNR Bureau of Research, in conjunction with DNR Fisheries Management and DNR Nonpoint Source have conducted sampling at three sites along Widow Green Creek since 1991. Currently fish species, habitat, temperature, dissolved oxygen, turbidity, and conductivity are routinely sampled. More extensive sampling may be done in the future.

Nonpoint Source Pollutants

- The Widow Green subwatershed contains 14 (inventoried) animal lots which contribute 764 pounds of phosphorus, annually. This represents 39 percent of the barnyard-related phosphorus for the entire watershed.

- The upland sediment delivery in the Widow Green subwatershed is 1186 tons, annually, or 8 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 91 percent of the sediment load in the subwatershed.

- Sediment delivered from streambanks and lakeshores in the Widow Green subwatershed is 121 tons, annually, or 8 percent of the entire streambank/lakeshore load.

Water Resource Objectives

Purchase wetlands and marshlands to be set aside for preservation. Remediate agricultural practices contributing to nutrient and sediment loading.

Middle Neenah Subwatershed (MN)

Subwatershed Description

The Middle Neenah subwatershed is 13 square miles entirely in Marquette County, occupying southern Oxford and northern Douglas townships. It constitutes roughly 7 percent of the total priority watershed area. This subwatershed contains about 8 miles of Neenah Creek and contains no lakes. Refer to map 3-2.

Streams

Middle Neenah Creek (T14, R8E, S33) is roughly outlined as that portion between Fox Drive and County Hwy. P. The direction of flow is due south. Average stream width is 31 feet. Widow Green Creek is a tributary (that enters at T14N, R8E, S21) as well as several drainage ditches.

Water Quality Conditions - Streams

This 8.1-mile section of Neenah Creek is classified as Class III trout water. Fish surveys indicate a highly diverse fishery, from intolerant cold-water to very tolerant warm-water species. Biotic indices range from fair to very good. Habitat assessments here range from

fair to good. Water quality is generally good except for high average temperatures (for trout). Bottom substrate is mostly sand with silt, clay and gravel present.

Surrounding land use is agricultural. Areas of trampled banks and general bank erosion are reported. Drainage ditches join between County Hwys. P and A. Temperature and siltation levels are higher than in Upper Neenah Creek. Temperature change can be attributed to the impoundment at Oxford. Siltation is likely caused by farming, with agricultural land use increasing substantially over Upper Neenah Creek.

The fish manager considers this stretch of the stream to be a marginal Class III. Class II is attainable given the few limiting factors. Resource goals include: 1) consider dam removal; 2) correct agricultural practices contributing to nutrient and sediment loading (NPS).

Nonpoint Source Pollutants

- The Middle Neenah subwatershed contains 9 (inventoried) animal lots which contribute 182 pounds of phosphorus, annually. This represents 9 percent of the barnyard-related phosphorus for the entire watershed.

- The upland sediment delivery in the Middle Neenah subwatershed is 3085 tons, annually, or 20 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 99 percent of the sediment load in the subwatershed.

- Sediment delivered from streambanks and lakeshores in the Middle Neenah subwatershed is 35 tons, annually, or 2 percent of the entire streambank/lakeshore load.

Water Resource Goals

Consider dam removal at Oxford. Remediate agricultural practices contributing to nutrient and sediment loading.

Mason Lake Subwatershed (ML)

Subwatershed Description

The Mason Lake is the third largest subwatershed, at 28 square miles, or 17 percent of the total priority watershed area. ML subwatershed is almost totally in New Haven Township, with its westernmost and southern tips spreading into Douglas and Newport townships, respectively. A small piece extends into the town of Lewiston. This subwatershed contains the largest lake in the watershed, Mason Lake, and several tributaries including Big Spring Creek. Amey Pond, adjacent to Mason Lake, also lies in this subwatershed. Refer to map 3-3.

Streams

Big Spring Creek is the primary stream resource in this subwatershed. It's spring-fed and flows southeasterly into Mason Lake (at T14, R7E, S26). The creek originates from a 3-acre spring pond. It is dammed at roughly its half-way point in the village of Big Spring where it forms the 7-acre Big Spring Pond. On average, the stream is 17 feet wide, with the stretch below the pond substantially wider than that above.

There are also two unnamed creeks studied in this subwatershed. One is a tributary to Big Spring Creek, and the other flows into Morris Cove (T14N, R7E, S26) of Mason Lake.

Water Quality Conditions - Streams

The upstream portion of Big Spring Creek, upstream of the dam, is classified Class I trout water, while downstream is unmanaged for trout. Although it is short (1.8 miles), it has potential to be a better Class I trout stream than it now is. Previous fish survey indicate a naturally reproducing population of brook trout including some large specimens. Because it is spring-fed, the stream has good water quality characteristics. The fish community is dominated by intolerant species. The variable biotic indices are attributed to site-specific non-point effects. Habitat assessment is only fair due to an abundance of silt and limited fish habitat of instream macrophyte beds and overhanging banks. Riffles are uncommon. The bottom substrate is primarily clay and silt with some gravel in the upper reaches.

The sampling site, near the junction of Golden Avenue and County Hwy. G, is a problem area. Excessive silt (up to 2 feet) and macrophyte growth were observed. There are several intense barnyards directly adjacent to pastures. Stream-bank erosion is common in these areas. Road work during the appraisal period contributed to sediment load. This is the only access point to the upper creek area and is fenced off across the stream.

Big Spring Pond suffers from excessive macrophyte and algae growth throughout the summer. The sedimentation rate in the pond is high as evidenced by the decreasing average depth, now roughly 1-2 feet. Dissolved oxygen levels were observed to drop to 3 ppm, exceeding water quality standards for a cold water classification and effectively forcing fish upstream. Water temperatures are raised quite a bit in the pond, which is considered unsuitable for trout downstream.

Because water quality from the pond has been degraded, resource objectives should include considering removing the dam. Preliminary goals for Big Spring Creek include: 1) reducing agricultural sediment and nutrient inputs in the identified problem areas (NPS), 2) improving fish habitat (FM), 3) improving access (FM), and 4) consider removing the dam.

There is a small, unnamed tributary to Big Spring Creek (T14N, R7E, S27). About one mile long, the spring-fed creek flows southerly and joins Big Spring Creek just south of Golden Ave. Its average width is 3-4 feet and average depth about 1/2 foot. Its bottom is firm and experiences aquatic macrophyte growth in wide areas. The creek now supports cold-water forage fish with some trout in the lower reaches likely.

Intolerant fish and macroinvertebrate species dominate. Water quality is good. Habitat rating is only fair owing to the shallow nature of the stream and the lack of instream cover. The primary beneficial use is providing forage for the trout of Big Spring Creek. It may also serve as a trout refuge and nursery. But this creek is affected by farming similar to Big Spring Creek. A small impoundment upstream of the sampling site suffers from excessive macrophyte growth and likely contributes to higher downstream temperatures.

While lack of cover and low flow may prohibit trout from continuously occupying the upper sections of stream, the lower reaches could possibly support a more stable population. The resource objective should be to remediate agricultural practices loading sediment and nutrients (NPS). This would enhance the creek's ability to support a more diverse, cold water forage fishery as well as a resident trout population.

Another unnamed creek flows southerly into the Morris Cove of Lake Mason. Although long (3.3 miles) and draining a relatively large basin, the creek is small, shallow and averages 3-4 feet wide with low flow. Bottom sediment is mostly silt. This creek has numerous channels throughout and supports a limited forage fishery.

Few numbers and species of forage fish were recovered in a limited survey of the upper stretch, most likely due to lack of habitat from excessive siltation. The species which were recovered were tolerant ones. Further fish sampling should be conducted at other locations to confirm the characterization. Macroinvertebrate indices are good despite heavy siltation perhaps due to the cold, spring fed nature of the water. Habitat ratings are poor. Water chemistry characteristics are good. This creek's potential is as a cold water forage fishery, with agricultural impacts being the limiting factors.

Much of this creek is utilized as agricultural drainage. The creek is channelized in places and contains heavy silt loads. It was assumed in the past that this creek carried significant nutrient and sediment loads to the Morris Cove of Lake Mason since that cove has experienced problems with algae and macrophyte growth. Though the presence of large amounts of sediments was obvious, nutrient levels were found to be of average values. Spring runoff nutrient sampling is recommended to confirm nutrient loading to Mason Lake. The resource objectives for this creek are to: 1) reduce agricultural practices contributing to sediment and nutrient inputs (NPS), 2) limit future channelization (NPS).

Lakes

Big Spring Millpond covers a 7 acre area. This spring fed area drains into Mason Lake. Big Spring Millpond and dam have prevented much of the silt and nutrients from entering Lake Mason. These hydraulic characteristics of the past are now limited by the increased depth of silt of the millpond and decreased retention time of water passing through it (Atkinson, 1992).

Mason Lake (T14N, R7E, S25, 26, 35, 36) and (T14N, R8E, S30, 31) is the largest lake in the watershed. Its area is 855 acres with a maximum depth of 10 feet. A control structure is used to maintain the lake level.

Water Quality Conditions - Lakes

Mason Lake has a diverse fishery including northern pike, largemouth bass, bluegills, pumpkinseed, black crappie, yellow perch, yellow bass, black bullheads and carp. Muskrat are present. Although some dabbler ducks nest at the lake, the majority are present during their migration periods (DNR, 1966).

A study done on Green Lake (DNR, 1981) concluded that the 60-70,000 geese present contribute roughly 5 percent of the phosphorus load to the lake. Because Mason Lake freezes sooner than Green Lake, the 5 percent estimate is likely to be high for Mason Lake.

Turbidity, aquatic vegetation and carp are the major recreational use problems on this lake. Excessive plant growth and algae blooms limit fishing and recreation potential. Eurasian water milfoil (Myriophyllum spicatum) is found throughout much of the lake (Coates, 1992). It would be beneficial to eliminate this exotic plant and to re-establish native vegetation in many areas of the lake. Current management concerns involve the effects of eutrophication.

The local lake association has been active in assisting the DNR in various projects and recognizes the need for control of nutrient sources to the lake. The agricultural watershed surrounding the lake is the most likely source of nutrient and sediment loading to the lake. In a survey of Mason Lake landowners, the number one problem of Mason Lake was the abundance of plants and excessive nutrients (Atkinson, 1992). Long-term protection of the watershed is listed as top priority (Atkinson, 1992).

There is a chronological history of Mason Lake available in the appraisal report. The report, compiled in 1992, documents the biologists' activities on Mason Lake and the resulting lake characteristics from 1932 to 1991.

During construction of a new dam, in late March, 1993, the dam at Briggsville burst. Water levels dropped a few feet before the break was filled. Water quality impacts are unknown, but are probably minor or insignificant. The new dam was completed in 1993 and will be capable of manipulating water levels on Mason Lake.

Since the Neenah Creek Appraisal Report was written (1992), the dam at Big Spring has been removed and the lake drawn down (Spring 1993).

Nonpoint Source Pollutants

- The Mason Lake subwatershed contains 13 (inventoried) animal lots which contribute 242 pounds of phosphorus, annually. This represents 12 percent of the barnyard-related phosphorus for the entire watershed.

- The upland sediment delivery in the Mason Lake subwatershed is 4606 tons, annually, or 29 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 87 percent of the sediment load in the subwatershed.

- Sediment delivered from streambanks and lakeshores in the Mason Lake subwatershed is 676 tons, annually, or 47 percent of the streambank/lakeshore watershed load.

Water Resource Objectives

Reduce agricultural sediment and nutrient inputs in the identified problem areas.
Improve fish habitat.
Improve public access.
Consider removing the dam at Big Spring.
Limit future stream channelization.
Consider changing Mason Lake Association to a Lake District.

South Branch Neenah Creek Subwatershed (SB)

Subwatershed Description

The South Branch Neenah Creek subwatershed is the smallest of the 10. It is made up of only 3 square miles, or 2 percent of the total Neenah Creek Priority Watershed area. SB lies in the southwestern corner of Douglas Township, with a small, southern piece of the subwatershed entering into Lewiston Township. The main water resource of SB is the section of South Branch Creek from its source at Mason Lake (T14N, R8E, S31), flowing east until it joins Neenah Creek near the Columbia-Marquette county line. There are no lakes in this subwatershed, but the land is marshy near Briggsville (T14N, R8E, S32).

Streams

S. Branch Neenah Creek is short (3.2 miles), but wide. Its average width is 43 feet. The bottom consists mostly of silt. It is classified as warm-water sport fishery and was treated in 1970 for carp eradication.

Water Quality Conditions - Streams

Fish surveys indicate a presence of warm-water sport, rough, and forage species in S. Branch Neenah Creek. Macroinvertebrate indices are poor as to be expected where silt is the dominant substrate. Habitat rating was good. Water chemistry results pointed out the following:high average temperatures, low dissolved oxygen,high pH, and low alkalinity.

Because this is a short stream which originates from Mason Lake, water quality characteristics are primarily dictated by the lake. Resource objective is to maintain and increase the current diversity of warm-water sport fishes. This may best be accomplished by stabilizing or reversing the trophic status of the lake itself.

Nonpoint Source Pollutants

- The South Branch subwatershed contains no (inventoried) animal lots.
- The upland sediment delivery in the South Branch subwatershed is 193 tons, annually, or 1 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 97 percent of the sediment load in the subwatershed.
- Sediment delivered from streambanks and lakeshores in the South Branch subwatershed is 5 tons, annually, or less than one percent of the entire streambank/lakeshore load.

Water Resource Objectives

Maintain and increase the current diversity of warm-water sport fishes.

Lower Neenah Subwatershed (LN)

Subwatershed Description

The Lower Neenah subwatershed contains the easternmost tip of the Neenah Creek Priority Watershed where Neenah Creek joins the Fox River (T13N, R9E, S4). Straddling the Marquette-Columbia county line, the LN subwatershed has portions in four townships — Douglas, Lewiston, Moundville and Fort Winnebago. LN is 15 square miles in area, or 9 percent of the total priority watershed area. It contains no lakes, and Lower Neenah Creek is the only named stream, while there are several unnamed tributaries and channels. Refer to map 3-4.

Streams

Lower Neenah Creek is that portion (9.1 miles) downstream of the confluence of S. Branch Neenah Creek. Flow is easterly along the Columbia-Marquette county line until joining the Fox River. There the stream is wide and sluggish. Average width is 50 feet. Tributaries include the South Branch of Neenah Creek, Big Slough and several drainage ditches.

Two unnamed creeks were also studied, one at T14N, R8E, S35, and the other at T14, R8E, S36. The former is the main channel of a networked drainage system. Both flow southerly joining Neenah Creek at the Columbia-Marquette county line. Gradient and flow are low. Average width is between 6-8 feet.

Water Quality Conditions - Streams

Fish surveys of Lower Neenah Creek show a warm-water fishery with several "nuisance" species such as carp present, but not abundant. Carp eradication took place in 1970 as part of

the Upper Fox River Project. Classification for the creek's fishery is warm-water sport. Low numbers of brown trout were recovered in the upper portions of this section of creek. Historical biotic indices are fair. No recent data are available for water chemistry and habitat assessments. Monitoring emphasis was placed on Middle and Upper Neenah Creek and sampling stations were not chosen for this lowest section of the stream. Bottom substrate is mostly silt.

Much of the shoreline in this area has been left in natural cover. Wetland tracts are common. Also common are drainage ditches and so-called "muck" farms. These most likely contribute greatly to sediment and nutrient loads in Neenah Creek.

The potential of this section of stream is as an improved warm-water sport fishery. Limiting factors include rough fish recruitment from the Fox River. Also inhibiting fish habitat is excess siltation and lack of instream cover. Resource objectives should include: 1) correct farming practices causing sediment and nutrient loading (NPS), and 2) control sediment and nutrient inputs from tributaries (NPS) (see S.Branch Neenah Creek).

Regarding the two unnamed creeks, a recent fish survey recovered only a limited number of forage species, mostly tolerant. Habitat assessment was poor because of heavy silt and the channelized nature of the stream. Macroinvertebrate index was poor. Water chemistry revealed low average dissolved oxygen and high nitrate plus nitrite values indicating possible fertilizer run-off. Silt in places is 1-2 feet in depth. Macrophytes are abundant. Bottom substrate is silt in both creeks. The streams are unclassified but support a limited warm-water forage fishery.

Primary water quality concerns relate to the influx of sediments and nutrients these and other ditches carry to Neenah Creek. Resource objectives include: 1) limiting future channelization (NPS), and 2) remediation of agricultural practices contributing to sediment and nutrient loading (NPS).

Nonpoint Source Pollutants

- The Lower Neenah subwatershed contains 1 (inventoried) animal lot which contributes 36 pounds of phosphorus, annually. This represents 2 percent of the barnyard-related phosphorus for the entire watershed.

- The upland sediment delivery in the Lower Neenah subwatershed is 171 tons, annually, or 1 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 68 percent of the sediment load in the subwatershed.

- Sediment delivered from streambanks and lakeshores in the Lower Neenah subwatershed is 80 tons, annually, or 6 percent of the entire streambank/lakeshore load.

Water Resource Objectives

Remediate agricultural practices causing nutrient and sediment loading. Control sediment and nutrient inputs from tributaries (see South Branch Subwatershed) Limit future stream channelization.

Big Slough Subwatershed (BS)

Subwatershed Description

The largest and southernmost subwatershed, Big Slough is 37 square miles, or 22 percent of the total priority watershed area. It lies almost entirely in Columbia County, with a large center section in Lewiston Township and other parts east in the town of Newport and west in Fort Winnebago. Running through this subwatershed is an 8-mile tributary to Neenah Creek called Big Slough. It has several of its own unnamed tributaries. While the Wisconsin River lies just to the south, Big Slough flows from south to north, to Neenah Creek, which ultimately joins the Fox River, another northerly flowing stream. While there are no lakes, large wetland areas exist throughout the basin. Refer to map 3-4.

Streams

As previously stated, Big Slough is tributary to Neenah Creek. It flows northerly about 8 miles in Columbia County before joining Neenah Creek near the Marquette-Columbia county line. It originates in a swampy area (T13, R8E, S35) and is of very low gradient throughout. The lower 2 miles are sufficiently wide to allow for boating. Width of Big Slough proper averages 520 feet with maximum depth about 10 feet. It is the major boating and fishing resource of the area.

Also studied was the major un-named tributary (T13N, R8E, S16) that joins the upper reaches of Big Slough. The flow is easterly and it joins Big Slough east of Adney Road. It is heavily channelized and fed by numerous drainage ditches. Width is roughly 8 feet, and bottom substrate is silt. Gradient and flow are very low. There is a limited forage fishery present.

Water Quality Conditions - Streams

Big Slough is a warm-water fishery with a potential for improvement. Bottom substrate is of sand and "muck." The fishery is warm-water with a historical carp problem. Carp are probably at "nuisance levels." Panfish are overabundant and stunted. The fish manager would like this to be managed as a panfishery.

Stream sampling stations were upstream of the Big Slough itself. Habitat was judged to be poor. Macroinvertebrate indices were poor. There was low average dissolved oxygen. Of primary water quality concern in this subwatershed is the preponderance of ditched waterways. Large tracts of wetlands have been converted to cropland or other farming use,

and therefore, significant nutrient and sediment inputs are made to Big Slough and eventually to Neenah Creek.

Preliminary water resource objectives here are three-fold: 1) correct agricultural practices causing sediment and nutrient loading (NPS), 2) increase wetland holdings to maintain wildlife habitat and biodiversity, and 3) improve panfishery (FM).

In the unnamed tributary, fish communities at sampling sites consist almost exclusively of tolerant and very tolerant species. Macroinvertebrate index was poor. At one sampling site, no invertebrates were recovered (perhaps due to pesticide runoff). Habitat has been judged fair. High conductivity values and nitrate plus nitrite values were measured indicating possible agricultural fertilizer runoff. Silt is up to 1-2 feet deep in places.

So-called "muck" farms are common throughout the area. Extensive tracts of wetlands have been converted for farming. Drainage ditches criss-cross the area. Resource objectives are: 1) remediate agricultural practices contributing to sediment, nutrient and pesticide runoff (NPS), and 2) minimize future ditching (NPS).

Nonpoint Source Pollutants

- The Big Slough Subwatershed contains 13 (inventoried) animal lots which contribute 562 pounds of phosphorus, annually. This represents 29 percent of the barnyard related phosphorus for the entire watershed.

- The upland sediment delivery in the Big Slough Subwatershed is 3122 tons, annually, or 20 percent of the entire upland load. Upland erosion is the major source of sediment in this subwatershed, contributing 100 percent of the sediment load in the subwatershed.

- Most of the streams in the Big Slough subwatershed are ditched and dredged. Although there is erosion from these practices, estimates of sediment loading were not made.

Water Resource Objectives

Remediate agricultural practices contributing to sediment, nutrient and pesticide loading. Increase wetland holdings to maintain wildlife habitat and biodiversity. Improve panfishery. Minimize future ditching.

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 Neenah Creek Watershed. Livestock operations comprised of 58 (inventoried) animal lots are a source of 1964 pounds of phosphorus per year (table 3-2). Most of the oxygen-demanding pollutants and nutrients associated with these operations drain via concentrated flow to creeks and wetlands. An additional 20 animal lots drain to closed depressions and add nutrients to groundwater.

Table 3-2. Barnyard Inventory Results: Neenah Creek Watershed

Subwatershed	Number of Barnyards	Total Phosphorous[1] (lbs)	Percent Watershed Phosphorus Load
Upper Neenah (UN)	2	133	7
Oxford Lake (OL)	5	29	1
Crooked Lake (CL)	1	16	1
Jordan Lake (JL)	0	0	0
Widow Green (WG)	14	764	39
Middle Neenah (MN)	9	182	9
Mason Lake (ML)	13	242	12
South Branch (SB)	0	0	0
Lower Neenah (LN)	1	36	2
Big Slough (BS)	13	562	29
Totals	58	1964	100

[1] Based on Annual Phosphorus Loads

Sources: Adams, Marquette and Columbia County LCD(s), DNR and DATCP

Upland Sediment

Intensive agricultural practices have caused considerable amounts of eroded soil to reach streams, ponds, and wetlands in the Neenah Creek Watershed over time, with most probably occurring since the 1940s. Upland erosion is the major source of the sediments that are carried downstream, beyond individual subwatershed boundaries.

Upland sediment sources were evaluated through sampling of the entire watershed (169 square miles). The results of this inventory are summarized in tables 3-3 and 3-4. An estimated 15,637 tons of soil per year are delivered to wetlands or streams in the watershed from uplands (of this, 14,800 comes from cropland). An additional 167 tons/year are delivered from grassland, pastures, and woodlots. Uplands are the source of 92 percent of the sediment delivered to surface waters. The remaining eight percent of sediment delivered comes from streambank and shoreline erosion. Figure 3-1 and table 3-4 summarize upland sediment loading by land use for all subwatersheds. Figure 3-2 represents Neenah Creek land use and cropped acres.

Table 3-3. Tons of Upland Sediment Delivered

Subwatershed	Tons/Year	Percent
Upper Neenah (UN)	10	0
Oxford Lake (OL)	2,432	16
Crooked Lake (CL)	460	3
Jordan Lake (JL)	372	2
Widow Green (WG)	1,186	8
Middle Neenah (MN)	3,085	20
Mason Lake (ML)	4,606	29
South Branch (SB)	193	1
Lower Neenah (LN)	171	1
Big Slough (BS)	3,122	20
Totals	15,637	100

Based on WINHUSLE model
Sources: Adams, Marquette and Columbia County LCD(s), DNR and DATCP

Figure 3-1. Summary of Upland Sediment Loading by Land Use: All Subwatersheds

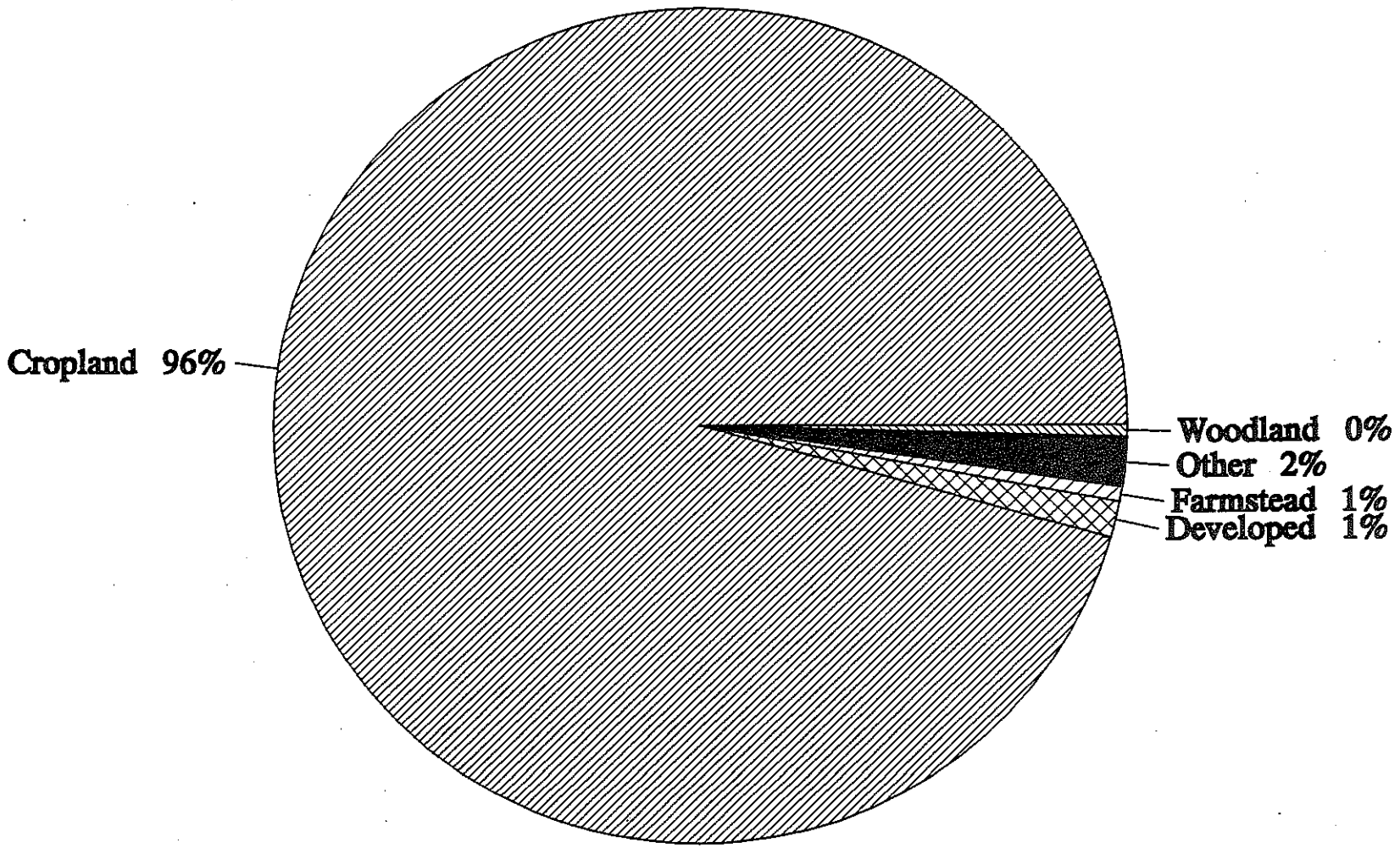
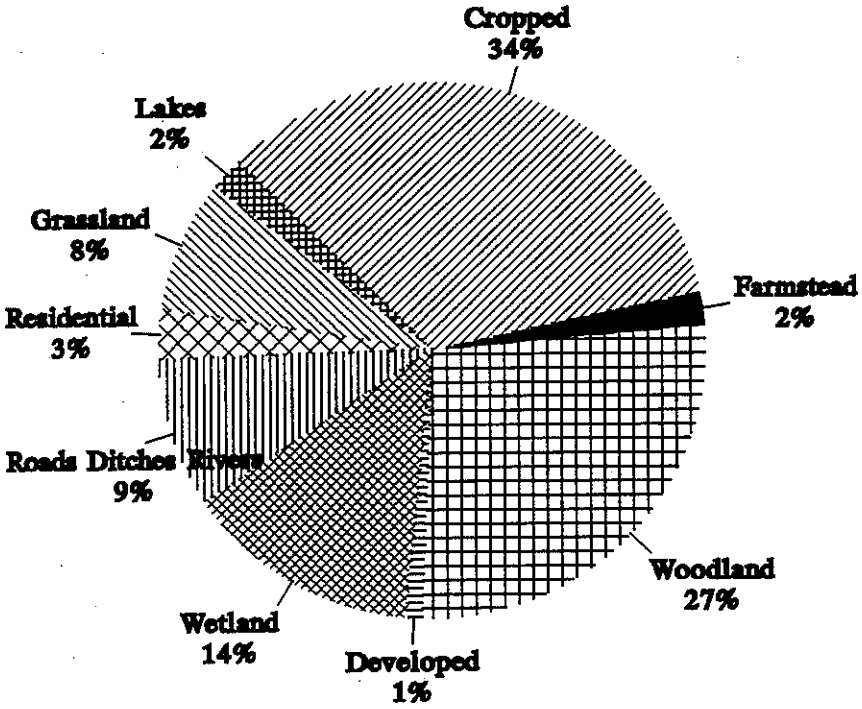
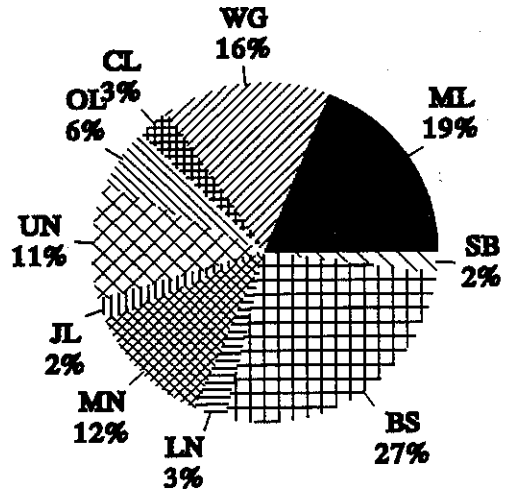


Figure 3-2. Neenah Creek Land Use and Cropped Acres



Land Use (Total) by Acres



Distribution of Cropped Acres

Table 3-4. Land Use and Sediment Delivery in Neenah Creek

	Cropped	%	Grass	%	Residential	%	Developed	%	Wetland	%	Woodland	%	Farmland	%	Lakes	%	Other	%	Total	%
Upper Neenah	3,949	20	2,747	14	2,307	11	248	1	663	3	9,625	48	161	1	426	2	72	0	20,198	19
	10	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
Oxford Lake	2,236	44	452	9	94	2	223	4	376	7	1,572	31	55	1	14	0	46	1	5,068	5
	2,213	91	0	0	7	0	150	6	24	1	2	0	34	1	0	0	1	0	2,432	16
Crooked Lake	1,018	45	151	7	66	3	60	3	336	14	620	27	20	1	64	3	0	0	2,335	2
	308	67	0	0	6	1	36	8	13	3	68	15	4	1	0	0	24	5	460	3
Jordan Lake	661	15	1,127	26	253	6	44	1	103	2	1,961	45	59	1	213	5	145	3	4,566	4
	90	24	1	0	5	0	5	0	1	0	0	0	0	0	0	0	270	76	372	2
Widow Green	6,028	53	1009	9	56	0	0	0	1124	10	2947	26	162	1	0	0	2	0	11,328	11
	1,181	100	1	0	4	0	0	0	0	0	1	0	0	0	0	0	0	0	1,187	8
Middle Neenah	4,485	57	375	5	12	0	16	0	1,483	19	1,398	18	135	2	0	0	11	0	7,915	7
	2,993	97	0	0	1	0	22	1	35	1	0	0	34	1	0	0	0	0	3,085	20
Mason Lake	7,189	47	840	6	185	1	0	0	647	4	5,424	35	221	1	918	6	0	0	15,424	14
	4,560	99	0	0	45	1	0	0	1	0	1	0	0	0	0	0	0	0	4,607	29
South Branch	708	33	247	12	44	2	10	0	873	41	224	10	37	2	0	0	0	0	2,143	2
	170	88	0	0	0	0	0	0	14	7	0	0	8	4	0	0	0	0	193	1
Lower Neenah	936	19	166	3	52	1	0	0	2,164	44	1,533	31	80	2	0	0	0	0	4,931	5
	157	92	0	0	0	0	0	0	3	2	1	0	9	5	0	0	0	0	170	1
Big Slough	10,016	42	1,213	5	252	1	104	0	7,333	31	4,140	18	572	2	0	0	0	0	23,630	22
	3,118	100	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	3,123	20
TOTAL	37,226	34	8,327	8	3321	3	795	1	15,102	14	29,444	27	1,502	2	1,635	2	276	0	97,538	91
	14,800	95	2	0	68	0	217	1	91	0	74	1	89	1	0	0	295	2	15,637	100
Roads, Ditches, Rivers not inventoried with WINHUSLE																			9,718	9
TOTAL LANDUSE																			107,256	100

Shaded Area = ACRES
White Area = SEDIMENT DELIVERED (TONS/YEAR)

- "Grass" includes CPR, hay, natural, pasture
- "Developed" includes industrial, mining, commercial
- "Wetland" includes wildlife habitat
- "Other" includes recreational, public, irrigated cropland

- **All numbers are based on the WINHUSLE model.**

Source: DNR, Adams, Marquette and Columbia County LCD's.

Streambank Erosion

Streambank erosion contributes 4 percent of the total sediment to surface waters in the Neenah Creek Watershed. Approximately 117 miles of streams were evaluated. Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 5 miles (4%) of streambank. An estimated 762 tons of sediment are eroding into streams annually. Streambank erosion may be higher during periods of ditch cleaning. Stable streambanks are very important for habitat. See table 3-5 for streambank inventory results.

Shoreline Erosion

There are 21 named lakes in the Neenah Creek Watershed, with approximately 30 miles of shoreline. Shoreline erosion is estimated to contribute 698 tons annually to the lakes, which is 4 percent of the total sediment delivered to surface waters. See table 3-9 for inventory results. While the inventory does not identify shoreline erosion as a major sediment problem, there may be areas where shoreline habitat is being affected where erosion is severe.

Winter-Spreading of Manure

Manure spread on frozen or saturated ground is a significant water quality problem in this watershed. The water quality concern happens in the spring when manure has not been incorporated into the soil, surface water runoff is high, and manure is carried to lakes and streams. Preliminary calculations indicate that at least 10,000 to 18,000 pounds of elemental phosphorus (23,000 to 41,000 pounds P205) are applied to frozen fields in this watershed annually. This calculation assumes an average 65-head dairy operation with 40 replacement stock, and 180 days of manure production. Calculated pounds of phosphorus produced is based on The Livestock Waste Facilities Handbook. Although the amount of phosphorus runoff in the spring cannot be easily predicted, it is assumed to be a significant pollutant.

The percentage of the manure, and hence phosphorus, spread in the winter that reaches surface waters is unclear. Scientific opinion ranges from 25 percent to 75 percent delivery rate. Even on 2-5 percent slopes when buffers are present some manure is assumed to reach surface waters. As a rough estimate, phosphorus loading from winterspread manure is usually thought to be at least as great as from barnyards or uplands. Landowners are strongly encouraged to follow a nutrient management plan, and all livestock owners are eligible for cost-sharing to have a nutrient management plan written.

See figure 3-3 for summary of nonpoint sources of sediment and phosphorus in Neenah Creek Watershed. Table 3-7 shows phosphorus loading by land use in lake watersheds and table 3-8 shows sediment loadings by subwatershed.

Table 3-5. Streambank Erosion

Subwatershed	Total Length (feet)	Degraded Length (E+T+S)(feet)	Percent Degraded	Total Sediment Loss (t/yr)	Sediment from Agricultural Impact (t/yr)	Percent Sediment Impact by Livestock Access	Length Trampled (feet)	Percent Trampled
Upper Neenah	63,360	785	1	191	84	44	0	0
Oxford Lake	45,440	0	0	0	0	0	0	0
Crooked Lake	56,920	222	0	2	0	0	100	0
Jordan Lake	No Streams							
Widow Green	68,640	2,645	4	124	114	38	2,471	4
Middle Neenah	141,396	8,379	6	35	0	0	6,850	5
Mason Lake	64,416	11,500	18	318	233	73	1,800	3
South Branch	29,832	200	1	5	0	0	0	0
Lower Neenah	86,568	790	1	80	0	0	0	0
Big Slough	63,360	0	0	0	0	0	0	0
Totals	619,932	24,521	4	755	431	50	11,221	2

Adams County—inventoried ditched areas (80-90% of problems). Marquette and Columbia Counties did not include ditches.

Figure 3-3. Nonpoint Sources of Sediment and Phosphorus of Neenah Creek Watershed

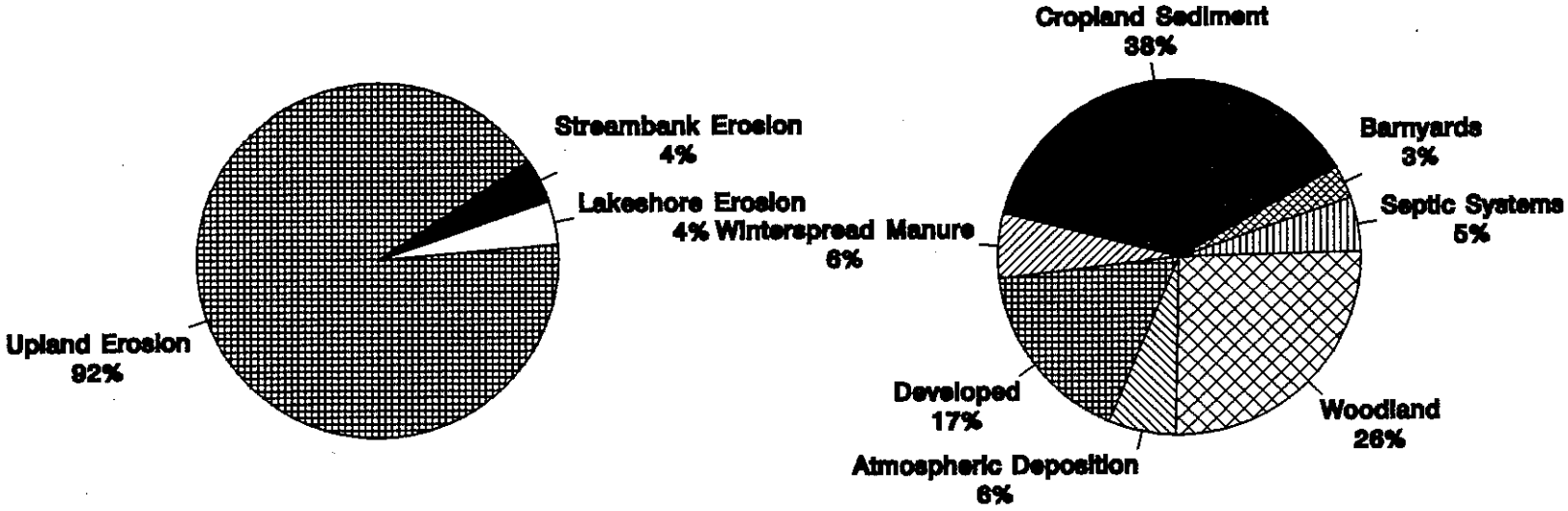


Table 3-7. Phosphorus Loading by Land Use in Lake Subwatersheds Only

Subwatershed	Annual P Loading Barnyards (lbs)	%	Annual P Loading Cropland (lbs)	%	Annual P Loading Streambanks and Shoreline (lbs)	%	Annual P Loading Woodland	%	Annual (P) Loading Developed (lbs)	%	Annual P Loading Winterspread Manure (lbs)	%	Total P Loading Septic Systems (lbs)	%	Total P Loading Atmospheric Deposition (lbs)	%	Total P Loading (lbs)	%
Upper Neenah	133	3	570	11	5	0	1925	37	1916	37	145	3	308	6	240	5	5242	100
Jordan Lake	0	0	216	21	0	0	392	38	223	21	0	0	106	10	106	10	1043	100
Mason Lake	242	4	4144	61	7	0	1085	16	139	2	582	9	200	3	428	6	6827	100
Totals	375	3	4930	38	12	0	3402	26	2278	17	727	6	614	5	774	6	13,112	100

Table 3-8. Sediment Loading by Subwatershed

Subwatershed	Uplands (tons)	%	Streambanks (tons)	%	Shoreline (tons)	%	Total (tons)
Upper Neenah	10	2	191	38	296	60	497
Oxford Lake	2432	100	6	0	4	0	2442
Crooked Lake	460	96	2	0	18	4	480
Jordan Lake	372	94	0	0	22	6	394
Widow Green	1186	91	122	9	0	0	1307
Middle Neenah	3085	99	35	1	0	0	3120
Mason Lake	4606	87	358	6	358	7	5282
South Branch	193	97	5	3	0	0	198
Lower Neenah	171	68	80	32	0	0	251
Big Slough	3122	100	0	0	0	0	3122
TOTAL	15,637	92%	798	4%	698	4%	17,133

Note: Percents are calculated by row, not by column.

Table 3-9. Shoreline Erosion Inventory Results: Neenah Creek Watershed

Erosion Level	Subwatershed	% of Total Shoreline	Total Sediment Loss (tons/year)
Severe erosion	ML	30%	358
Moderate erosion	UN	10%	296
Mild erosion	OL,CL,JL	5%	44
Totals			698

Residential and Urban Nonpoint Sources

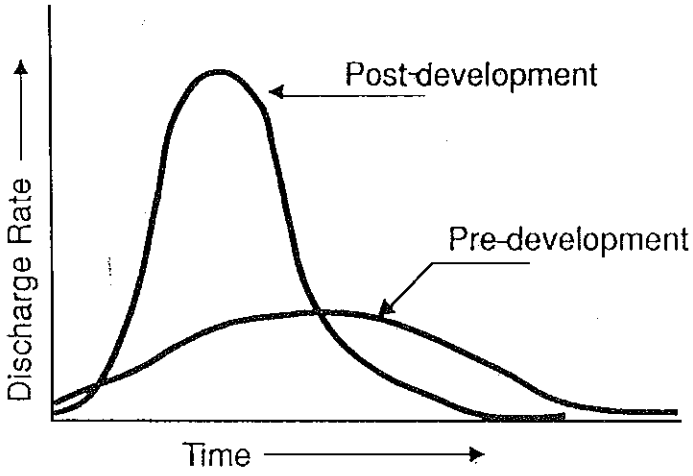
Residential Nonpoint Sources. Neenah Creek watershed is predominantly rural, but includes the village of Oxford and the unincorporated community of Briggsville. Residential and developed areas account for only 4% of the total land use. However, the loadings from developed areas and septic systems may contribute up to 22% of the total phosphorus. Control of residential pollution will be achieved primarily through information and education activities. To support these activities, a general description of urban and residential nonpoint sources of pollution is included.

Residential runoff carries a variety of pollutants to surface water. Some pollutants are specific to residential runoff while others are also found in runoff from agricultural areas. Pollutants found primarily in residential 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 residential runoff that are also found in runoff from rural areas include sediment, nutrients, bacteria and other pathogens, and pesticides.

Runoff from residential areas also affects stream characteristics. For example, as pavement and rooftops prevent rainwater and snowmelt from soaking into the ground, water runs off the surface at a much higher rate. Streams crest sooner and at much higher levels than prior to residential development. See figure 3-4 for hydrographics illustrating pre- and post-development stream flow rates. Consequently, in some areas groundwater recharge is reduced and dry-weather stream flows decrease to below minimum levels needed to sustain fish and aquatic life.

In effect, residential runoff produces "flashy" streams with temperatures and chemical characteristics which limit animal life and recreational uses. Streambank erosion may increase as high and low flow extremes occur. Flooding of adjacent property may also occur.

Figure 3-4. Pre- and post-development hydrographs



In addition to these typical residential nonpoint sources, there are numerous other sources which need additional attention, including construction site erosion, and in-place contamination resource extraction industries. Each of these represent potential causes of lake use impairment. All of these factors, many of which are addressed by WPDES stormwater permit requirements, undoubtedly contribute, in varying degrees, to lake use impairment.

Residential Land Use

Highways, commercial areas, and high density residential areas are the greatest collectors of sediment, lead, and zinc on a per acre basis. Medium density residential areas are less important sources of sediment and lead, but are significant sources of pesticides, bacteria, and household or automotive maintenance products dumped into ditches and storm sewers. Low density residential areas, particularly in the lakeshore areas, are important where the improper use and disposal of pesticides, fertilizers, and automotive maintenance products may occur.

The potential for lawn care chemicals to be carried by runoff from shoreline areas and nearby drainage ways to the lakes is a concern. Most lawns are groomed to the edge of the water and many are devoid of plants. Fertilizers and herbicides appear to be commonly used in those areas with direct drainage to the lakes. These factors undoubtedly contribute to lake use impairment.

In general, the pollutants in residential runoff depend on the configuration of "source areas." Source areas—characterized by streets, parking lots, rooftops and lawn areas—are present in different proportions depending on the type of land use. For example, residential areas contain more lawn area than commercial areas, while commercial areas have more rooftop, street, and parking lot surfaces. Lawns can be important sources of fertilizers and pesticides. Rooftop areas are important sources of zinc and atmospheric pollutants. Their connection is to surface water either directly through storm sewers or indirectly across lawns, down streets or ditches depending on the use of downspouts, grassed areas, drain tiles, etc. Streets in large urban areas are sources of significant amounts of lead, cadmium, sediment, and other pollutants, depending on their condition and the amount of traffic.

Stormwater Conveyance

Stormwater is most commonly conveyed to streams and lakes through a combination of storm sewers, roadside ditches, grassed swales, and/or detention ponds. Storm sewers transport runoff rapidly with no "pretreatment" or filtering of the runoff before it enters streams. Properly designed grassed swales generally transport lesser amounts of runoff because of infiltration, and vegetation serves to remove some pollutants from the runoff before it flows into lakes, streams, or storm sewer systems.

Construction Site Erosion

Construction site erosion is a major water quality concern in the watershed. Uncontrolled construction site erosion can devastate aquatic communities in lakes receiving sediment-laden runoff. The reduced capacity of stormwater conveyance systems (including ditches) resulting from sedimentation can cause localized flooding. Importantly, water quality improvements occurring through implementation of nonpoint source control practices for existing residential areas can be negated by these pollution sources.

Predicting rates of construction site erosion is difficult. However, erosion rates exceeding 75 tons/acre/year can occur. This rate of erosion is greater than what occurs on the most severely eroding croplands and is 65 times the sediment loading rate from existing commercial and industrial areas.

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 (WDNR, 1987). It contains provisions for planning, designing, installing and maintaining erosion control practices. It also contains guidance for administering and enforcing the ordinance.

Pollutant Reduction Goals

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 40 percent. To meet this goal, the following is needed:

- 40 percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- 75 percent reduction in streambank sediment delivered to all streams and 100 percent overall repair of streambank habitat in all subwatersheds.

Phosphorus and Organic Pollutant Goal: reduce overall phosphorus load by 40 percent. To meet this goal, the following is needed:

- 75 percent reduction in organic pollutants from barnyards in all subwatersheds.
- 40 percent reduction in organic pollutants from winterspread manure on "unsuitable" acres.
- 30 percent reduction in phosphorus reaching streams from agricultural uplands in all subwatersheds.

Groundwater Goal: Proper abandonment of private wells no longer in use where other NPS control measures are implemented and cost-shared.

- Implementation of Nutrient and Pest management practices on irrigated vegetable crops.

In addition, this plan calls for a restoration of 10 percent of degraded or converted wetlands.

Other Pollution Sources

This section describes pollution sources that have an impact on water quality in the Neenah Creek 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. The village of Oxford and the Oxford Federal Correctional Institute have municipal wastewater treatment plants that discharge to surface water. Chapter 147, Wis. Stats., requires any person discharging pollutants into the waters of the state to obtain a Wisconsin Discharge Elimination System (WPDES) Permit.

Village of Oxford Wastewater Treatment Plant

The village of Oxford WWTP discharges to Neenah Creek. Treatment of wastewater is through a stabilization lagoon with sand filters, built in 1980. It is operating well within its design capacity, serving 446 people in 1990. It was designed to serve 850 people.

Federal Correctional Institute - Oxford

This WWTP discharges to groundwater. Treatment of wastewater is through lagoons, built in 1986.

Refer to the Upper Fox River Areawide Water Quality Management Plan for additional details on municipal and industrial pollution sources.

Status of the NR 217, the Point Source Phosphorus Effluent Limitation Rule

The Phosphorus Rule was passed in June, 1992 by the DNR Board. It was approved by the legislature in Fall, 1992. The Rule requires both municipal and industrial point sources with surface water discharge points to remove phosphorus from their effluents to 1.0 ppm. Industries that generate 60 pounds of phosphorus per month and municipalities that generate 150 pounds per month must comply. It will take 3–8 years before all facilities are on line. The Oxford wastewater treatment plant (Neenah Creek Watershed) generated less than the required 150 pounds per month, and so will not be covered under NR 217.

Failing Septic Systems

Septic systems consist of a septic tank and a soil absorption field. Septic systems fail due to soil type, location of system, poor design or poor maintenance. Although septic systems are common within the Neenah Creek Watershed, the majority of soils throughout the watershed are not suitable for conventional septic tank absorption systems. Unsuitable soils allow for a greater potential of developing water quality problems.

There are a variety of soils in the watershed and this information is general and not all-inclusive. There are small areas scattered within the watershed where the soils have a moderate permeability rate. However, the majority of soils in the watershed tend to have an excessive permeability rate with poor filtration such as the sands, sandy loams or loamy

sands, or a slow permeability rate and/or a high water table such as the peats, mucks and silts. Septic systems located within these groups of soils can contribute to the pollution of both groundwater and surface water. Pollutants from septic system discharges include nitrates, bacteria, viruses and hazardous materials from household products.

The Wisconsin fund is a Private Sewage System Replacement Grant Program offering financial assistance designed to help eligible homeowners and small business operators offset the costs of replacing a failing septic system. The program is administered by each county's Zoning Department. The grant program applies to principle residences and small businesses built prior to July 1, 1978 and is subject to income and size restrictions. Seasonal homes are not eligible for participation in this program. Columbia County has been using the Wisconsin Fund since 1979; Adams County has been using it since 1992; and Marquette County has opted not to use the Wisconsin Fund. Interested individuals should contact their local Zoning Department for more information.

Solid Waste Disposal Sites

There are no active landfills in the watershed, but there are several abandoned landfills in Oxford and Lewiston townships.

Sites listed as Waste Disposal Sites are from the DNR's "Registry of Waste Disposal Sites in Wisconsin" (February, 1990) which lists known solid and hazardous waste disposal sites. The list includes active, inactive and abandoned sites. Inclusion on the list does not mean that environmental contamination has occurred, is occurring, or will occur in the future. The registry is a source of general information as to the location of waste disposal sites in Wisconsin. See table 3-10.

Table 3-10. Waste Disposal Sites (February, 1990)

Site Name	Location
John Barth Landfill	Lewiston
Donald Schwanz Property	Lewiston
Brakebush Brothers	Oxford
Wisconsin DNR	Oxford
Village of Oxford	Oxford

Petroleum Storage: Leaking Underground Storage Tank (LUST) Sites

There are no Superfund sites in the Neenah Creek Watershed.

Active Leaking Underground Storage Tank (LUST) sites are listed in table 3-11. Sites listed are currently in some phase of investigation or cleanup and are on the "List of Active Leaking Underground Storage Tanks" (April 13 1992).

Table 3-11. Leaking Underground Storage Tanks (April, 1992)

Site Name	Location	Status	Substance
Mason Station	Briggsville	Investigation	Unknown Hydrocarbons
Oxford Elem. School	Oxford	Investigation	Unleaded Gasoline
Riesen Family Restaurant	Oxford	No Action	Unknown Hydrocarbons

Remedial Action - Cleanup in progress.
No Action - No action taken yet.
Investigation - Field investigation of source and extent of contamination underway.
Unknown - No status report at time of printing.

Other Contaminated Sites

Spills listed below, from the "Spills Summary Report", (DNR April 30, 1991), include spills reported to the DNR only. Locations of the spills are approximate in most cases.

The Wisconsin Remedial Response Site Evaluation Report (PUBL-SW-144-91) 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. See table 3-12.

Table 3-12. Spills (April, 1991)

Location	Action	Substance
Oxford	Clean Up	Morphaline
Oxford	Investigation	Ammonium phosphate
Oxford	Investigation	Gasoline
Oxford	Investigation	Fuel Oil
Oxford	Investigation	Disel Fuel

No Action - No on-site investigation.
Investigation - On-site assessment to confirm release, identify potential responsible parties, assess environmental harm and direct potential responsible party to take action.
Cleanup - WDNR hired cleanup contractor.

Wind Erosion

Wind erosion is a major problem in this watershed. According to the Adams County Erosion Control Plan (1987) an average of 2.0 T/A/Y soil is lost due to water erosion while 4.3 T/A/Y is the average soil loss due to wind erosion. Of the townships in the watershed, New Chester has the worst wind erosion problem, losing 5.3 T/A/Y to wind but only 2.7 T/A/Y to water erosion.

Damages caused by wind erosion include on-site damages to crops. In 1984 an estimated 10% of total cropland and 23% of irrigated cropland were damaged, with financial losses estimated at $857,371. Off-site damages also occur. For example, blowing soil and decreased driver vision is blamed for several automobile accidents.

Wind-eroded soil is also a water quality problem. According to "Wind Erosion Impacts on Water Quality in the Sand Plain of Central Wisconsin" (Oberhofer, 1993), "wind erosion is perceived to be a major contributor to the area's water quality problems. Wind eroded soil is periodically deposited in the extensive network of drainage ditches..."

The study collected wind blown debris deposited in drainage ditches. Surface water grab samples were also taken. Results include the following: a) 85,440 pounds of soil per acre of stream surface were deposited in one of the study ditches following a wind event, b) total phosphorus concentrations ranged from 0.200 to 7.25 mg/l in surface water grab samples, and c) 19 different pesticides were present in the drainage ditches.

Sand and Gravel Mining

There is a sand and gravel extraction pit in Jackson Township, Adams County.

Land Application of Municipal and Industrial Wastes

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

Land application of municipal and industrial sludge is regulated under NR 204 and NR 214 respectively 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.

Compost

The Columbia County Recycling Center applies "compost" to designated lands via a DNR permit. Most of the municipalities (cities, villages and townships) have mandatory recycling

where pre-sorting recyclables reduces the total volume of trash. The trash is digested and becomes "compost" suitable for land application. Plastics and other undigested large objects are removed through a series of screens prior to land application.

The compost is tested regularly for nutrients, metals and other materials. If the compost meets stringent DNR permit requirements, it is applied to nearby fields where field corn will be planted. The nutrients are utilized by the corn. The soils are also routinely tested for adverse affects.

This innovative digesting and composting process may become more widely used in the future as landfill space becomes more difficult to find. This process represents a unique type of "nutrient management" and protection of water quality.

The city of Portage also has a digester. It has test plots and they monitor soil conditions and potential groundwater affects.

Atmospheric Phosphorus and Nitrogen

Due to human practices which disturb land and encourage wind erosion or point source air emissions, phosphorus and nitrogen become suspended in the air, often being attached to sediment particles. The concentrations of phosphorus and nitrogen vary regionally. As noted on figure 3-3, these nutrients can settle out and may be a significant source of nutrients to surface waters. Some of the BMPs used in this watershed project will help to reduce atmospheric phosphorus and nitrogen contributions.

Agricultural Chemicals

As mentioned in the Water Resource portion of Chapter Three and in the nutrient and pest management portion of Chapter Four, chemicals applied to agricultural lands may be degrading water quality and may not be improved through this watershed project.

Agricultural and Household Clean Sweeps

To help reduce excess chemicals on farms and in residential homes, the DATCP sponsors "Clean Sweep" days. On these days people are encouraged to bring their excess hazardous chemicals to specific sites, and the DATCP pays for disposal. Both Adams and Columbia Counties have held agricultural and household clean sweeps and intend to hold more.

Geese

Geese are abundant in the Neenah Creek Watershed. Although no monitoring was done in this watershed to determine phosphorus loading to surface waters by geese, an extensive study was done on Green Lake in Green Lake County in 1978.

Geese density and watershed topography are presumed to be similar between Green Lake and the Neenah Creek Watershed, particularly on Mason Lake and other areas where geese are a major concern.

The Green Lake Study concluded that the 60-70,000 geese present contribute roughly 5% of the phosphorus load to the lake. Because Mason Lake freezes sooner than Green Lake, the 5% estimate is likely to be high for Mason Lake.

Several management practices were tried; none were very successful. Practices tried include: a) aeration on Grand River Marsh, to keep water open into January and to draw geese away from the lake; b) open-water hunting on Green Lake; and c) extended hunting season.

DNR staff conclude that phosphorus loading due to geese is insignificant in the Neenah Creek Watershed, and that BMPs to reduce the phosphorus loadings have not been shown to be effective.

CHAPTER FOUR
Recommended 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. (See page 86 for a summary of identified pollutant reduction goals.) Also, the criteria which determine the eligibility of each pollutant source for cost-share funding through the nonpoint source program are described in this chapter.

Management Categories

Nonpoint source control needs are addressed by assigning "management categories" to each major type of nonpoint source pollution (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, streambanks and lakeshores; **pounds of phosphorus** delivered annually to surface waters from barnyards; **the ratio of manure produced to of suitable acres** available for land-spreading; and the **feet of streambank trampled** by cattle. A definition of each management category is given below. Following this are the criteria used to define the management categories for each pollutant source.

The criteria used to define these management categories must be confirmed at the time that the county staff visit on-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 landowner's expense for a period of ten years.

Management Category I

Nonpoint sources included in this category contribute a significant amount of the pollutants impacting surface waters. A reduction in their pollutant load is essential for achieving the water quality objectives in the watershed project.

Nonpoint sources in Category I are eligible for funding and/or technical assistance under the priority watershed project. As a condition of funding, all sources in Management Category I must be controlled if a landowner wishes to participate in any aspect of the watershed project.

Management Category II

Nonpoint sources in this category collectively contribute less of the pollutant load than those in Management Category I. These nonpoint sources are identified and included in cost-sharing eligibility to further insure that water quality objectives for pollutant controls are met. Nonpoint sources in this category are eligible for funding and/or technical assistance under the priority watershed project. Controlling sources in this category is not mandatory for a landowner to be funded for controlling other sources.

Management Category III

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 Departmental 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.

Conclusions from the Neenah Creek Watershed Water Resource Appraisal Report (Herman and Schenck, 1992) indicate that the control of barnyard runoff is critical to the success of this project. While reduction of sediment from all sources is a goal of the project, phosphorus reduction will be the primary objective of this project.

Criteria for Eligibility and Management Category Designation

Croplands And Other Upland Sediment Sources

Upland Erosion: As mentioned, upland erosion represents 92 percent (15,637 tons) of the total sediment load to streams in the watershed. A 40 percent reduction in sediment from eroding fields is targeted for agricultural lands. This translates into bringing all lands that are contributing sediment to streams at a rate greater than .4 tons/acre/year down to

.4 tons/acre/year. On average, soil loss is roughly 5-10 times sediment delivery. To be in Category I, landowners' fields must be contributing greater than .4 tons/acre/year of sediment and/or soil loss greater than "T". The average sediment delivery rate for all subwatersheds is 0.16 tons/acre/year, and ranges from .02 to .63. This category will control an estimated 4700 acres of cropland, and 39 percent of the watershed's upland sediment load.

An additional 6 percent of the sediment load delivered to the stream will be controlled through Category II, Category II includes those landowners with fields delivering sediment at a rate between .2 and .4 tons/acre/year. See table 4-1.

Table 4-1. Upland Sediment Erosion Eligibility Criteria in the Neenah Creek Watershed

Upland Erosion					
Management Category Control	Eligibility Criteria Sediment Delivery * (tons/acre/year)	Soil/Loss (tons/acre/year)	Percent Control	Tons Controlled	Acres Controlled
I	>. 4 •	or > T	39%	6098	4610
II	between .2 and .4	< T	6%	938	NA
III	< .2	—	—		

Source: DNR, Adams, Columbia, Marquette County LCDs
• Ranges from 8 to 75% by subwatershed. Based on WINHUSLE model run at 50% participation.
* By field

See table 4-2 for Rural Uplands Targeted for Sediment Control

Gully Erosion

Gully erosion has not been identified as a significant problem in this watershed, therefore, only a cursory field inventory of gully erosion was done. Any significant gullies identified during implementation will be evaluated to determine if they are critical sediment sources and eligible for cost sharing. Gullies identified through this process will be Category II for eligibility, and must meet criteria: in table 4-3.

Table 4-2. Rural Uplands Targeted for Sediment Control

Subwatershed	Total Load Inventoried (tons/yr)	Cropped Acres	Management Category I		Management Category II		Estimated Control (%)
			Control (tons/yr)	Control (%)	Control (tons/yr)	Control (%)	
Upper Neenah	589	3,949	155	26	0	0	26
Oxford Lake	2380	2,236	1249	52	0	0	52
Crooked Lake	752	1,018	120	16	93	12	22
Jordan Lake	356	661	269	75	37	11	80
Widow Green	2724	6,028	607	22	327	12	28
Middle Neenah	8183	4,485	2198	27	781	9	32
Mason Lake	6011	7,189	3114	52	248	4	54
South Branch	242	708	112	46	16	7	49
Lower Neenah	13,164	936	8879	67	na	na	67
Big Slough	3846	10,016	319	8	na	na	8
Totals	na	37,226	na	39%	na	6	42%

- The estimated control is assumed to be one half of the Category II fields and all of the Category I fields, based on WINHUSLE model and 50% participation.
- Due to the routing techniques of the model, total sediment is not additive by subwatershed.

Table 4-3. Gully Erosion Criteria in the Neenah Creek Watershed

Management Category Control	Eligibility Criteria
I	none
II	sites with: 1)gully depths of at least 3 vertical feet; 2)bare soils and evidence of active erosion; 3)direct connection with streams and lakes via channelized flow during runoff events; and 4)reasonable access to necessary machinery.

Animal Lot Runoff

To achieve the water quality objectives in the Neenah Creek Watershed Project, the phosphorus and other pollutants contained in animal lot runoff must be controlled at a high level (see tables 4-4 to 4-6). There are 58 inventoried livestock operations in the watershed that drain to surface water. Operations that contribute over 50 pounds of phosphorus to surface water per year are classified as Category 1. Thirteen barnyard segments fall into this category. Reducing the phosphorus contribution from each barnyard in Category 1 to 15 pounds of phosphorus would yield 74% reduction. All barnyards must reduce the

phosphorus load to 15 pounds or less to be eligible for cost sharing and meet the pollution reduction goal.

There are another 13 operations that produce between 15 and 50 pounds of phosphorus annually and are classified as Category 2. Reducing the phosphorus contribution in Category 2 to 15 pounds per barnyard will yield 10 percent reduction. Only low-cost practices such as roof gutters and clean water diversions are eligible for cost sharing for Category 2.

Landowners receiving cost sharing for animal lot runoff (Waste Management System, SCS Std. 312) are required to do a nutrient management plan (SCS Std. 590) for their operation. They are eligible for 50% funding to do so. Eligible Nutrient and Pest Management practices include the development of both nutrient management (SCS Std. 590) and pest management (SCS Std. 595) plans, soil testing and crop scouting.

If the animal lot runoff system does not include waste collection, handling or storage, it is exempt from the nutrient management plan requirement. Such systems could consist of clean water diversion work such as: Roof Runoff Management (588), Livestock Exclusion (472), Clean Water Diversion (362).

Internally Drained Animal Lots

Twenty internally drained yards were identified in the Neenah Creek Watershed. Initial determinations of eligibility for internally drained animal lots will be based on the same phosphorus loading and design target criteria as lots that drain to surface water. Based on this criteria, it is estimated that 15 animal lots meet Category 1 criteria and 2 lots meet Category 2 criteria. High amounts of phosphorus indicate potentially high amounts of nitrates and, therefore, the likelihood of groundwater contamination.

Actual need for BMPs will be determined by county watershed staff. This determination will be based on threat to groundwater pollution from manure due to depth to water table, soil texture, depth to and type of bedrock, and other site conditions. Where the potential for impact to groundwater caused by an internally drained lot is uncertain, field investigations may be conducted jointly by the county project staff, water resource management investigators from the Department's Southern District Office, and staff from DATCP.

Table 4-4. Barnyards Targeted for Runoff Control

		Management Category I			Management Category II			Category III
Subwatershed	Total Phos. (lbs)	Yards (#)	Control (lbs)	Control (%)	Yards (#)	Control (lbs)	Control (%)	Yards (#)
Upper Neenah	133	1	128	96%	0	0	0	1
Oxford Lake	29	0	0	0	0	0	0	5
Crooked Lake	16	0	0	0	1	9	56%	0
Jordan Lake	0	0	0	0	0	0	0	0
Widow Green	764	3	704	94%	0	0	0	11
Middle Neenah	182	3	116	64%	1	5	3%	6
Mason Lake	242	2	105	43%	4	81	33%	10
South Branch	0	0	0	0	0	0	0	0
Lower Neenah	36	0	0	0	2	21	58%	0
Big Slough	562	4	393	70%	5	82	14%	8
Totals	1964	13	1446	74%	13	198	10%	41

Table 4-5. Animal Lot Runoff Eligibility Criteria—Neenah Creek Watershed

Management Category	Phosphorus Load per Barnyard	Number of Barnyard Segments	Pounds Reduced	Percent Reduction
I	greater than 50 lbs	13	1445	74%
II	between 15 and 50 lbs	13	200	10%
III	less than 15 lbs	41	NA	NA

Table 4-6. Animal Lots: Draining to Surface Waters and to Closed Depressions

Management Category	# of Barnyard Segments Draining to Surface Waters	# of Barnyards Internally Drained	Total # of Barnyard Segments
I	13	15	28
II	13	2	15
III	41	3	44
Total	67	20	87

Nutrient and Pest Management

Prevention of ground and surface water degradation, through better nutrient and pest management, will be more effective than treating degraded waters after damage has been done.

Farmers can benefit from nutrient pest management plans by taking nutrient credits for legumes and landspread manure and reducing applications of commercial nutrients.

Landowners will be encouraged to participate in a nutrient pest management educational program to reduce over-application of nutrients and pesticides through better management. Nutrient and pest management plans will be developed, complete with soil tests, crop scouting and farm visits. These plans will follow Soil Conservation Service Nutrient Management Standard 590 and SCS Pest Management Standard 595. A professional services contract may be established for this purpose. Each landowner can participate in this stage of the program for up to three years, and is responsible for paying 50 percent of these consulting fees.

Soil and manure testing, crop scouting, and spill control basins for pesticide handling are also eligible for cost sharing as individual practices. The nutrient and pest management practices are cost shared at 50 percent, except for spill control basins which are cost shared at 70 percent.

Livestock operations that are category I and II in table 4-5 (animal lot runoff) and table 4-7 (winterspread manure runoff), and growers of specialty crops such as vegetables, are eligible for this educational program. Specialty crop operations comprise a large portion of the agriculture in this watershed and may be contributing excess nutrients and pesticides to ground and surface waters because of over application to these high value crops. Up to 15,500 acres from all operations will be eligible to participate in this program.

Table 4-7. **Winter Spread Manure Runoff and Eligibility for NPM Educational Program Neenah Creek Watershed**

Participation Groups	Suitability Ratio	Number of Livestock Operations (approximately)
I	Greater than 1	9 (500 ac)
II	Between 0 and 1	54 (6,000 ac)

It is anticipated that nutrient and pest management plans will be developed for about half of the eligible acreage and only nutrient management plans will be developed for the remaining areas.

The nutrient and pest management plans will be submitted to and approved by the Adams, Columbia, or Marquette County Land Conservation Departments. Records will be kept showing progress towards reducing the use of fertilizer and pesticides. An evaluation report to the DNR and DATCP will be required at the end of the implementation of the watershed project.

How Eligibility is Determined for Nutrient and Pest Management

A computer model (SPREADIT) was used to rank livestock operations in the Neenah Creek Watershed based on a partial inventory of acres spread with manure during the winter. The model develops a suitability ratio ranking livestock operations that are likely to produce excessive manure runoff from croplands due to lack of suitable spreading sites. If the suitability ratio is equal to or less than 1.0, then there is likely to be enough land to safely spread manure in the winter months without degrading water quality. If the suitability ratio is greater than 1.0, there is a probability that this farm does not have enough land for manure spreading, and a greater chance of water quality degradation exists.

The ranking from SPREADIT places any operation with a suitability ratio greater than 1.0 into Group I. There are approximately 9 livestock operations (500 ac) in this group. All other livestock operations are in Group II. Approximately 54 livestock operations (6,000 ac) that fall into this group.

Although the nutrient and pest management plans will be optional, it will be a priority to work with the farms in Group I first. This group is likely to have livestock operations that produce excessive manure runoff from croplands due to lack of suitable spreading sites.

In Neenah Creek Watershed, only 46 percent of the private wells sampled for nitrates are below the "preventative action limit" (2 mg/l), a health advisory level. Furthermore, groundwater is very near the surface in most of the watershed. For these reasons, nutrient and pest management is extremely important in this watershed to protect groundwater

quality. Therefore, another 9,000 acres will be eligible for cost sharing for nutrient and pest management planning.

Landowners who participate in the NPM educational program may sign a 3-year contract with the county LCD to receive funding. This is different from the conventional cost share agreement used for other practices. Receiving funding for NPM does not obligate the operator to correct all Category I resources as a cost share agreement would. The NPM plans may be done by consultants or by LCD staff.

Manure Storage

Eligibility for cost-sharing for manure storage practices will be based on the Nutrient Management Plan, developed in compliance with SCS standard 590. A manure storage facility will be considered Category I if the 590 plan indicates need as described below. There is no Category II for manure storage. (Table 4-8).

An operation is Category I if the nutrient management plan demonstrates that manure cannot be feasibly managed during periods of snow covered, 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.

Table 4-8. Manure Storage—Neenah Creek Watershed

Management Category	Eligibility Criteria
I	Exceeds 590 Standard
II	None
III	Does 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 have greater than 6 month capacity, shall not be spread on frozen, snow covered, or saturated ground (as stated in NR 120).

Streambanks

Streambank Erosion

Streambanks contribute 4 percent of the overall sediment delivered to streams in the watershed. Category I participants will be those with identified severe erosion sites with an erosion rate of greater than 60 tons/year/landowner. County staff will evaluate site accessibility/feasibility on Category I sites.

Category II participants are also eligible for streambank erosion control practices. Eligible streambanks are those with erosion rates between 18 and 60 tons/year/landowner.

Category III streambanks are those with slight erosion rates, below 18 tons/year/landowner.

Livestock Access

Category I (essential) streambanks include trampled sites over 200 feet per landowner and less than 75 perccent vegetative cover. One landowner on perennial streams falls into this category.

Category II (eligible) streambanks are all other sites with livestock access. Eleven landowners on perennial streams fall into this category.

Additional sites on intermittent streams which meet the criteria above may be identified.

See table 4-9 for streambank eligibility criteria and table 4-10 for additional information on streambank eligibility.

Table 4-9. Streambank Eligibility Criteria for the Neenah Creek Watershed

Management Category	Criteria
Streambank Erosion	
I	over 60 tons/year/landowner
II	between 18 and 60 tons/year/landowner
III	less than 18 tons/year/landowner
Streambank Habitat	
I	over 200 feet/trampled and less than 75% vegetative cover
II	any livestock access

Sources: Adams, Marquette and Columbia County Land Conservation Departments, WDNR and DATCP

Table 4-10. Streambank Erosion Eligibility for the Neenah Creek Watershed

Subwatershed	# of Landowners and Length Eroded				# of Landowners with Cattle Access & Length Trampled	
	Category I (severe)	Feet	Category II (moderate)	Feet	Cattle Access	Feet
Upper Neenah	2	165	1	328	0	0
Oxford Lake	0	0	0	0	0	0
Crooked Lake	0	0	2	35	1	100
Jordan Lake	0	0	0	0	0	0
Widow Green	0	0	0	0	1	2,471
Middle Neenah	0	0	5	592	3	6,850
Mason Lake	2	6400	1	1800	2	1800
South Branch	0	0	1	200	0	0
Lower Neenah	1	580	1	210	0	0
Big Slough	0	0	0	0	0	0
Totals	5	7145	11	3,165	7	11,221

* Adams, County included ditched areas in their inventory (ML). Ditches represented 80-90% of streambank erosion problems. Marquette and Columbia counties did not include ditches in their inventory.

Shoreline Erosion

Shoreline erosion on the 21 lakes in the watershed contributes 4 percent of the overall sediment delivered in the watershed. Table 4-12 refers to shoreline erosion eligibility criteria for Category I, II and III sites.

Category I sites for shoreline erosion are those with erosion rates greater than 7 tons/year/landowner.

Category II sites are those with erosion rates between 3 and 7 tons/year/landowner.

Category III sites are those with mild erosion, with rates less than 3 tons/year/landowner. See table 4-4 for eligibility criteria.

Sediment Management Strategy

See table 4-11: Management Strategy for Sediment: All Sources

Table 4-11. Management Strategy for Sediment: All Sources Category I

Subwatershed	Annual Cropland Sediment (tons)	Annual Streambank Sediment (tons)	Annual Shoreline Sediment (tons)	Total Annual Subwatershed Sediment (tons)	Cat I Sediment Control Planned: Cropland (tons)	%	Sediment Control Planned: Streambanks (tons)	%	Sediment Control Planned: Shoreline (tons)	%	Total Sediment Control Planned (tons)	%
Upper Neenah	589	191	296	497	155	26	156	82	222	75	NA	
Oxford Lake	2380	6	4	2442	1249	52	0	0	3	75	NA	
Crooked Lake	752	2	18	480	166	22	0	0	14	75	NA	
Jordan Lake	356	0	22	394	287	80	0	0	16	75	NA	
Widow Green	2724	121	0	1307	772	28	111	92	0	0	NA	
Middle Neenah	8183	35	0	3120	2588	32	0	0	0	0	NA	
Mason Lake	6011	358	358	5282	3238	54	205	65	269	75	NA	
South Branch	242	5	0	198	120	49	0	0	0	0	NA	
Lower Neenah	13,164	80	0	251	8879	67	62	78	0	0	NA	
Big Slough	3846	0	0	3122	319	8	0	0	0	0	NA	
Watershed Totals	NA	798	698	17,133	NA +	42	534	70	524	75	7158	42

+ The estimated sediment control is assumed to be one half of the Category II fields and all of the Category I fields, based on WINHUSLE model and 50% participation.
Due to the routing techniques of the model, total sediment is not additive by subwatershed.

Table 4-12. Shoreline Erosion Eligibility Criteria: Neenah Creek Watershed

Category	Erosion Level	Soil Loss (tons/year)	# Landowners	% Control
I	severe/ moderate	over 7 tons/year/ landowner	53	75%
II	moderate/mild	between 3 and 7 tons/year/ landowner	66	50%
III	mild		less than 3 tons/year/ landowner	
	Totals			119

Phosphorus Management Strategy

See table 4-13: Management Strategy for Phosphorus: All Sources for subwatersheds that have lakes.

Wetland Restoration

There will be no Category I for wetland restoration. All inventoried wetlands and artificially drained cropland (8,000 acres) will be Category II, eligible for restoration, if the sites meet the criteria that follow. The targeted goal is to restore 10 percent (800 acres) of the wetlands sites inventoried.

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.

Table 4-13. Management Strategy for Phosphorus: All Sources, for subwatersheds that have lakes

Subwatershed	Annual P Loading Barnyards (lbs)	%	Annual P Loading Cropland (lbs)	%	Annual P Loading Stream-banks and Shoreline (lbs)	%	Annual P Loading Woodland	%	Annual (P) Loading Developed (lbs)	%	Annual P Loading Winter-spread Manure (lbs)	%	Total P Loading Septic Systems (lbs)	%	Total P Loading Atmo-spheric Depo-sition (lbs)	%	Total P Load-ing (lbs)	%
Upper Neenah	133	3	570	11	5	0	1925	37	1916	37	145	3	308	6	240	5	5242	100
Jordan Lake	0	0	216	21	0	0	392	38	223	21	0	0	106	10	106	10	1043	100
Mason Lake	242	4	4144	61	7	0	1085	16	139	2	582	9	200	3	428	6	6827	100
Totals	375	3	4930	38	12	0	3402	26	2278	17	727	6	614	5	774	6	13,112	100
Phosphorus Control Planned																		
Upper Neenah		96		21		82		0		0		40		0		0		
Jodan Lake		0		47		0		0		0		40		0		0		
Mason Lake		43		50		65		0		0		40		0		0		

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 Management Category I upland sediment sources through the WINHUSLE model.

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

   - All upland fields draining to the wetland must be controlled to a soil loss rate that is less than or equal to the soils "T" value.
   - Wetland restoration costs must be the **least-cost** practice to reach sediment reduction goals.

Land Easements

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

- Shoreline Buffers
- Critical Area Stabilization
- Wetland Restoration

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

    - there is any grazing of wetlands.

    - livestock density is so great that areas of unvegetated soil are within 60 feet of streams or intermittent streams.

    - More than 2,000 feet of streambank are severely trampled and eroding.

    - channel erosion is exacerbated by livestock grazing such that unvegetated streambanks are two feet or more in height.

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

    - Row cropping is occurring within 60 feet or less of streams or intermittent streams.

3. Easements are strongly recommended,to support eligible wetland restorations.

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

    - Engineering options would require intensive management in order to continue to provide adequate pollution reduction.

    - Surrounding land use is largely agricultural and it is anticipated that it will remain so for two decades or more.

NOTE: In addition to the criteria described above, participating landowners must control all "Management Category I" sources (through a cost-share agreement) to be eligible for an easement through the watershed project.

Wind Erosion

As explained in Chapter 3, wind erosion is a water quality problem in the Neenah Creek Watershed. Best Management Practices to reduce wind erosion are listed in "Wind Erosion Impacts on Water Quality in the Sand Plain of Central Wisconsin." The Neenah Creek Watershed Project will cost share the following SCS practices at 70%: Streambank and Shoreline Protection (580) Critical Area Planting (342). In addition, windbreaks will be cost-shared at 70% according to the standards identified in the Stewardship Incentive Program (SIP4).

Cost sharing for wind related BMPs must be related to improved water quality, as documented in the Oberhofer (1993) study or otherwise. Cost sharing may not be used to artificially drain land. All of these BMPs are applicable to any type of channel, either natural or artificial, in which water flows with a free surface (i.e., stream or ditch). Any BMPs in a "drainage district" must be done in accordance with ATCP 48.

Should additional BMPs be needed in the future, they will be considered. For example, easements may be available as a form of cost-sharing for windbreaks on irrigated cropland. The size of easement taken must be large enough to be cost-effective, based on real estate appraisal costs.

Ordinances

Manure Storage Ordinance

A manure storage ordinance is primarily intended to prevent ground and surface water pollution by assuring the proper design, construction, location, and management of permitted facilities. An ordinance must meet the guidelines adopted by DATCP and cite the applicable USDA Soil Conservation Service construction and management standards. A manure storage facility ordinance requires permits for the installation, modification and major repair of manure storage facilities.

Poorly located, designed, constructed, or managed storage facilities can contaminate groundwater. Elevated nitrate-nitrogen concentrations are particularly common in groundwater near leaking storage facilities.

Surface water resources are also at risk with manure storage facilities, when improperly located, designed, or constructed. Manure overflows or a blowout from storage facilities are a serious threat to aquatic life. When above-ground facilities are improperly installed, the potential for system malfunctions increases. Drainage from these facilities can degrade surface quality unless properly treated.

Manure storage facility ordinances are an essential tool in the prevention of water quality degradation. Thirty-two of 72 Wisconsin counties have already adopted ordinances for

manure storage. Columbia County has already enacted a manure storage ordinance. To assure protection of surface and groundwater from manure storage facilities throughout the watershed, the adoption of a manure storage ordinance in Adams and Marquette Counties is necessary during the span of the Neenah Creek Watershed Project. Certain costs for the development and administration of the ordinance are eligible for reimbursement under the Priority Watershed Project. Adams and Marquette Counties have initiated discussion on the development of a manure storage ordinance with the intention of adopting an ordinance in 1994. As required by State Statute, should the County fail to adopt a manure storage ordinance, the County must repay to the State all Neenah Creek Nonpoint Source Grant Agreement funding. This will be a condition of the Adams and Marquette County Nonpoint Source Grant Agreement.

Construction Site Erosion Control Ordinance

Wisconsin State Statutes Sections 89.19, 101.65, 101.651, and 101.653 were created in 1992 to address the problem of construction site erosion on a statewide basis.

Currently inspection and enforcement measures for erosion control on construction sites for 1 and 2 family dwellings are administered by the Wisconsin Department of Industry, Labor and Human Relations.

Currently DILHR has been authorized to enforce erosion control measures on 1 and 2 family dwellings in areas that have adopted the Uniform Dwelling Code. At this time areas with populations less than 2,500 are not mandated to regulate construction site erosion for 1 and 2 family dwellings.

As a part of the Nonpoint Program counties are encouraged to adopt erosion control ordinances to provide enforcement authority in these areas.

Road and Bridge Construction Erosion Control

Wisconsin State Statute 89.19 deals with construction site erosion control for highway and bridge construction that is funded in whole or in part by state or federal funds. State Statute 89.19 requires the Department of Transportation in consultation with the DNR to establish standards for the control of erosion related to highway and bridge construction, and establish a program of training for persons who prepare plans for, review plans for, conduct inspections of or engage in highway or bridge construction activities.

Highway and bridge construction that is not state or federally funded is not covered under the provisions of State Statute 89.19. Highway and bridge construction projects are often next to streams and water conveyance structures, and for this reason it is of utmost importance that erosion be controlled in these areas. As a part of the Neenah Creek Priority Watershed Plan, the DNR strongly recommends that areas of road and bridge construction not covered under State Statute 89.19 abide by the guidance standards for erosion control as specified by the

Department of Transportation's Facilities Development Manual and the DNR Wisconsin Construction Site Best Management Practice Handbook.

Local Ordinances Require Developers to Prepare and Carry Out Construction Site Runoff and Erosion Control Plans

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

Thus, local governments are developing or amending subdivision ordinances, zoning ordinances, and other local ordinances to include runoff and erosion control requirements for developing land areas. Regulations seem to work best if they are tied into existing local regulations. For example, developers and builders already must comply with subdivision regulations; adding erosion and runoff control requirements to these regulations merely requires the developer to assume a few additional responsibilities.

Chapter 236 of the Wisconsin Statutes gives cities, villages, towns, and counties authority to control erosion from developing subdivisions and smaller land divisions. This chapter establishes the minimum standards and procedures for land division in Wisconsin to insure that the conversion of land into building lots is carried out in an orderly manner. Subdividing is accomplished by either a subdivision plat or a certified survey map. A subdivision plat is a detailed map that shows all subdivision lots, lot numbers, roads, streets, and other land areas. A certified survey map is required for smaller land divisions.

While Chapter 236 establishes the minimum standards, the chapter enables local governments that have an established planning agency to adopt subdivision ordinances that are more restrictive than the state standards. According to the State Department of Development, about half of the cities and villages and 63 counties had adopted their own subdivision ordinances by 1977.

Several of these government units have included runoff and erosion control provisions in their ordinances. These ordinances typically require a developer to submit a detailed plan specifying how he will minimize erosion and runoff during and after development. An appropriate reviewer (for example, a city engineer or a soil and water conservation district employee) reviews the erosion control plan. If the initial or preliminary plat is approved and the erosion and runoff control plan is considered adequate, the developer may begin construction. Typically, before a final plat is filed the person who reviewed the erosion and runoff control plan visits the development site and certifies that the measures have been installed in accordance with the plan.

Financial Assistance Available to Municipalities

Neenah Creek Survey of Construction Site Erosion

An informal survey of recent population census, building permit and sanitary permit data was taken for each township in the watershed.

Adams County

Adams County has had the most significant development since 1980 and appears most likely to have residential development in the future. Nearly all of the lakes in the watershed are located in Adams County, and lakes are most vulnerable to construction site erosion. Adams County also contains 45 percent of the total watershed area. For these reasons, it is imperative that construction site erosion be controlled in Adams County. Adams County has adopted the Uniform Dwelling Code (UDC) county-wide. The county is strongly encouraged to enforce the UDC and to consider adopting more stringent control of construction site erosion. Aggressive information and education activities, such as presentations to construction companies and to home buyers, are also encouraged.

Marquette County

Marquette County contains 25 percent of the watershed area and has not adopted the UDC. Oxford township had adopted the UDC, but dropped it in 1992. Construction site erosion is not anticipated to be a major problem in the Marquette portion of the watershed. Development is fairly slow, and while in general farmland is being converted to residential land, most of the development is on upland woodlots, far from surface waters. Furthermore, most lakeshore property has already been developed. Therefore, construction site erosion does not appear to be a major water quality problem. Nevertheless, even one acre of badly eroding development could substantially degrade water quality. Therefore, the townships in the watershed are encouraged to minimize the impacts of construction site erosion through information and education activities.

Columbia County

Columbia County represents 30 percent of the total watershed area. This portion of the county has low development rates. Most of the area is wetlands unsuitable for development. Construction site erosion is not likely to be a major water quality problem. The county is encouraged to minimize potential effects of construction site erosion through information and education activities.

Village of Oxford and the Unincorporated Community of Briggsville

The village of Oxford and the town of Briggsville have expressed interest in a stormwater management plan. Cost-sharing for the development of the plan may be available through the Neenah Creek Watershed Project.

Statewide Construction Erosion Control

Stricter control of construction site erosion may be available at the state level in the future. Local agencies are still strongly encouraged to control erosion.

The DNR, through the watershed project, may request 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 may 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 Neenah Creek Priority Watershed Project.

Stormwater Management

Town of Jackson

Adams County was the fastest growing county in Wisconsin between 1980 and 1990 (15.9%). Jackson township, in Adams County, has several lakes which face development pressure. As new developments go in, it is critical that they be designed to protect water quality. A stormwater management plan or ordinance would be extremely beneficial to protecting these lakes. The stormwater ordinance could require contractors to have a stormwater plan before a building permit is issued. Such a plan would also: a) limit impervious areas, b) require installation of practices if necessary to protect water quality from pollutants and changes in peak flow or volume that could lead to flooding, draining problems, or changes in channel stability.

Funding for the development of a stormwater management plan and ordinance may be available with up to 100 percent cost-shared. Usually the ordinance is the legal method of implementing the plan. Funding for enforcement of the plan may be available at 100 percent cost-sharing for up to five years. The plan should focus at least on the areas that drain to the lakes, and should deal with water quality issues.

CHAPTER FIVE
Local Government's Implementation Program

Introduction

This chapter identifies the means for implementing the rural and residential land use management actions for nonpoint source pollution control described in the previous chapter. See Chapter 3 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:

1. The agencies and units of government responsible for carrying out the identified tasks;

2. The best management practices (BMPs) necessary to control pollutants on the critical sites identified in Chapter 4;

3. The cost-share budget;

4. The cost containment policies;

5. The cost-share agreement reimbursement procedures, including administrative procedures for carrying out the project;

6. Staffing needs, including total hours per year and number of staff to be hired;

7. Schedules for implementing the project;

8. The involvement of other programs;

9. 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 Neenah Creek Watershed eligible for cost-share assistance through the priority watershed program include: 1) individuals; 2) Adams, Columbia, and Marquette Counties; 3) other governmental units described in NR 120.02(19); 4) corporations; and 5) the State of Wisconsin.

Adams, Columbia, and Marquette Counties are the primary units of government responsible for implementing this plan in rural areas.

The County Land Conservation Committee (LCC) will act for the County Board 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 LCC 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, and are summarized below:

1. Identify in writing a person to represent the county during implementation of the project.

2. Contact all owners or operators of lands identified as significant nonpoint sources (Cat I) within one year of signing the nonpoint source grant agreement. The county's strategy for contacting landowners is included in this chapter.

3. Develop farm conservation plans consistent with the needs of the project.

4. 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.

5. For lands the county owns or operates, to enter into cost-share agreements with DNR to correct identified nonpoint sources and fulfill their obligations as a cost-share recipient.

6. Design best management practices and verify proper practice installation.

7. Reimburse cost share recipients for the eligible costs of installing BMPs at the rates consistent with administrative rules and as established in this plan.

8. Prepare and submit annual work plans for activities necessary to implement the project. The Adams, Columbia, and Marquette County LCDs shall submit a workload analysis and grant application to the DATCP as required in s. Ag. 166.50.

9. Prepare and submit to the DNR and the DATCP the annual resource management report required under s. NR 120.21(7) to monitor project implementation by tracking changes in the nonpoint source inventory, and quantifying pollutant load reductions which result from installing BMPs.

10. Participate in the annual watershed project review meeting.

11. Conduct the information and education activities identified in this plan for which they are responsible.

Department of Natural Resources

The role of the DNR is identified in s. 144.24, Stats. and s. NR 120, Wis. Adm. Code. (NR 120) The Department has been statutorily assigned the overall administrative responsibility for the Wisconsin Nonpoint Source Pollution Abatement Program. The Department's role is summarized below.

Project Administration

Project administration includes working with the counties to ensure that work commitments required during the 8-year project implementation phase can be met. The DNR will participate in the annual work planning process with the county.

The Department reviews cost-share agreements signed by the county and the participating landowners for installing BMPs. The DNR provides guidance when questions arise concerning the conformance of proposed activities with the statutes, administrative rules, and the watershed plan.

Financial Support

Financial support for implementation of the priority watershed project is provided to each county in two ways: a local assistance grant agreement, and a nonpoint source grant agreement. These agreements are described later in this chapter.

The DNR may also enter into cost-share agreements directly with local or state units of government for the control of pollution sources on land the governments own or operate.

Project Evaluation

The DNR has responsibility for priority watershed project monitoring and evaluation activities. These efforts determine if changes in water quality occur as best management practices and other pollution controls are installed or implemented. The water quality evaluation and monitoring strategy for the Neenah Creek Watershed is included in Chapter 8.

The DNR documents the results of monitoring and evaluation activities in interim and final priority watershed project reports.

Technical Assistance

The DNR provides technical assistance to the county on the design and application of best management practices. This assistance is primarily for urban areas.

Other Responsibilities

These include:

1. The appropriate District Nonpoint Source Coordinator arranges for DNR staff to assist county staff with site reviews to determine the impacts of nonpoint sources on wetlands and/or groundwater quality.
2. The appropriate District Nonpoint Source Coordinator assists county staff in integrating wildlife and fish management concerns into selection and design of BMPs.

Department of Agriculture, Trade and Consumer Protection

The role of the DATCP is identified in s. 144.25, stats., ch. 92 stats., and NR 120. In summary, the DATCP will:

1. Manage a training program for the staff involved with project implementation.

2. Cooperate with the University of Wisconsin - Extension to act as a clearinghouse for information related to agricultural best management practices, sustainable agriculture, and nutrient and pest management.

3. Assist the counties to carry out the information and education activities or tasks described in this plan.

4. Assist county staff to identify watershed participants subject to federal or state conservation compliance programs.

5. Assist counties, if requested, to develop a manure storage ordinance.

6. Assist county staff to complete annual workload analyses and grant applications for work conducted under the priority watershed project.

7. Participate in the annual project review meetings.

8. If the need arises, assist in developing technical standards for agricultural BMPs, and provide technical assistance to county staff concerning application of these practices.

9. Assist county staff to evaluate the site specific practicality of implementing rural best management practices.

10. Provide technical and engineering assistance to counties for agricultural BMPs.

Other Agencies

The Neenah Creek Watershed Project will receive assistance from the agencies listed below.

Soil Conservation Service (SCS)

This agency works through the local LCC to provide technical assistance for planning and installing conservation practices. The local SCS personnel will work with the county staff to provide assistance with technical work when requested by the Land Conservation Committee and if SCS staff time is available. Personnel from the Area SCS office will provide staff training and engineering assistance for best management practices. Efforts will be made by DATCP to assist SCS to coordinate the Neenah Creek Priority Watershed Project with the conservation compliance and other conservation provisions of the 1985 and subsequent Federal Farm Bills.

University of Wisconsin Extension (UWEX)

County and Area Extension agents will provide support in developing and conducting a public information and education program aimed at increasing voluntary participation in the project. This will include assistance to carry out the information and education activities identified in this plan.

Agricultural Stabilization and Conservation Service (ASCS)

ASCS administers most of the federal programs aimed at the stabilization of the prices paid producers for agricultural products and administers federal funds for rural soil and water and other resource conservation activities. The Agricultural Conservation Program (ACP) which is administered by ASCS will, to the extent possible, be coordinated with the Neenah Creek Priority Watershed Project. In addition other conservation incentives such as the Conservation Reserve Program (CRP) will be used whenever possible to control critical nonpoint sources of pollution.

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 SCS 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.

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.

Following is 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.

Contour Farming

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

Contour Stripcropping

Growing crops in a systematic arrangement of strips or bands, on the contour, in alternate strips of close grown crops, such as grasses or legumes, and row crops. All operations from seed bed preparation to harvest are done on the contour.

Reduced Tillage

A system which leaves substantial amounts of crop residue on the soil surface after crops are planted. The minimum amount of ground cover after planting shall be 30%. It is utilized in two situations; one for continuous (at least 3 consecutive years) row crops, the other for short crop rotations (no more than 2 years corn and small grains and hay) or for the establishment of forages and small grains.

Critical Area Stabilization

The planting of suitable vegetation on critical nonpoint source sites and other treatment necessary to stabilize a specific location, including in-field buffers.

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

BEST MANAGEMENT PRACTICE	STATE COST SHARE RATE
Field Diversions and Terraces	70%
Grassed Waterways	70%
Critical Area Stabilization	70%[2]
Shoreline Buffers	70%[2]
Wetland Restoration	70%[2]
Shoreline and Streambank Stabilization	70%[2]
Grade Stabilization Structures	70%
Agricultural Sediment Basins	70%
Barnyard Runoff Management	70%
Animal Lot Relocation	70%
Manure Storage Facilities	70%[3]
Livestock Exclusion from Woodlots	50%
Nutrient and Pesticide Management	50%[3]
Abandonment of Leaking and Improperly Sited Manure Storage Systems	50%
Field Windbreaks	70%

[1] Table 5-2 shows BMPs cost shared at a flat rate.
[2] Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See Chapter 4 for an explanation of where easements may apply.
[3] Maximum cost share amount is $20,000 for manure storage.
[4] Spill control basins have a state cost share rate of 70%.

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 Stripcropping	$ 12.00/ac[1]
Reduced Tillage	$ 45.00/ac[2]
Reduced Tillage	$ 15.00/ac[3]

[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.

Grassed Waterways

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

Grade Stabilization Structure

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

Livestock Exclusion from Woodlots

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

Shoreline and Streambank Stabilization

The stabilization and protection of stream and lake banks against erosion and the protection of fish habitat and water quality from livestock access. This practice includes streambank riprap, streambank shaping and seeding, stream crossings, livestock watering, fencing and fish habitat structures. This practice may also include plans and practices to manage or exclude livestock.

Terraces

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

Field Diversions

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

Barnyard Runoff Management

Structural measures such as filter systems and/or diversions and rain gutters to redirect surface runoff around the barnyard, and collect, convey or temporarily store runoff from the barnyard.

Manure Storage Facility

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

Agricultural Sediment Basins

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

Shoreline Buffers

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

Animal Lot Relocation

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

Wetland Restoration

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

Nutrient Management

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

Pesticide Management and Spill Control Basin

The management of the handling, disposal and application of pesticides including the rate, method and timing of application to minimize the amount of pesticides entering surface and groundwater. This practice includes integrated pest management scouting and planning and spill control basins with liquid-tight floors for pesticide handling areas.

Easements

Although not considered to be Best Management Practices, easements are useful legal tools and their applicability is defined in Chapter 4, Management Actions. Details for such arrangements will be worked out between DNR and the counties during implementation phase.

Alternative BMPs

- ***Abandonment of Leaking and Improperly Sited Manure Storage Systems:*** Proper abandonment of leaking and improperly sited manure storage systems will aid in protection of water resources from contamination by animal waste. The practice includes proper removal and disposal of wastes, liner materials, and saturated soil, as well as shaping, filling, and seeding. Technical specifications for this BMP will be provided by the DNR.

- ***Field Windbreak:*** Reduction in wind erosion will aid in the protection of water resources from contamination by sediment, herbicides, fertilizers and other contaminants. The practice includes site preparation, plant materials, installation, weed control and fencing. Technical specifications for this BMP will be provided by the DNR.

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.

BMPs Not Cost-Shared

BMPs not cost-shared, but which shall be included on the cost share agreement if necessary to control the nonpoint sources, are listed in NR 120.17. Several examples are included below.

- That portion of a practice to be funded through other programs.

- Practices previously installed and necessary to support cost-shared practices.

- Changes in crop rotations and other activities normally and routinely used in growing crops or which have installation costs that can be passed on to potential consumers.

- Changes in location of unconfined manure stacks involving no capital cost.

- Other activities the DNR and the Counties determine are necessary to achieve the objectives of the watershed project.

Activities and Sources of Pollution Not Eligible For Cost Share Assistance

Priority watershed cost-share funds cannot be used to control sources of pollution and land management activities specifically listed in NR 120.10(2). The following is a partial list of ineligible activities most often inquired about for cost-sharing in rural areas.

- Operation and maintenance of cost-shared BMPs,
- Actions which have drainage of land or clearing of land as the primary objective,
- Practices already installed,with the exception of repairs to the practices which were rendered ineffective due to circumstances beyond the control of the landowner,
- Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program or covered in other ways by Chapter 147 of Wis. Stats. (including livestock operations with more than 1,000 animal units, or livestock operations issued a notice of discharge under ch. NR 243),
- Septic system controls or maintenance,
- Dredging activities,
- Silvicultural activities,
- Bulk storage of fertilizers and pesticides,
- Activities and structures intended primarily for flood control,
- Practices required to control sources which were adequately controlled at the time the cost-share agreement was signed, with the exception of those that occur beyond the control of the landowner,
- Other practices or activities determined by DNR not to meet the objectives of the program.

Cost-Share Budget

Costs of Installing BMPs

The quantity and type of management practices that are required to meet the water quality objectives of this project are listed in table 5-3. The capital cost of installing the BMPs are listed in this table assuming landowner participation rates of 100 percent and 75 percent. 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 $2.6 million, assuming 100 percent participation.

- State funds necessary to cost-share this level of control would be about $1.8 million.

- The local share provided by landowners and other cost-share recipients would be about $0.7 million.

At a 75 percent level of participation, the state funds needed to cover capital installation would be about $1.4 million.

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 Adams, Columbia, and Marquette Counties is shown in table 5-3a, 5-3b and 5-3c. At 100 percent participation, the estimated purchase price of easements on eligible lands would be $600,000. At 75 percent participation, the cost would be $450,000. 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.

Stormwater Management Planning Costs

Chapter 4 identifies where nonpoint source program funds can be used to develop stormwater management plans. Table 5-3d shows estimated costs. At 100 percent participation, the estimated state costs would be $110,000. However, it is very difficult to estimate the response of municipalities to stormwater management planning, and, therefore, very difficult to estimate costs.

Residential Land Use Nonpoint Source Implementation Strategy

Land use in the Neenah Creek watershed is mostly rural. However, the village of Oxford, the unincorporated community of Briggsville and the township of Jackson are eligible for funding for development of stormwater management plans. Cost-sharing may be directly from the DNR or via the county LCD. Estimated cost of implementing this strategy is shown in table 5-3d.

Table 5-3. Total Cost-Share Budget Needs for Rural Management Practices

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	2,100 ac	NA (2)	0	0	0	0	0
Contour Cropping	1,720 ac	6	10,320	10,320	0	7,740	0
Contour Strip Cropping	460 ac	12	5,520	5,520	(3)	4,140	(3)
Reduced Tillage (4)	7,000 ac	45	315,000	315,000	0	236,250	0
Reduced Tillage (5)	12,500 ac	15	187,500	187,500	0	140,625	0
Critical Area Stabilization	470 ac	300	141,000	98,700	42,300	74,025	31,725
Grass Waterways	45 ac	2,500	112,500	78,750	33,750	59,063	25,313
Field Diversions & Terraces	13,000 ft	3	39,000	27,300	11,700	20,475	8,775
Grade Stabilization	6 ea	3,000	18,000	12,600	5,400	9,450	4,050
Agricultural Sediment Basin	3 ea	10,000	30,000	21,000	9,000	15,750	6,750
Nutrient Management (6)	7,500 ac	18	139,500	69,750	69,750	52,313	52,313
Nutrient and Pest Mgmt. (6)	7,500 ac	30	232,500	116,250	116,250	87,188	87,188
Shoreline Buffers	140 ac	200	28,000	19,600	8,400	14,700	6,300
Wetland Restoration	33 ea	3,000	99,000	69,300	29,700	51,975	22,275
Livestock Exclusion, Woods	1,000 rods	15	15,000	7,500	7,500	5,625	5,625
Spill Control Basins	8 ea	15,000	120,000	84,000	36,000	63,000	27,000
Animal Waste Management							
Barnyard Runoff Control							
Complete System	14 ea	20,000	280,000	196,000	84,000	147,000	63,000
Roof Gutters	10 ea	2,000	20,000	14,000	6,000	10,500	4,500
Clean Water Diversion	10 ea	2,500	25,000	17,500	7,500	13,125	5,625
Manure Storage Facility (7)	8 ea	30,000	240,000	160,000	80,000	120,000	60,000
Abandoned/Improperly Sited	5 ea	30,000	150,000	75,000	75,000	56,250	56,250
Manure Storage Systems							
Streambank Erosion Control							
Shape and Seeding	27,500 ft	7	192,500	134,750	57,750	101,063	43,313
Fencing	3,300 rods	20	66,000	46,200	19,800	34,650	14,850
Riprap	3,300 ft	20	66,000	46,200	19,800	34,650	14,850

Table 5-3. Continued.

Best Management Practices	Number	Cost/Unit	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Livestock/Machinery							
Crossing/Watering Ramp	13 ea	1,500	19,500	13,650	5,850	10,238	4,388
Remote Watering Systems	19 ea	1,500	28,500	19,950	8,550	14,963	6,413
Subtotal:			$2,580,340	$1,846,340	$734,000	$1,384,755	$550,500
Easements	1,200 ac	500	600,000	600,000	0	450,000	0
TOTALS			$3,180,340	$2,446,340	$734,000	$1,834,755	$550,500

(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) Nutrient and Pest Management is cost shared per acre over a three year period.
(7) Maximum cost-share is $20,000

Source: DNR; DATCP; and the Land Conservation Department of Adams, Columbia, and Marquette Counties

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

Best Management Practices	Number	Cost/Unit in $	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Change in Crop Rotation	1,000 ac	NA (2)	0	0	0	0	0
Contour Cropping	1,000 ac	6	6,000	6,000	(3)	4,500	(3)
Contour Strip Cropping	260 ac	12	3,120	3,120	(3)	2,340	(3)
Reduced Tillage (4)	1,000 ac	45	45,000	45,000	(3)	33,750	(3)
Reduced Tillage (5)	1,000 ac	15	15,000	15,000	(3)	11,250	(3)
Critical Area Stabilization	280 ac	300	84,000	58,800	25,200	44,100	18,900
Grass Waterways	25 ac	2,500	62,500	43,750	18,750	32,813	14,063
Field Diversions & Terraces	7,000 ft	3	21,000	14,700	6,300	11,025	4,725
Grade Stabilization	3 ea	3,000	9,000	6,300	2,700	4,725	2,025
Agricultural Sediment Basin	1 ea	10,000	10,000	7,000	3,000	5,250	2,250
Nutrient Management (6)	4,500 ac	18	81,000	40,500	40,500	30,375	30,375
Nutrient and Pest Mgmt. (6)	4,500 ac	30	135,000	67,500	67,500	50,625	50,625
Shoreline Buffers	30 ac	200	6,000	4,200	1,800	3,150	1,350
Wetland Restoration	15 ea	3,000	45,000	31,500	13,500	23,625	10,125
Livestock Exclusion, Woods	500 rods	15	7,500	3,750	3,750	2,813	2,813
Spill Control Basins	4 ea	15,000	60,000	42,000	18,000	31,500	13,500
Animal Waste Management							
Barnyard Runoff Control							
Complete System	4 ea	20,000	80,000	56,000	24,000	42,000	18,000
Roof Gutters	4 ea	2,000	8,000	5,600	2,400	4,200	1,800
Clean Water Diversion	4 ea	2,500	10,000	7,000	3,000	5,250	2,250
Manure Storage Facility (7)	3 ea	30,000	90,000	60,000	30,000	45,000	22,500
Abandoned/Improperly Sited	2 ea	30,000	60,000	30,000	30,000	22,500	22,500
Manure Storage Facility							

Table 5-3a. Continued.

Best Management Practices	Number	Cost/Unit in $	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Streambank Erosion Control							
Shape and Seeding	10,000 ft	7	70,000	49,000	21,000	36,750	15,750
Fencing	600 rods	20	12,000	8,400	3,600	6,300	2,700
Riprap	1,800 ft	20	36,000	25,200	10,800	18,900	8,100
Livestock/Machinery							
Crossing/Watering Ramp	8 ea	1,500	12,000	8,400	3,600	6,300	2,700
Remote Watering Systems	8 ea	1,500	12,000	8,400	3,600	6,300	2,700
Subtotal:			$1,070,120	$737,120	$333,000	$552,840	$249,750
Easements	400 ac	500	200,000	200,000	0	150,000	0
TOTALS			$1,270,120	$937,120	$333,000	$702,840	$249,750

(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) Nutrient and Pest Management is cost shared per acre over a three year period.
(7) Maximum cost-share is $20,000

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

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

Best Management Practices	Number	Cost/Unit in $	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Change in Crop Rotation	500 ac	NA (2)	0	0	0	0	0
Contour Cropping	120 ac	6	720	720	(3)	540	(3)
Contour Strip Cropping	100 ac	12	1,200	1,200	(3)	900	(3)
Reduced Tillage (4)	5,000 ac	45	225,000	225,000	(3)	168,750	(3)
Reduced Tillage (5)	5,000 ac	15	75,000	75,000	(3)	56,250	(3)
Critical Area Stabilization	50 ac	300	15,000	10,500	4,500	7,875	3,375
Grass Waterways	10 ac	2,500	25,000	17,500	7,500	13,125	5,625
Field Diversions & Terraces	3,000 ft	3	9,000	6,300	2,700	4,725	2,025
Grade Stabilization	1 ea	3,000	3,000	2,100	900	1,575	675
Agricultural Sediment Basin	1 ea	10,000	10,000	7,000	3,000	5,250	2,250
Nutrient Management (6)	2,500 ac	18	45,000	22,500	22,500	16,875	16,875
Nutrient and Pest Mgmt. (6)	2,500 ac	30	75,000	37,500	37,500	28,125	28,125
Shoreline Buffers	50 ac	200	10,000	7,000	3,000	5,250	2,250
Wetland Restoration	8 ea	3,000	24,000	16,800	7,200	12,600	5,400
Livestock Exclusion, Woods	200 rods	15	3,000	1,500	1,500	1,125	1,125
Spill Control Basins	2 ea	15,000	30,000	21,000	9,000	15,750	6,750
Animal Waste Management							
Barnyard Runoff Control							
Complete System	3 ea	20,000	60,000	42,000	18,000	31,500	13,500
Roof Gutters	1 ea	2,000	2,000	1,400	600	1,050	450
Clean Water Diversion	1 ea	2,500	2,500	1,750	750	1,313	563
Manure Storage Facility (7)	3 ea	30,000	90,000	60,000	30,000	45,000	22,500
Abandoned/Improperly Sited	1 ea	30,000	30,000	15,000	15,000	11,250	11,250
Manure Storage Facility							

Table 5-3b. Continued.

Best Management Practices	Number	Cost/Unit in $	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Streambank Erosion Control							
Shape and Seeding	12,500 ft	7	87,500	61,250	26,250	45,938	19,688
Fencing	800 rods	20	16,000	11,200	4,800	8,400	3,600
Riprap	1,000 ft	20	20,000	14,000	6,000	10,500	4,500
Livestock/Machinery							
Crossing/Watering Ramp	3 ea	1,500	4,500	3,150	1,350	2,363	1,013
Remote Watering Systems	8 ea	1,500	12,000	8,400	3,600	6,300	2,700
Subtotal:			$875,420	$669,770	$205,650	$502,328	$154,238
Easements	550 ac	500	275,000	275,000	0	206,250	0
TOTALS			$1,150,420	$944,770	$205,650	$708,578	$154,238

(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) Nutrient and Pest Management is cost shared per acre over a three year period.
(7) Maximum cost-share is $20,000

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

Table 5-3c. Cost-Share Budget Needs for Rural Management Practices in Columbia County

Best Management Practices	Number	Cost/Unit in $	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Change in Crop Rotation	600 ac	NA (2)	0	0	0	0	0
Contour Cropping	600 ac	6	3,600	3,600	(3)	2,700	(3)
Contour Strip Cropping	100 ac	12	1,200	1,200	(3)	900	(3)
Reduced Tillage (4)	1,000 ac	45	45,000	45,000	(3)	33,750	(3)
Reduced Tillage (5)	500 ac	15	7,500	7,500	(3)	5,625	(3)
Critical Area Stabilization	140 ac	300	42,000	29,400	12,600	22,050	9,450
Grass Waterways	10 ac	2,500	25,000	17,500	7,500	13,125	5,625
Field Diversions & Terraces	3,000 ft	3	9,000	6,300	2,700	4,725	2,025
Grade Stabilization	2 ea	3,000	6,000	4,200	1,800	3,150	1,350
Agricultural Sediment Basin	1 ea	10,000	10,000	7,000	3,000	5,250	2,250
Nutrient Management (6)	750 ac	18	13,500	6,750	6,750	3,375	3,375
Nutrient and Pest Mgmt. (6)	750 ac	30	22,500	11,250	11,250	8,438	8,438
Shoreline Buffers	60 ac	200	12,000	8,400	3,600	6,300	2,700
Wetland Restoration	10 ea	3,000	30,000	21,000	9,000	15,750	6,750
Livestock Exclusion, Woods	300 rods	15	4,500	2,250	2,250	1,688	1,688
Spill Control Basins	2 ea	15,000	30,000	21,000	9,000	15,750	6,750
Animal Waste Management							
Barnyard Runoff Control							
Complete System	7 ea	20,000	140,000	98,000	42,000	73,500	31,500
Roof Gutters	5 ea	2,000	10,000	7,000	3,000	5,250	2,250
Clean Water Diversion	5 ea	2,500	12,500	8,750	3,750	6,563	2,813
Manure Storage Facility (7)	2 ea	30,000	60,000	40,000	20,000	30,000	15,000
Abandoned/Improperly Sited	2 ea	30,000	60,000	30,000	30,000	22,500	22,500
Manure Storage Facility							

Table 5-3c. Continued.

Best Management Practices	Number	Cost/Unit in $	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Streambank Erosion Control							
Shape and Seeding	5,000 ft	7	35,000	24,500	10,500	18,375	7,875
Fencing	1,900 rods	20	38,000	26,600	11,400	19,950	8,550
Riprap	500 ft	20	10,000	7,000	3,000	5,250	2,250
Livestock/Machinery							
Crossing/Watering Ramp	2 ea	1,500	3,000	2,100	900	1,575	675
Remote Watering Systems	3 ea	1,500	4,500	3,150	1,350	2,363	1,013
Subtotal:			$634,800	$439,450	$195,350	$329,588	$146,513
Easements	250 ac	500	125,000	125,000	0	93,750	0
TOTALS			$759,800	$564,450	$195,350	$423,338	$146,513

(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) Nutrient and Pest Management is cost shared per acre over a three year period.
(7) Maximum cost-share is $20.000

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

Table 5-3d. Estimated Cost of Stormwater Management Planning

Municipality	Acres	Cost/Ac	Total Cost
Briggsville	120	$100	$12,000
Oxford	480	$100	$48,000
Jackson	8,000	$6.25	$50,000
TOTAL	8,600		$110,000

Source: DNR table 5-e. shows more specific urban/residential practices eligible for cost-sharing.

Table 5-e. Residential and Urban Implementation Eligible for State Funding

ACTIVITY	SUPPORT RATE
Development of Stormwater Management Ordinances	100%
Engineering Studies for Existing Urban Areas; Studies for Planned Urban Areas	100% (1)
Design and Engineering for Structural Best Management Ordinances	100%
Staff for Enforcing Construction Stormwater Management Ordinances	100% (2)
Development of Alternative Financing and Administration Strategies	100%

(1) Funding not available for components dealing exclusively with drainage and flooding.
(2) Funding limited to five years. Level of staffing based on a work plan submitted by local units of government and approved by the DNR.

Source: DNR.

Cost Containment

Cost Containment Procedures

Chapter NR 120 requires that cost containment procedures be identified in this plan to control the costs of installing BMPs. The cost containment procedures to be used by Adams, Columbia, and Marquette Counties are described below. The bidding procedure and average cost and flat rate lists can be obtained from the county LCD.

Bids

Competitive bids will be required in each county for all structural BMPs with estimated total costs, as determined by the project technician, exceeding $5,000. The bidding process requires a minimum of two bids from qualified contractors in itemized bid format. In cases where bids were requested from a minimum of three qualified contractors but only one bid was received, the county will determine if the bid constitutes an appropriate cost for the project. If no bids are received or if the lone bid is not deemed appropriate, counties will limit cost sharing based on average costs.

Average Costs

Average costs will be used for all structural BMPs with an estimated cost of less than $5,000 and for all non-structural BMPs not using a flat rate, unless the cost share recipient decides, and the county agrees, to bid the installation of the BMPs. If the cost share recipient or any county decides to bid a structural BMP under $5,000 the before mentioned bid procedure will pertain.

Flat Rates

BMPs using flat rates are shown in table 5-2. The rates shown are the state's share of the practice installation costs.

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

The Wisconsin Conservation Corps may be used to install best management practices for cost share recipients.

Cost-share payments will be based on actual installation costs. If actual installation costs exceed the amount of cost-sharing determined by cost estimates, then 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.

Cost-Share Agreement Reimbursement Procedures

Nonpoint Source Grant Agreement and Administration

General Information

The Nonpoint Source Grant Agreement is the means for transmitting funds from the DNR (through the Nonpoint Source Program) to Adams, Columbia, and Marquette Counties for use in funding the state's share of cost share agreements. Cost share agreements are the means to transmit funds from the county to the landowners.

A portion of the Nonpoint Source Grant is forwarded to each County to allow the county to set up an "up front" account. Funds from this account are used by the county to pay landowners after practices are installed through the project. As this account is drawn down, the county will request reimbursements from DNR to replenish the account. The county will submit reimbursement requests on a quarterly basis or sooner if needed. This reimbursement schedule will insure that the "up front" account balance is maintained at an adequate level. The Nonpoint Source (NPS) Grant Agreement will be amended annually to provide funding needed for cost sharing for the year. The funds obligated under cost share agreements must never exceed the total funds in the NPS Grant Agreement.

Fiscal Management Procedures, Reporting Requirements

Counties are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Neenah Creek 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.

Cost Share Agreement and Administration

Purpose and Responsibilities

Consistent with s. 144.25, Stats. and NR 120, Wis. Adm. Code, cost-share funding is available to landowners for a percent of the costs of installing BMPs to meet the project objectives. Landowners have three years after formal approval of the watershed plan to enter into cost-share agreements (CSA). Practices included on cost-share agreements must be installed within the schedule agreed to on the cost-share agreement. Unless otherwise approved, the schedule of installing BMPs will be within 5 years of signing the cost-share agreement. Practices must be maintained for a minimum of ten years from the date of installing the final practice included in the cost-share agreement.

The cost-share agreement is a legal contract between the landowner and the county. The agreement includes the name and other information about the landowner and grant recipient,

conditions of the agreement, the practices involved and their location, the quantities and units of measurement involved, the estimated total cost, the cost share rate and amount, the timetable for installation, and number of years the practice must be maintained. The agreements also identify and provide information on practices not cost-shared through the nonpoint program but that are essential to controlling pollution sources (such as crop rotations). These items will be completely listed in the conservation plan and the conservation plan is tied to the CSA via addendum 2 of the CSA. Once it is signed by both parties, they are legally bound to carry out the provisions in it.

If land ownership changes, the cost-share agreement remains with the property and the new owner is legally bound to carry out the provisions. NR 120.13(9) and (10) has more information on changes of land ownership and the recording of cost-share agreements.

Local, state, or federal permits may be needed prior to installation of some BMPs. The areas most likely to need permits are zoned wetlands and the shoreline areas of lakes and streams. These permits are needed whether the activity is a part of the watershed project or not. Landowners should consult with the County Planning and Zoning Department or the Land Conservation Department offices to determine if any permits are required. The landowner is responsible for acquiring the needed permits prior to installation of practices.

The cost-share agreement binds the county to provide the technical assistance needed for the planning, design, and verification of the practices on the agreement, and to provide the cost-share portion of the practice costs.

Counties are responsible for enforcing compliance of cost-share agreements to which they are a party. Where DNR serves as a party to an agreement with a unit of government, the DNR will take responsibility for monitoring compliance. The responsible party will insure that BMPs installed through the program are maintained in accordance with the operation and maintenance plan for the practice for the appropriate length of time. Adams, Columbia, and Marquette Counties will check for compliance with practice maintenance provisions once every three years after the last practice has been installed. The county must check maintenance at its own expense after the Nonpoint Source Agreement has lapsed, unless state funding for this activity becomes available at any time during the implementation or monitoring phase of this project.

Landowner Contact Strategy

The following procedure will be used to make landowner contacts.

- During the first three months of the implementation period, all landowners or operators with eligible nonpoint sources will receive from the county a mailing explaining the project and how they can become involved.

- After the initial landowner mailings, county staff will make personal contacts with all landowners that have been identified as having critical nonpoint sources of pollution (Management Category I). These contacts will occur within the cost-share sign-up period.

- The county will continue to make contacts with eligible (Management Category I and II) landowners and operators until they have made a definite decision regarding participation in the program.

- The county will contact all eligible landowners (as defined in c above) not signing cost-share agreements by personal letter six months prior to the end of the cost-share sign-up period.

Procedure for Developing a Cost Share Agreement

Eligibility for cost-sharing is verified following a site visit, using the criteria described in Chapter 4.

The development of farm conservation plans will be the primary method used to develop cost-share agreements. These plans are specific to a particular landowner and are a comprehensive approach to the abatement of the nonpoint sources of pollution, and the conservation of soil and other resources. The farm plan takes into consideration the sustainability of the agricultural resources and the management decisions of the owner or operator.

The cost share agreement specifies the items listed in the farm conservation plan that are necessary to reduce the nonpoint sources of pollution. The conservation plan and cost share agreement will document existing management which must be maintained to protect water quality.

The following procedure will be used by the county for developing and administering agreements. Below are the steps from the initial landowner contact through the completion of BMP maintenance.

1. Landowner and county staff meet to discus the watershed project, NPS control practice needs, and coordination with conservation compliance provisions if applicable.

2. Landowner agrees to participate with the watershed project.

3. A farm conservation plan is prepared by the county.

4. The landowner agrees with the plan, a Cost Share Agreement is prepared and both documents are signed by the landowner and the county. A copy of the Cost Share Agreement (CSA) is sent to the DNR Southern District Nonpoint Source Coordinator and a copy given to the landowner. The CSA will be recorded by the county with the County Register of Deeds.

5. Practices are designed by the county, or their designee, and a copy of the design is provided to the landowner.

6. Landowner obtains the necessary bids or other information required in the cost containment policy.

7. Amendments to the CSA are made if necessary.

8. The county staff oversee practice installation.

9. The county verifies the installation.

10. The landowner submits paid bills and proof of payment (canceled checks or receipts marked paid) to the county.

11. Land Conservation Committees or their designated representative and if required, county boards, approve cost-share payments to landowners.

12. Checks are issued by the county to the respective landowners and project ledgers are updated.

13. The county records the check amount, number, and date.

14. DNR reimburses the county for expended cost-share funds.

Identifying Wildlife and Fishery Needs

The Adams, Columbia, and Marquette County staff will consult with DNR's Southern District wildlife management and fisheries management staff to optimize the wildlife and fish management benefits of nonpoint source control BMPs. Specifically, the county staff will contact DNR staff if in the county's opinion: Fence rows, rock piles, wetlands, or other wildlife habitat components will be adversely affected by installation of agricultural BMPs.

The DNR staff will assist county staff at the County's request by:

- Identifying streambank protection practices that benefit fish and wildlife.

- Identifying wildlife habitat components that could be incorporated into vegetative filter strips along streams or in upland areas.

- Reviewing placement of agricultural sediment basins to assure that negative impacts on stream fish and aquatic life do not occur and recommending wildlife habitat components.

- Providing technical assistance when the installation of BMPs will require the removal of obstructions or other wildlife habitat by proposing measures to minimize impact on wildlife habitat.

- Assisting to resolve questions concerning effects of agricultural nonpoint source BMPs on wetlands.

Submittal to the Department of Natural Resources

Cost-share agreements do not need prior approval from DNR, except in the following instances:

- where cost-share funds are to be used for practices on land owned or controlled by the county.
- for agreements or amendments where the cost-share amount for all practices for a landowner exceeds $50,000 in state funds.
- for grade stabilization structures and agricultural sediment basins with embankment heights between 15 and 25 feet and impoundment capacities of 15 to 50 acre feet.
- for streambanks to be controlled using riprap or other materials with banks over 6 feet high, according to NR120.14. If applications are similar to each other in content, they will be reviewed to determine if future applications need be subject to this approval procedure.
- for animal lot relocation.
- for roofs over barnyards or manure storage facilities.

Local Assistance Grant Agreement Administration

General Information

The Local Assistance Grant Agreement (LAGA) is a grant from the DNR to the County for staff and support costs. Consistent with NR 120, the counties will use funds from the LAGA for staff to implement the project and conduct information and education activities. Other items such as travel, training, and certain office supplies are also supported by the LAGA. Further clarification of eligible costs supported by this grant is given in NR 120.14(4) and (6).

Grant Agreement Application Procedures

An annual review of the Local Assistance Grant Agreement is conducted through the development of an annual workload analysis by the county. This workload analysis estimates the work needed to be accomplished each year. The workload analysis is provided to DATCP and DNR for review and clarification. Along with the workload analysis, a grant application form is sent. Funds needed to complete the agreed upon annual workload are amended to the local assistance grant agreement.

Fiscal Management Procedures, Reporting Requirements

Adams, Columbia, and Marquette Counties are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Neenah Creek 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.

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

Tables 5-4 lists the total estimated staff needed to implement the project. Tables 5-4a,b and c list the estimated staff needed by county. Figures are provided for both the 50 percent and 75 percent levels of participation. A total of about 56,750 staff hours are required to implement this plan at a 75 percent landowner participation rate. This includes 4,680 staff hours to carry out the information and education program.
Currently, 3 positions are being funded on the Neenah Creek 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.

Staffing Costs

The estimated cost for staff at the 75 percent participation rate (see table 5-5) is approximately $1.1 million. These costs will be paid by the state through the Local Assistance Grant Agreement.

Table 5-4. Estimated County LCD Staff Needs for Project Implementation

Activity	Project Years When Work Will Be Done	Adams, Marquette and Columbia Counties	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project & Financial Mgmt.	1-8	9,512	9,512
Information & Education Program	1-8	4,680	4,680
Pre-Contact Office Inventory Landowner Contacts, & Progress Tracking	1-3	4,389	2,926
Conservation Planning & Cost Share Agreement Development	1-3	9,119	6,079
Plan Revisions and Monitoring	1-8	6,224	3,632
Practice Design & Installation Upland Sediment Control Animal Waste Management Streambank Erosion Control	1-8	9,237 8,950 3,168	5,642 4,864 2,112
Training	1-8	1,480	1,480
Total LCD Workload:		56,750	40,926
Estimated Staff Required for Years 1-3:		4.7 per year	3.3 per year
Hours		9,777 per year	6,848 per year
Estimated Staff Required for Years 4-8:		3.3 per year	2.5 per year
Hours		6,886 per year	5,118 per year

Source: DNR; DATCP and Land Conservation Department of Marquette County

Table 5-4a. Estimated County LCD Staff Needs for Project Implementation

Activity	Project Years When Work Will Be Done	Adams County	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project & Financial Mgmt.	1-8	5,851	5,851
Information & Education Program	1-8	2,831	2,831
Pre-Contact Office Inventory Landowner Contacts, & Progress Tracking	1-3	3,024	2,016
Conservation Planning & Cost Share Agreement Development	1-3	7,671	5,114
Plan Revisions and Monitoring	1-8	5,772	3,331
Practice Design & Installation Upland Sediment Control Animal Waste Management Streambank Erosion Control	1-8	5,517 1,937 1,718	3,161 671 1,145
Training	1-8	1,080	1,080
Total LCD Workload:		35,400	25,200
Estimated Staff Required for Years 1-3:		3.0 per year	2.0 per year
Hours		6,200 per year	4,200 per year
Estimated Staff Required for Years 4-8:		2.0 per year	1.5 per year
Hours		4,200 per year	3,150 per year

Source: DNR; DATCP and Land Conservation Department of Adams County

Table 5-4b. Estimated County LCD Staff Needs for Project Implementation

Activity	Project Years When Work Will Be Done	Marquette County	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project & Financial Mgmt.	1-8	1,861	1,861
Information & Education Program	1-8	1,849	1,849
Pre-Contact Office Inventory Landowner Contacts, & Progress Tracking	1-3	630	420
Conservation Planning & Cost Share Agreement Development	1-3	1,035	690
Plan Revisions and Monitoring	1-8	293	195
Practice Design & Installation Upland Sediment Control Animal Waste Management Streambank Erosion Control	1-8	2,722 674 1,297	1,815 449 865
Training	1-8	320	320
Total LCD Workload:		10,680	8,463
Estimated Staff Required for Years 1-3:		0.9 per year	0.7 per year
hours		1,914 per year	1,495 per year
Estimated Staff Required for Years 4-8:		0.6 per year	0.5 per year
hours		1,266 per year	1,017 per year

Source: DNR; DATCP and Land Conservation Department of Marquette County

Table 5-4c. Estimated County LCD Staff Needs for Project Implementation

Activity	Project Years When Work Will Be Done	Columbia County	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project & Financial Mgmt.	1-8	1,800	1,800
Information & Education Program	1-8	0	0
Pre-Contact Office Inventory Landowner Contacts, & Progress Tracking	1-3	735	490
Conservation Planning & Cost Share Agreement Development	1-3	413	275
Plan Revisions and Monitoring	1-8	159	106
Practice Design & Installation Upland Sediment Control Animal Waste Management Streambank Erosion Control	1-8	998 6,332 153	666 3,744 102
Training	1-8	80	80
Total LCD Workload:		10,670	7,263
Estimated Staff Required for Years 1-3:		.8 per year	.6 per year
hours		1,663 per year	1,153 per year
Estimated Staff Required for Years 4-8:		.7 per year	.5 per year
hours		1,420 per year	951 per year

Source: DNR; DATCP and Land Conservation Department of Columbia County

Table 5-5. Total Project Costs and Disbursement Schedule at 75% Landowner Participation for Neenah Creek Watershed Project

Item	1	2	3	4-8	TOTAL
Cost Share Funds: Practices	$276,951	$553,902	$553,902	$0	$1,384,756
Cost Share Funds: Easements	90,000	180,000	180,000	0	$450,000
Local Assistance Staff Support*	171,815	171,815	171,815	602,175	$1,117,620
Information/Education Direct	4,753	4,753	4,753	14,260	$28,520
Other Direct (travel, supplies, etc.)	47,000	47,000	47,000	94,000	$235,000
TOTAL	$590,519	$957,471	$957,471	$710,435	$3,215,896

* Salary + Indirect = $36,400/year

Source: DNR; DATCP and Land Conservation Departments of Adams, Marquette and Columbia Counties

Table 5-5a. Total Project Costs and Disbursement Schedule at 75% Landowner Participation for Adams County

Item	1	2	3	4-8	TOTAL
Cost Share Funds: Practices	$110,568	$221,136	$221,136	$0	$552,840
Cost Share Funds: Easements	30,000	60,000	60,000	0	$150,000
Local Assistance Staff Support*	109,200	109,200	109,200	364,000	$691,600
Information/Education Direct	2,377	2,377	2,377	7,130	$14,260
Other Direct (travel, supplies, etc.)	30,000	30,000	30,000	60,000	$150,000
TOTAL	$282,144	$422,712	$422,712	$431,130	$1,558,700

* Salary + Indirect = $36,400/year

Source: DNR; DATCP and Land Conservation Departments of Adams, Marquette and Columbia Counties

Table 5-5b. Total Project Costs and Disbursement Schedule at 75% Landowner Participation for Marquette County

Item	1	2	3	4-8	TOTAL
Cost Share Funds: Practices	$100,466	$200,931	$200,931	$0	$502,328
Cost Share Funds: Easements	41,250	82,500	82,500	0	$206,250
Local Assistance Staff Support*	33,495	33,495	33,495	110,775	$211,260
Information/Education Direct	1,188	1,188	1,188	3,565	$7,130
Other Direct (travel, supplies, etc.)	10,000	10,000	10,000	20,000	$50,000
TOTAL	$186,399	$328,115	$328,115	$134,340	$976,968

* Salary + Indirect = $36,400/year

Source: DNR; DATCP and Land Conservation Departments of Adams, Marquette and Columbia Counties

Table 5-5c. Total Project Costs and Disbursement Schedule at 75% Landowner Participation for Columbia County

Item	1	2	3	4-8	TOTAL
Cost Share Funds: Practices	$65,918	$131,835	$131,835	$0	$329,588
Cost Share Funds: Easements	18,750	37,500	37,500	0	$93,750
Local Assistance Staff Support*	29,120	29,120	29,120	127,400	$214,760
Information/Education Direct	1,188	1,188	1,188	3,565	$7,130
Other Direct (travel, supplies, etc.)	7,000	7,000	7,000	14,000	$35,000
TOTAL	$121,976	$206,644	$206,644	$144,965	$680,228

* Salary + Indirect = $36,400/year

Source: DNR; DATCP and Land Conservation Departments of Adams, Marquette and Columbia Counties

Schedules

Grant Disbursement and Project Management Schedule

Implementation may begin upon approval of this watershed plan by the Adams, Columbia, and Marquette County Boards; DATCP; and the DNR. The priority watershed project

implementation period lasts eight years. It includes an initial three year period for contacting eligible landowners and signing cost-share agreements. Practices on any cost-share agreement must be installed within five years of signing the CSA.

Under extenuating circumstances, the initial period for entering into cost-share agreements can be extended by DNR for a limited period of time if it will result in a significant increase in nonpoint source control. Limited extensions for the installation period for practices on individual cost-share agreements must also be approved by DNR and DATCP.

The disbursement of the grants (Local Assistance and Nonpoint Source) to the Counties will be based on an annual workload analysis and grant application process. The estimated grant disbursement schedule based on 75 percent participation by eligible landowners can be found in tables 5-5, 5-5a, 5-5b and 5-5c.

Total Project Cost

The total state funding required to meet the rural nonpoint source pollution control needs at a 75 percent level of landowner participation is presented tables 5-5, 5-5a, 5-5b and 5-5c.. This figure includes the capital cost of practices, staff support, and easement costs presented above. The estimated cost to the state is $3.4 million and the estimated cost to landowners and others is $0.6 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.

Involvement of Other Programs

Coordination With State and Federal Conservation Compliance Programs

The Neenah Creek 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 Soil Conservation Service. DATCP will assist the LCD and the SCS offices to identify landowners within the watershed that are subject to the compliance provisions of FPP and FSA. Conservation Farm Plans were completed for all landowners in FSA on December 31, 1989.

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

farm planning will facilitate consideration of the various goals and objectives for all the programs in which the landowner participates.

Some eroding uplands in management categories 1 and 2 may need control, in addition to that required for meeting sediment delivery targets, in order to meet soil erosion program goals established through other state and federal programs. Where this occurs, technical and financial assistance from the Nonpoint Source Program can be used to support practice design and installation on these critical lands. This assistance applies only where the additional control needed to meet soil erosion goals can be achieved using low cost practices.

CHAPTER SIX
Information and Education Program

Preface

It is the considered opinion of each staff worker for the Neenah Creek Priority Watershed Project that it is important to emphasize information and education strategies. This is a large and diverse watershed with many different audiences. The bulk of improvements needed to abate nonpoint source pollution needs to come first from a change of attitude and a recognition of the connection of ourselves and what we do on the land with our water resources. Improvement will come from a change in management of our land along with the concomitant built systems available through the priority watershed program. Changing management procedures on agricultural as well as recreational land will require significant education and persuasion. This project will not be as costly in concrete and engineered solutions as many watershed projects. Funds should be allocated and can be well employed in teaching skills necessary to adopt practices in the agricultural areas of conservation tillage, crop scouting, integrated pest management, safe manure storage, handling and utilization, rotational grazing, wind erosion control and other sustainable agricultural practices. In the nonagricultural areas and at the farmsteads we feel education about buffer strips and uses of native vegetation, home pesticide and fertilizer use, home hazardous waste reduction and water infiltration practices is a necessary step for success in this watershed.

Therefore the tours, meetings, workshops, presentations and signage have been developed to provide an identity with the project and the solutions to the problem. We feel that these are essential to affect the types of changes in behavior necessary to make a difference long-term in this watershed. With these activities people will be better able to identify with the water and the land uses that impact water quality and will develop pride in the protection and improvement of local water quality and a connection between environmental health and economic well being.

Objective

The objective of the Information and Education (I & E) Program is to improve water quality by maximizing landowner participation in the Neenah Creek Watershed Project; and to develop a citizenry that is knowledgeable about the problem of nonpoint source pollution and the Neenah Creek Priority Watershed Project, and is willing and able to reduce their contribution to surface and groundwater pollution.

Goals of the Program

To achieve its objective of cleaner water, the I & E program has been structured around the following goals:

- Increased awareness, understanding and appreciation of the water resources in the Neenah Creek Watershed and its benefits to the area.

- Increased understanding of the principles of water pollution, especially nonpoint source (NPS) water pollution as experienced in the Neenah Creek Watershed and knowledge of how NPS impacts people and the natural environment.

- Increased awareness, knowledge and ability to implement Best Management Practices (BMPs) being promoted through the Neenah Creek Watershed Project, including awareness and knowledge of how these practices can lead to cleaner water and improved land management.

- Increased awareness and knowledge of habitat concerns and ecosystem sustainability within the Neenah Creek Watershed and willingness to participate in programs that improve fish and wildlife habitat.

- Increased awareness and understanding of the purpose, operation and benefits of the Neenah Creek Watershed Project.

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 [Citizen Advisory Committee members, nonresident lake users, residents of small towns and villages, rural nonagriculture landowners, lake and riverbank residents, campgrounds users, teachers and youth].

Delivery Team

The Adams County Land Conservation Department (LCD) will take the lead responsibility for the delivery of the I & E Program. Marquette and Columbia County LCD offices will share responsibility for those I&E activities involving BMPs and agriculturally related I&E

activities, with the University of Wisconsin-Cooperative Extension (UWEX), the DNR and the Department of Agriculture (DATCP) providing supporting assistance.

Activities

Brief program information is presented for each of the I & E Program activities listed below.

Newsletters

Description: Newsletters will be a major component of the Neenah Creek I & E Program. During the sign-up period, newsletters will focus on building an awareness and knowledge of the problem of nonpoint source pollution and of promoting the purpose, operation and benefits of the project and of the Best Management Practices (BMP). Newsletters will be sent to all landowners in the watershed from an existing mailing list. In addition newsletters will be made available to other residents and nonresident lake users at other locations in the watershed. The implementation period newsletters will emphasize the operation and maintenance of BMPs, the water quality improvements realized through BMP installation and overall watershed progress. Four newsletters per year will be sent out during project sign-up. After project sign-up and until project end, two newsletters per year will be prepared. Newsletters will be the responsibility of the Adams County LCD in cooperation with UWEX.

Evaluation: Evaluation will be based on research being done through UWEX publications and the DNR NPS I&E Coordinator on the value of specific types of newsletters. In addition, the Citizen Advisory Committee will be asked to evaluate the effectiveness and usability of the newsletters annually in order to make improvements and suggestions for future issues.

Cost: $9,500 postage; $150 photographic supplies

News Releases

Description: News releases will be sent to local newspapers and paid announcements will be included in the local shopping guide. Topics of these will include:

1. Description of the water resources and impact of nonpoint source pollution in the watershed.
2. Current status of watershed project progress.
3. Success stories of improved water quality.
4. Invitations to project tours and meetings.
5. Pollution awareness and benefits of BMP installation.

The news releases will be the responsibility of the Adams County LCD. At least releases per year will be scheduled during project sign-up and one release per year during implementation. Announcements of upcoming events will be placed in the local shopping guide as necessary.

Evaluation: No formal evaluation planned, informal evaluation will include questions on tour or workshop evaluations concerning where people heard about the event.

Cost: $600, cost for paid advertising in local shopping guide, amount per release will depend on size.

Radio Announcements

Description: Paid radio announcements will be used during project signup. These will be designed to describe the impact of nonpoint source pollution in the watershed, promote watershed participation, educate lake users and residents about their role in preventing NPS pollution and provide status updates. Adams County LCD will take the lead responsibility for this activity.

Evaluation: No formal evaluation planned.

Cost: $50 each for 16 radio spots for a total of $800.

Public Informational Meetings

Description: Joint public meetings will be held by the Adams, Marquette and Columbia County LCDs during each year of project sign-up. This will provide an opportunity to answer any questions, allow participating landowners to share their experiences thereby helping to convince other landowners to participate by signing cost-share agreements and encourage other residents to adopt appropriate behaviors to reduce or prevent NPS pollution in the watershed. Topics that will be covered at these meetings will be:

- The explanation of nonpoint source pollution and detailed explanations of BMPs needed to reduce pollution problems.
- Program overview; including project sign-up, practice design & installation, and payment procedure.
- Goals and objectives of the watershed plan.
- Administrative rules for the watershed project, including eligibility and cost sharing.

These meetings may be held as part of the annual tour. At the end of signup a meeting will be held in conjunction with an appreciation dinner to honor all those who signed cost share agreements. This meeting will provide an opportunity to thank participants and to provide a status update and report of project success.

Evaluation: Evaluation will be based on attendance and the number of contacts these meetings generate for county staff. If held in conjunction with annual tour a questionnaire will be administered.

Cost: Two public meetings with out tour, at $150 each for a total of $300. Two public meetings with tour (cost in tour), one public meeting in conjunction with meal $2,600

Demonstration Tours

Description: Three sites have been selected for demonstrations; 1) manure storage and handling, 2) lake shoreland stabilization and 3) lake owner nutrient education project. Construction of the first two should be completed in the Fall of 1993, the third will begin implementation this fall and will continue throughout project implementation. Tours of these BMP demonstrations will allow landowners to observe BMPs first hand with watershed project staff present to answer questions. Meeting landowners who have installed these BMPs will encourage those attending the tour to participate with the project. Three formal well-publicized tours will be held. One tour will be held during the fall of 1993. This will focus on the impact of nonpoint source pollution in the watershed with a general look at solutions both in the agricultural areas and in the recreational (lakes) areas of the watershed. The purpose of this first tour is to build an awareness and knowledge base. Tours during each year of signup will continue this building on knowledge and will focus on specific audiences. The second tour will have an agricultural focus. The focus of the third tour will be determined by the needs of the project with suggestions by the citizen advisory committee. At least one of these tours will include a well abandonment demonstration. The tours will be conducted jointly by the Adams, Marquette and Columbia County LCDs.

Evaluation: A questionnaire will be distributed to every participant to be completed at the end of the tour. It will include short answer knowledge questions and questions on quality of activities which use a Likert-like rating of 1 - 5 with 5 being high. After the completion of each tour staff will do a self evaluation to discuss how to improve the next tour and additional suggestions for program modification.

Cost: Three tours at $1,700 each for a total of $5,100.

Nutrient and Pest Management Field Days

Description: Nutrient and pest management field days will be held annually to address identified and potential nonpoint source surface and groundwater contamination from agricultural sources. The UWEX Nutrient and Pest Management (NPM) program will develop the demonstrations and take the lead on organizing the field days in cooperation with the Neenah Creek Priority Watershed Project. NPM staff will develop field plots demonstrating exemplary management of manure and other crop production inputs on one or two farms each year. Efforts will be made to locate these farms within the watershed.

Field days will be held annually to allow the public to view the results and learn about the practices. Some of the field days may be held jointly with the Priority Watershed annual demonstration tour. The NCPW project in order to encourage participation in this event will host a portion of the day, perhaps by supplying a light meal. Methods for encouraging participation will be analyzed annually to determine the most effective available.

Evaluation: An economic evaluation of the implemented practices will be done by NPM annually for each participating farm. Increases in awareness and adoption of the demonstrated practices on the cooperating farms and its impact on landowners within the watershed may be evaluated through the Farm Practices Inventory (FPI) survey or a survey developed by county staff and UWEX area agent. See Project Evaluation at end of I&E strategy.

Cost: Two field days per year for eight years at $100 each, total of $1,600.

BMP Installation Videotapes

Description: Each LCD office will record through photos and videotapes before and after conditions at participating sites. These materials will be used as part of staff information packets. They will also be used to increase knowledge of the project and to develop a positive attitude toward it at Land Conservation Committee and county board meetings. These items will also be used during tours and at meetings as appropriate. Adams County has a video camera available for their staff's use, Columbia County anticipates acquiring one and Marquette County will either borrow one from other county sources or will work with Adams County to have their sites videotaped.

Evaluation: Subjective evaluation will be based on the perceived increased understanding of the project and of the problem of nonpoint source pollution by LCC and county boards.

Cost: $100 for materials

Demonstration Fact Sheet

Description: A fact sheet will be prepared for each demonstration site. It will include the before and after photos, project explanation, an outline of costs, and the cost sharing breakdown. This will be done when the practice is completed and the necessary information is available. The fact sheet will be developed by the appropriate county LCD with assistance from UWEX.

Evaluation: No formal separate evaluation planned.

Cost: $50 for printing.

Lake Fact Sheet

Description: A fact sheet will be developed for each major lake. This will include ecological, historical and environmental information. The major focus will be on the NPS impacts, sources and solutions, especially in relation to individual responsibility.

Evaluation: No separate evaluation planned.

Cost: $150

Project Display

Description: A display has been designed for the inventory stage of the project. It will be updated as the project moves through signup and implementation. This display can be used in banks, schools and co-ops and will highlight area nonpoint source pollution problems and solutions. In addition one panel displays will be developed for use at local restaurants, campgrounds and resorts.

Evaluation: No separate evaluation planned.

Cost: $200 for one panel displays plus a portion of the photography budget for updated photographs.

Presentation

Description: A presentation on nonpoint source pollution and the project will be created using local slides. The presentation will be used at meetings and talks given to the project's targeted audiences. The slide presentation will be completed by the Adams County LCD. Either county or UWEX staff will provide a construction erosion presentation to county and town boards as requested. Other presentations on specific topics will also be made as requested.

Evaluation: Presentations will be evaluated as part of tour and meeting evaluations.

Cost: Photographic costs included in general photography budget ($2,000 total for all uses over project life).

Staff Informational Packets

Description: One-on-one contact between landowners and staff is an important component of our I&E strategy, especially with the agricultural community. Each county staff person will receive a binder of information that they can use when talking to individual landowners. The binder will contain before and after pictures of BMPs, other educational charts and drawings, such as distance manure or sediment can travel over different slopes and the impact of wind

erosion on water quality, press releases, and other useful information for landowners. This packet will be developed by Adams County LCD with assistance from UWEX and the DNR NPS Implementation Coordinator.

Evaluation: County staff will annually evaluate usefulness of packet; making changes and updates. Evaluation of the one-on-one contacts will be evidenced in the numbers of cost-share agreements signed.

Cost: 5 packets at $30 each for a total of $150.

Stream Identification Road Crossing Signs

Description: Signs identifying the name of streams being crossed by county and state highways at up to sixteen locations within the watershed will be ordered and placed on bridges.

Evaluation: No separate evaluation planned.

Cost: 16 signs at $20 each for a total of $320.

Residential Clean Water Workshop

Description: During each year of signup a residential home and yard care workshop will be offered. The purpose of the workshop will be to educate home owners, especially lake residents, about the problems and solutions to NPS water pollution. Home owners will learn the best methods of reducing pollution from their homes including fertilizer and pesticide use, water infiltration practices, composting, septic system education, and home hazardous waste reduction. People who complete the workshop will receive a certificate and a small plastic sign for display in their yard that identifies them as supporting clean water.

Evaluation: Each workshop will be evaluated by means of a questionnaire using both Likert-like scales of 1-5 with 5 being high and short answer evaluation questions.

Cost: Five workshops at $200 each for a total of $1,000.

Watershed Signs

Description: Each landowner that signs a cost-share agreement will receive a sign with the Neenah Creek Logo and the inscription "Cooperator". These will be available in two sizes, we expect that agricultural landowners will want the larger (3' x 3') sign and lake property owners will desire the smaller (1' x 1') sign. In addition any person living in the watershed who demonstrates a willingness to improve water quality through personal actions can receive the smaller sign.

Evaluation: Evaluation will be based on the interest of landowners in displaying signs.

Cost: 60 cooperator signs at $15 each for a total of $900, 400 supporting clean water signs at $2.50 each for a total of $1,000.

Citizen Advisory Committee

Description: During the inventory stage of the project an active Citizen Advisory Committee has been established. It is the interest of the group to continue to meet and to provide assistance in the area of information and education to the county staff. As suggested by the Citizens Advisory Committee we will develop materials such as stickers to attach to bait containers, 'clean water supporter' bumper stickers and restaurant placemats. The CAC will also be used to identify appropriate locations and events for the display as well as appropriate methods of distributing UWEX, DNR and DATCP materials.

Evaluation: At the end of signup and again at the end of the project, a random sample of 50% of the active Citizen Advisory Committee members will be called and asked questions concerning there involvement with the program, change in their understanding of the program and methods for improving citizen involvement in watershed activities.

Cost: 23 meetings at an average cost of $30 for a total cost of $690. Funds for CAC generated awareness activities, $900.

Youth Education and Wisconsin WAV

Description: Local county staff will identify and work with at least one local youth group, school class or conservation group to participate in the Wisconsin WAV (Water Action Volunteers), formally known as the Adopt a Stream Program and/or with the UWEX Adopt a Lake Program. As appropriate to the group they will monitor the stream/lake, participate in stream walks and/or work on habitat improvement. County staff will also act as a resource to local schools and youth groups providing information on the project, nonpoint source pollution and groundwater education.

Evaluation: Students or groups involved in extensive activities with the watershed project will be asked to evaluate their involvement. Teachers will be asked to fill in an evaluation form after the completion of any program involving more than one class period.

Cost: $400 for Groundwater Model, $600 for chemical and physical water quality monitoring equipment for a total cost of $1,000.

Evaluation of Information & Education Program

Since the education component of this project is complex and pervasive many items could not be evaluated on there own. We suggest using the following criteria for evaluating the effectiveness of the I&E strategies.

Number of Cost Share Agreements signed.
Improved practices around lakes and homes.
Improved farm practices without a cost share agreement.

In order to obtain information on the last two components we would like to survey residents during the first year of signup and again at the completion of the project. Our preference is that the DNR and UWEX include Neenah Creek in the contract for the Farm Practices Inventory, Lake Property Practices Inventory and Non-farm Homeowners Practices Inventory (names of inventories may not be accurate). If that is not possible we would like to develop our own inventory instrument to be administered by county staff during one of their first two visits to agricultural landowners and through mail surveys to non-farm residents. Upon completion of the project a second survey would be completed, best method for administration of the survey to be determined at that time.

Cost: For survey administered by county staff, $2,000 for both pre and post survey.

Summary of Previously Completed I & E Tasks

Several I & E activities were completed prior to the implementation stage of the project. They are:

- Watershed Boundary signs.
- Information Packets for CAC members
- Watershed Display for use with local businesses and at county fairs
- Newsletters
- Bookmark for distribution to school groups, at county fairs, etc.
- Project brochure explaining the project; its goals, timetable, etc.
- Purchase of polo shirts, and beverage insulators and other promotional items with logo and phone number
- Neenah Creek Connections; a day of tours and presentations

See table 6-1 for estimated costs of information and education activities.

Table 6-1. Information and Education Budget and Staff Needs

Activity	Total Number	Total Direct Costs	Required Staff Hours	
			Years 1-3	Years 4-8
Newsletters	19	$ 9,500	540	600
News Releases	11	600	48	40
Radio Announcements	1	800	36	40
CAC Meetings	23	690	80	48
Demonstration Tours	3	5,100	160	90
Public Meetings	5	2,900		
BMP Installation Video	1	100	50	0
Demonstration Fact Sheets	6	200	100	0
Project Display	1	200	80	0
Presentation	1	60	80	40
Cooperator Signs	60	900	130	15
Supporter Signs	400	1,000	30	0
Residential Clean Water Workshop	5	1,000	60	0
Awareness Activities	3	900	60	0
Staff Informational Packets	5	150	24	0
NPM Field Days	16	1,600	270	120
Photography		2,000	50	20
Stream Identification Road Signs	16	320	32	0
Groundwater Model	1	400	60	60
Water Quality Monitoring Equipment	1 set	600	60	100
Survey	2	2,000	400*	400*
Totals		31,020	2,350	1,573

* In conjunction with farm visits

Note: Budget is based on availability of funds.

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. The fishery manager should be consulted for input in the design of each streambank protection BMP, including easements.

Wetland Restoration

Significant amounts of restorable wetland areas exist in this watershed. This is especially so for the floodplain areas along Neenah Creek and in the Big Slough subwatershed. 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.

These wetlands (existing and restorable) were identified in the wetlands inventory conducted by the Adams, Marquette and Columbia County Land Conservation Departments (LCDs). 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.

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.

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 in the watershed:

- All of Big Spring and its tributaries.
- All of the upper portion of Neenah Creek is already a DNR Fisheries Area, eligible for acquisition through that program.

Additional streams, including Widow Green Creek, 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 Chapter 2 of the plan. To the best extent possible, every effort should be made to protect these species. If specific 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 Chapter Two. Known archaeological sites within the Neenah Creek Watershed, will need

special consideration when structural best management practices are being considered. Settling basins, manure storage structures, and streambank or shoreline shaping and riprapping are likely practices that may impact archaeological sites.

Coordination with State and Federal Conservation Compliance Programs

The Neenah Creek 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 Soil Conservation Service.

Coordination with the Lake Associations and Lake Districts

Of the 21 lakes in the Neenah Creek Watershed, 4 have active Lake Associations or Lake Districts. These citizen organizations are mainly concerned about the quality of water in their lakes. A consultant paid by the Lake Mason Association has been an active member of the watershed project team. Several lakeshore residents have also been active on the Neenah Creek Citizen Advisory Committee.

Neenah Creek Watershed staff will continue to update Lake Associations on the status of the watershed project, through mailings to lakeshore residents, attendance at board meetings and public meetings. Fact sheets and other educational materials aimed at landowners around the lakes will be distributed.

CHAPTER EIGHT
Project Evaluation

Introduction

This chapter briefly summarizes the plan for monitoring the progress and evaluating the effectiveness of the Neenah Creek Watershed Project. The evaluation strategy includes these components:

- Administrative review.
- Pollution reduction evaluation.

Information on these components will be collected by the Adams, Marquette and Columbia County Land Conservation Departments and reported on a regular basis to the DNR and the DATCP. Additional information on the numbers and types of practices on cost-share agreements; funds encumbered on cost-share agreements, and funds expended will be provided by the DNR's Bureau of Community Assistance.

Administrative Review

The first component, the administrative review, will focus on the progress of Adams, Marquette and Columbia 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 Computer Assisted Management and Planning System, called CAMPS, is a computer data management system that has been developed by the U.S. Soil Conservation Service (SCS). The SCS, the DNR and the DATCP use CAMPS to meet the accomplishment reporting requirements of all three agencies. The Adams, Marquette and Columbia County Land Conservation Departments will use CAMPS to collect data for administrative accomplishments, and will provide the information to the DNR and the DATCP for program evaluation. As CAMPS is replaced by the Field Office Computer System (FOCS) in 1994/95, accomplishment reporting will also switch to FOCS.

The Adams, Marquette and Columbia County Land Conservation Departments will provide the following data to the DNR and the DATCP on a quarterly 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 quarterly reports, Adams, Marquette and Columbia Counties representatives will meet with the DNR and the DATCP staff annually to review progress and plan for the subsequent year.

2. **Financial Expenditures**

Adams, Marquette and Columbia Counties will provide the following financial data to the DNR and the DATCP on a quarterly basis:

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

Adams, Marquette and Columbia Counties 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**

Adams, Marquette and Columbia Counties will provide time summaries to both departments for the following activities on a quarterly 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 Load 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 water in the Neenah Creek Watershed; upland sediment, and runoff from barnyards and fields spread with manure, and streambank/shoreline erosion.

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 40 percent. To meet this goal, the following is needed:

- 40 percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- 75 percent reduction in streambank sediment delivered to all streams and a 100 percent overall repair of streambank habitat in all subwatersheds.
- 75 percent reduction in shoreline sediment delivered to the lakes.

Phosphorus and Organic Pollutant Goal: Reduce overall phosphorus load by 40 percent. To meet this goal, the following is needed:

- 75 percent reduction in organic pollutants from barnyards in all subwatersheds.
- 40 percent reduction in organic pollutants from winterspread manure on "unsuitable" acres in all subwatersheds.
- 30 percent reduction in phosphorus reaching lakes and streams from agricultural uplands in all subwatersheds.

Groundwater Goal:

- Proper abandonment of private wells no longer in use where other NPS control measures are implemented and cost-shared.
- Implementation of Nutrient and Pest Management practices on irrigated vegetable crops.

In addition, this plan calls for a restoration of 10 percent of degraded or prior converted wetlands.

Streambanks and Shoreline

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

Upland Sediment Sources

Adams, Marquette and Columbia County staff will use the WINHUSLE (Wisconsin Nonpoint Source) model to estimate sediment reductions due to changes in cropping practices. The counties will use CAMPS/FOCS to provide data for the WINHUSLE model on a quarterly basis, as described above.

It may be useful to evaluate uplands on a subwatershed basis, as the greatest water quality improvements might be seen in the smaller drainage areas and in specific water bodies. For ease of running the WINHUSLE inventory model, Adams County was responsible for UN, JL, WG and ML subwatersheds; Marquette County ran OL, CL, MN and BS subwatersheds; and Columbia County ran the model for LN and BS subwatersheds.

Barnyard Runoff

Adams, Marquette and Columbia Counties 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 CAMPS.

NOTE: In the event that CAMPS is replaced, the replacement system will be used for all project tracking.

CHAPTER NINE
Water Resource 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 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 when 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. County staff 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 one 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.

Neenah Creek Watershed

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 2003.

Southern and North Central District staff recommend 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 and Lakes

  Monitoring will follow the five year basin assessment schedule and will include the same types of monitoring outlined in the Neenah Creek Appraisal Report (Marshall, 1991). This monitoring approach should detect habitat and surface water quality improvements, especially where they are significant. Monitoring will occur only in subwatersheds where significant Best Management Practice Installation has occurred. Long term monitoring of specific lakes will continue through the Self-Help Monitoring Program.

Special Projects Approach

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

- A reference site, where few, if any management practices are implemented, will be selected within the Neenah Creek Watershed or Lower Rib River Watershed. (Note: This site will have similar characteristics as one of the above sites.)

These stream reaches will be evaluated using a combination of two methods. **In-stream fish habitat** will be monitored using a technique developed by Simonson and Lyons (Evaluation Monitoring of Stream Habitat During Priority Watershed Projects, Draft, Tim Simonson, John Lyons, May 1992). This method measures the physical characteristics of a stream before and after best management practices are installed and therefore should show improvements in stream habitat. **Changes or improvements in fish communities** will be monitored using the Index of Biotic Integrity (IBI), a technique developed by Karr (1981), but adapted to warm-water streams of Wisconsin by Lyons (1992). The IBI is a bio-assessment/bio-monitoring technique that allows attributes of fish communities to be used to assess biotic integrity and environmental quality of streams and rivers (Lyons 1992). IBI scores are calculated (table 9-1) and range from excellent to very poor. Again this technique assumes that improvement in fish habitat and water quality brought about by improved watershed management, will cause changes in fish communities.

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.

Table 9-1. Guidelines for interpreting overall IBI scores (modified from Karr et al. 1986)

Overall IBI Score	Biotic Integrity Rating	Fish Community Attributes
100-65	Excellent	Comparable to the best situations with minimal human disturbance; all regionally expected species for habitat and stream size, including the most intolerant forms, are present with a full array of age and size classes; balanced trophic structure.
64-50	Good	Species richness somewhat below expectation, especially due to the loss of the most intolerant forms; some species, especially top carnivores, are present with less than optimal abundances or size/age distributions; trophic structure shows some signs of imbalance.
49-30	Fair	Signs of additional deterioration include decreased species richness, loss of intolerant forms, reduction in simple lithophils, increased abundance of tolerant species, and/or highly skewed trophic structure (e.g., increasing frequency of omnivores and decreased frequency of more specialized feeders); older age classes of top carnivores rare or absent.
29-20	Poor	Relatively few species; dominated by omnivores, tolerant forms, and habitat generalists; few or no top carnivores or simple lithophilous spawners; growth rates and condition factors sometimes depressed; hybrids sometimes common.
19-0	Very Poor	Very few species present, mostly exotics or tolerant forms of hybrids; few large or old fish; DELT fish (fish with deformities, eroded fins, lesions, or tumors) sometimes common.
No score	Very Poor	Thorough sampling finds few or no fish; impossible to calculate IBI.

Legend
IBI - Index of Biotic Integrity

BIBLIOGRAPHY

Atkinson, R. 1992. Lake Mason Adams and Marquette Counties Inventory and Lake Management Plan. Unpublished.

Ball. J. 1982. "Stream Classification Guidelines for Wisconsin." Unpublished Draft Technical Bulletin, Department of Natural Resources. 13 pages.

Clayton, Lee. 1987. Pleistocene Geology of Adams County, Wisconsin, Wisconsin Geological and Natural History Survey Information Circular 59, University of Wisconsin-Extension. 14 pages.

Harr, C. A., L. C. Trotta, and R. G. Borman. 1978. Groundwater Resources and Geology of Columbia County, Wisconsin, USGS and WGNHS Information Circular Number 37, University of Wisconsin Extension. 30 pages.

Hilsenhoff, W. 1982. "Using a Biotic Index to Evaluate Water Quality in Streams." Wisc. Department of Natural Resources. Technical Bulletin 132.

Lippelt, I. D. and R. G. Hennings. 1981. Irrigable Lands Inventory - Phase 1 Groundwater and Related Information, WGNHS Miscellaneous Paper 81-1, University of Wisconsin Extension.

Midwest Plan Service. 1985. Livestock Waste Facilities Handbook. 109 pages.

Oberhofer, M., Shaw, B., Kruger, J., Hurley, E. 1993. Wind Erosion Impacts on Water Quality in the Sand Plain of Central Wisconsin. 197 pages.

Schenck, T., Herman, L. 1992. Neenah Creek Priority Watershed Project Water Resources Appraisal Report. Unpublished.

Sharps, S. 1988. Adams County Erosion Control Plan. 56 pages.

Simonson, Dan. 1992. Personal Communication, DNR.

Wedepohl, Richard. 1993. Personal Communication, DNR.

Wisconsin Department of Natural Resources. 1990. Upper Fox River Basin Water Quality Management Plan. PUBL WR-225-90 REV. Department of Natural Resources.

Wisconsin. 1981. *Big Green Lake Priority Watershed Plan*. 48 pages.

APPENDIX A
Watershed Planning Methods

This chapter describes the steps and procedures used to prepare this plan. These are:

- Evaluating water quality and aquatic habitat.
- Assessing pollution sources.
- Establishing water resource objectives.
- Establishing pollution reduction goals.
- Developing a nonpoint source control strategy.
- Involving the public and local units of government.

Evaluating Water Quality and Aquatic Habitat

The Department of Natural Resources (DNR) is responsible for: designating the biological and recreational uses that surface waters can support under proper management; prescribing the water quality required to sustain these designated uses; and indicating the methods to implement, achieve and maintain those conditions.

The DNR's Southern and North Central District Water Resources Management staff conducted investigations of the existing quality and natural resource conditions for streams and lakes during 1991-1992. Their purpose was to evaluate water quality problems and establish a basis for setting water resources management objectives. Detailed assessment results are documented in water resource appraisal reports.

Data Collection

The following is a summary of the five elements comprising the water quality and aquatic habitat investigation.

Subwatershed Delineation and Stream Segmentation

Prior to collecting field data, the watershed was divided into 10 hydrologic subwatersheds. This was accomplished using 1985 1"=400' scale aerial photographs and 1"=2,000' (7.5 minute) U.S. Geological Survey quadrangle maps. These maps were also used to divide the perennial and intermittent stream network into segments. Stream segments were used to separate portions of waterways where either natural conditions or human-induced changes resulted in pronounced differences in stream character and/or water quality.

Stream Habitat Evaluation

Information characterizing stream habitat—including flow rate and depth, substrate quality, channel configuration, stability, and water temperature—were collected using techniques that the DNR developed. The data were evaluated using DNR's Stream Classification Guidelines (Ball, 1982).

Water Quality Assessment

Surface water quality was assessed through review of historical water chemistry data and an evaluation of bottom dwelling animals (macroinvertebrates) using the Hilsenhoff Biotic Index (Hilsenhoff, 1982). Extensive bacteria (fecal coliform) surveys were conducted to assess the suitability of surface waters for recreational use. Private well samples were collected and analyzed for nitrate + nitrite and triazine herbicides. Analytical data were used to assess the quality of groundwater in the watershed.

Fisheries Resource Assessment

Fish communities were assessed qualitatively using a combination of historical data and information collected during this investigation. Resident fish populations in the streams, lakes, and impoundments were sampled using seines and electric shocking equipment.

Navigability and Recreational Use Determinations

The extent and degree to which streams are navigable was determined based on evidence of canoeing or boating, field data including evidence of stream alteration or use, and information that landowners or other local experts provided. Recreational uses were determined through field observations, file data and information from local users.

Data Interpretation

The data described above were used to determine the existing and potential biological and recreational uses for surface waters. The existing uses reflect present biological and recreational conditions. Potential uses reflect biological and recreational conditions that could be achieved under prescribed types and levels of management. Even though existing

and potential uses of a surface water are the same, management programs can result in significant changes in the quality of the aquatic environment. Use classifications and supporting water quality standards used in evaluating water resource conditions are discussed below.

Biological Stream Use Classification

Biological stream use classes describe the fish species or other aquatic organisms which a stream system supports. Designation is based on the ability of a stream to provide suitable habitat and water quality conditions for fish and other aquatic life. The following biological stream use classification system was used statewide and was applied to surface waters in the Neenah Creek Watershed.

COLD= Cold Water Communities include surface waters capable of supporting a community of cold water fish and other aquatic life or serving as a spawning area for cold water fish species.
WWSF= Warm Water Sport Fish Communities include surface waters capable of supporting a community of warm water sport fish and/or serving as a spawning area for warm water sport fish.
WWFF= Warm Water Forage Fish Communities include surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.
LFF= Limited Forage Fish Communities

Discussions also include the "class" of trout streams based on the publication "Wisconsin Trout Streams" [DNR Publ. 6-3600(80)] and Outstanding/Exceptional Resource Waters, Wisconsin Administrative Code NR 102.20 and NR 102.11.

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

Recreational Stream Use Classification

Recreational stream use classifications are described by a level of human body contact determined to be safe and reasonable. The system applies to all surface waters including those categorized as intermediate or marginal under the above referenced biological use

classification system. Three designations are used under the recreational stream classification system. These designations are full body contact, partial body contact, and noncontact.

Full Body Contact

These waters are used for human recreation where immersion of the head is expected and occurs often. Recreation activities classified as full body contact include swimming, waterskiing, sailboarding and other similar activities.

Partial Body Contact

These waters are used for human recreation where immersion of the head is not frequent and contact is most often incidental or accidental. Recreational activities classified as partial body contact include boating, canoeing, fishing and wading.

Noncontact

These waters should not be used for human recreation. This category is used infrequently when extenuating circumstances such as high concentrations of in-place pollutants, an uncontrollable pollution source, or other conditions dictate that contact with the water would be an unnecessary health risk.

Water Quality Standards and Criteria

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

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

Additional information used to assess the suitability of surface waters for biological uses includes recommended maximum nutrient levels, suspended solids concentrations and the extent to which streambeds are clogged with sediment.

Groundwater quality standards for substances of public health concern and public welfare concern are contained in Chapter NR 140 Wisconsin Administrative Code. The enforcement standards (ES) and preventative action limits (PAL) are defined in Chapter Two. If well sample results exceeded the nitrate + nitrite ES, owners were sent a notice warning them that infants under six months and pregnant women should not drink the well water. At

nitrate + nitrite levels greater than 40 mg/L, owners are eligible to apply for well compensation funds from the Bureau of Water Supply.

If well sample results using the triazine screen exceeded 1 μg/L, wells were resampled and analyzed specifically for atrazine and it's metabolites. This was free of charge and on a voluntary basis by the Bureau of Water Supply who assisted well owners in obtaining a clean water supply.

Assessing Pollution Sources

The purpose of the pollution source assessment is to identify the rural and urban sources and quantities of pollutants impacting surface waters. Rural and urban pollutant sources assessed for this watershed are discussed below.

Rural Nonpoint Sources

Excessive quantities of sediment, nutrients, oxygen demanding substances, pesticides and bacteria are pollutants carried in runoff draining agricultural areas. These pollutants degrade surface water quality thereby restricting recreational and biological uses. The principal rural nonpoint sources evaluated in preparing this plan include:

- Barnyards and livestock area runoff.
- Eroding uplands delivering sediment to surface waters.
- Eroding, slumping, or trampled streambanks and shorelines.
- Areas contributing runoff of winterspread livestock manure.
- Gullies.
- Wind erosion.

The Adams, Marquette and Columbia County Land Conservation Departments (LCDs) staff conducted inventories in 1991. The DNR in cooperation with the DATCP and the LCDs staff completed the data analyses. Inventory and evaluation procedures are summarized below.

Barnyard and Livestock Area Runoff

The LCDs staff mapped the locations of 58 barnyards in the watershed on 1985 1"=400' scale aerial photographs. A field survey of each barnyard was conducted to collect information needed to determine its pollution potential.

The barnyard data was used in the "BARNY" Model (Baun, 1992), a modification of the animal lot runoff model, which the U.S. Department of Agriculture, Agricultural Research Service developed (Young, 1982). Information about the mass loading of total phosphorus annually was generated to evaluate the relative pollution potential of each barnyard. The livestock operations were ranked according to their potential to impact surface and/or groundwater quality.

Upland Erosion and Sediment Delivery

The LCDs staff conducted the inventory on the entire watershed, 169 square miles, using existing data and field investigations. Cropland, pastures, grasslands, woodlands, wetlands and other open (non-urban) land uses were investigated. Existing data sources included site specific farm conservation plans, 1"=400' scale aerial photographs, and SCS Survey 1"=2,000' scale quadrangle maps. The information obtained for each parcel included size, soil type and erodibility, slope percent and length, land cover, crop rotation, present management, overland flow distance and destination, channel type and receiving water.

Upland erosion and sediment delivery was determined using the Wisconsin Nonpoint Source (WINHUSLE) Model (Baun & Snowden, 1992). The WINHUSLE model calculates the average annual quantity of eroded soil reaching surface waters from each farm field. The determination is made based on a "typical" year of precipitation. Estimated sediment delivery was used to assess the relative pollution potential of each farm field in the watershed.

Streambank and Shoreline Erosion

The LCDs staff conducted field surveys on about 117 miles of perennial and intermittent streams and 4 miles of lakeshore. The method used is a modification of the streambank erosion analysis included in Phase II of the Land Inventory Monitoring process used by the U.S. Department of Agriculture, Soil Conservation Service. At locations where erosion was occurring, the following information was recorded:

- Length of trampled or eroding bank.
- Vertical height.
- Estimated annual rate of recession.
- Adjacent land uses.
- Potential management measures.

The amount of sediment lost annually was calculated for each erosion site. In addition, areas adjacent to streams impacted by livestock, but which were not necessarily eroding at a high rate, were also noted.

Runoff from Areas Winterspread with Livestock Waste

This analysis was done to estimate the pollution potential associated with winterspreading livestock waste in the watershed. The information collected for the barnyard and upland erosion surveys was used in this evaluation.

This analysis was completed using a three-step process. First, the number of acres that each livestock operation needed to landspread manure was calculated for a six-month period approximating when manure cannot be incorporated into the ground because of frozen or saturated conditions. The amount of manure that each operation generated was based on the number and type of livestock.

Second, the land available to each livestock operation for winterspreading was characterized according to its environmental sensitivity. Lands having slopes equal to or greater than six percent or located within the floodplain were considered to have a high potential to deliver landspread manure to lakes and streams during periods of spring thaw.

Third, the number of sensitive acres winterspread with manure was estimated for each livestock operation based on the number of acres needed for winterspreading and the proportion of lands available to the livestock operation determined to be environmentally sensitive. This number was used to indicate the relative pollution potential of each livestock operation due to runoff of winterspread manure.

Wind Erosion

This analysis was based on "Wind Erosion Impacts on Water Quality in the Sand Plain of Central Wisconsin" (Oberhofer, 1993) and the Adams County Erosion Control Plan (1987)

Other Pollution Sources

Additional sources of surface water pollution beyond those discussed in this plan are degrading water quality in the watershed. These pollution sources have the potential of overshadowing improvements in water quality that might otherwise occur as a result of the priority watershed program.

The DNR conducted an inventory and evaluation of these other pollution sources. Inventory results and recommendations for alleviating the water quality impacts of these other pollution sources are documented in Chapter Four of this plan.

In addition, the DATCP, the DNR, and the UWEX are cooperatively working through a technical committee to define fertilizer and pesticide use guidelines to minimize threats to

surface and groundwater quality. The results will be applicable statewide and will be incorporated into this watershed project when available.

Establishing Water Resource Objectives

Recreational and biological water resource objectives were established for each of the streams and lakes in the watershed. These objectives identify how the project is anticipated to change the quality of the aquatic environment for recreational and biological uses. Factors considered in establishing water resource objectives include: existing water quality and aquatic habitat; factors or pollutants that may be preventing the surface water from reaching its full potential of supporting biological and recreational uses; and the practicality of reducing pollutants.

Establishing Pollution Reduction Goals

Nonpoint pollution reduction goals are estimates of the level of nonpoint source control needed to meet the water quality and recreational use objectives identified in this plan. Pollution reduction goals and water resource objectives are established together since they are integrally related.

The nonpoint source pollution reduction goals in this plan specifically target the control of sediment and phosphorus in rural areas. Importantly, reducing the quantity of these substances reaching surface waters and groundwater decreases the amount of other substances such as pesticides and bacteria which degrade water quality.

Developing a Nonpoint Source Management Strategy

The final step in the planning process is the development of a strategy for achieving the nonpoint source pollution reduction goals identified in the plan. Several items are addressed in developing the management strategy including:

- Critical nonpoint pollution sources.
- Effective management practices and guidelines for use of state cost-share funds for practice installation.
- Responsibilities, estimated workloads and work schedules for local implementing agencies, and guidelines for use of state funds to support local implementation activities.

- Estimated cost of installing practices and supporting staff at the local level.

- Information and education needs.

- Project evaluation needs.

Identification of critical nonpoint sources eligible for cost share and technical assistance under the Nonpoint Source Water Pollution Abatement (NPS) Program were determined by:

- Evaluating pollutant loading for each nonpoint source in each subwatershed.

- Determining the relative importance of controlling each source (barnyards, urban runoff, cropland erosion, etc.) to achieving the water resource objectives.

- Developing criteria to determine which sources need to be controlled.

- Applying the criteria to determine eligibility for participation in the priority watershed project.

This evaluation was carried out on a subwatershed and watershed basis for the nonpoint sources. The result is a site specific ranking of nonpoint sources and a determination of financial and technical assistance to be made available through the nonpoint source program for the control of NPS pollution.

Involving the Public and Local Units of Government

The DNR convened an advisory subcommittee and several technical work groups to assist in preparing this watershed plan. The advisory subcommittee contains representatives from lake associations, lake districts, counties, villages, and towns in the watershed, the UWEX, the DATCP, farmers, environmental groups and interested citizens. This subcommittee primarily provided policy guidance during the planning process and reviewed plan chapters.

Three types of technical work groups were convened to help with developing technical aspects of the plan--a water resource appraisal work group, a land use work group and an information and education work group. These groups reviewed land and water resource assessment information, assisted in developing water resource objectives and pollution reduction goals and assisted in developing the pollution control strategy.

APPENDIX B
Glossary

ACUTE TOXICITY:
Any poisonous effect produced by a single short-term exposure to a chemical that results in a rapid onset of severe symptoms.

ADVANCED WASTEWATER TREATMENT:
The highest level of wastewater treatment for municipal treatment systems. It requires removal of all but 10 parts per million of suspended solids and biological oxygen and/or 50% of the total nitrogen. Advanced wastewater treatment is also known as "tertiary treatment."

AGRICULTURAL CONSERVATION PROGRAM (ACP):
A federal cost-sharing program to help landowners install measures to conserve soil and water resources. ACP is administered by the USDA ASCS through county ACP committees.

ALGAE:
A group of microscopic, photosynthetic water plants. Algae give off oxygen during the day as a product of photosynthesis and consume oxygen during the night as a result of respiration. Therefore, algae effect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:
A form of nitrogen (NH_3) found in human and animal wastes. Ammonia can be toxic to aquatic life.

ANAEROBIC:
Without oxygen.

AREA OF CONCERN:
Areas of the Great Lakes identified by the International Joint Commission (IJC) as having serious water pollution problems.

AREAWIDE WATER QUALITY MANAGEMENT PLANS (208 PLANS):
A plan to document water quality conditions in a drainage basin and make recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

ANTIDEGRADATION:

A policy stating that water quality will not be lowered below background levels unless justified by economic and social development considerations. Wisconsin's antidegradation policy is currently being revised to make it more specific and meet EPA guidelines.

AVAILABILITY:

The degree to which toxic substances or other pollutants are present in sediments or elsewhere in the ecosystem and are available to affect or be taken up by organisms. Some pollutants may be "bound up" or unavailable because they are attached to clay particles or are buried by sediment. Oxygen content, pH, temperature and other conditions in the water can affect availability.

BACTERIA:

Single-cell, microscopic organisms. Some can cause disease, but others are important in organic waste stabilization.

BARNY:

The Wisconsin Barnyard Runoff Model, a computer model used to assess the water quality impacts of barnyards or feedlots. It was developed by DNR with assistance from SCS and DATCP.

BASIN PLAN:

See "Areawide Water Quality Management Plan".

BENTHIC ORGANISMS (BENTHOS):

Organisms living in or on the bottom of a lake or stream.

BEST MANAGEMENT PRACTICE (BMP):

The most effective, practical measures to control nonpoint sources of pollutants that runoff from land surfaces.

BIOACCUMULATION:

The uptake and retention of substances by an organism from its surrounding medium and food. As chemicals move through the food chain, they tend to increase in concentration in organisms at the upper end of the food chain such as predator fish, or in people or birds that eat these fish.

BIOASSAY STUDY:

A test for pollutant toxicity. Tanks of fish or other organisms are exposed to varying doses of treatment plant effluent. Lethal doses of pollutants in the effluent are then determined.

BIOCHEMICAL OXYGEN DEMAND (BOD):

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. BOD_5 is the biochemical oxygen demand measured in a five day test. The greater the degree of pollution, the higher the BOD_5.

BIODEGRADABLE:

Waste that can be broken down by bacteria into basic elements. Most organic wastes such as food remains and paper are biodegradable.

BIOTA:

All living organisms that exist in an area.

BUFFER STRIPS:

Strips of grass or other erosion-resisting vegetation between disturbed areas and a stream or lake.

BULKHEAD LINES:

Legally established lines that indicate how far into a stream or lake an adjacent property owner has the right to fill. Many of these lines were established many years ago and allow substantial filling of the bed of the river and bay. Other environmental laws may limit filling to some degree.

CAMPS:

Computer Assisted Management and Planning System, a computer data management system that has been developed by the U.S. Soil Conservation Service (SCS). In 1994-95 CAMPS will be updated to FOCS, Field Office Computer System.

CARCINOGENIC:

A chemical capable of causing cancer.

CATEGORICAL LIMITS:

All point source discharges are required to provide a basic level of treatment. For municipal wastewater treatment plants this is secondary treatment (30 mg/1 effluent limits for SS and BOD). For industry the level depends on the type of industry and the level of production. More stringent effluent limits are required, if necessary, to meet water quality standards.

CHLORINATION:

The application of chlorine to wastewater to disinfect it and kill bacteria and other organisms.

CHLORORGANIC COMPOUNDS (CHLORORGANICS):

A class of chemicals that contain chlorine, carbon and hydrocarbon. This generally refers to pesticides and herbicides that can be toxic. Examples include PCB's and pesticides such as DDT and dieldrin.

CHRONIC TOXICITY:

The effects of long-term exposure of organisms to concentrations of a toxic chemical that are not lethal, but is injurious or debilitating in one or more ways. An example of the effect of chronic toxicity is reduced reproductive success.

CLEAN WATER ACT:

See "Public Law 92-500."

COMBINED SEWERS:

A wastewater collection system that carries both sanitary sewage and stormwater runoff. During dry weather, combined sewers carry only wastewater to the treatment plant. During heavy rainfall, the sewer becomes swollen with stormwater. Because the treatment plant cannot process the excess flow, untreated sewage is discharged to the plant's receiving waters, i.e., combined sewer outflow.

CONFINED DISPOSAL FACILITY (CDF):

A structure built to contain and dispose of dredged material.

CONGENERS:

Chemical compounds that have the same molecular composition, but have different molecular structures and formula. For example, the congeners of PCB have chlorine located at different spots on the molecule. These differences can cause differences in the properties and toxicity of the congeners.

CONSERVATION TILLAGE:

Planting row crops while only slightly disturbing the soil. In this way a protective layer of plant residue stays on the surface. Erosion rates decrease.

CONSUMPTION ADVISORY:

A health warning issued by WDNR and WDHSS that recommends people limit the fish they eat from some rivers and lakes based on the levels of toxic contaminants found in the fish.

CONTAMINANT:

Some material that has been added to water that is not normally present. This is different from a pollutant, which suggests there is too much of the material present.

CONVENTIONAL POLLUTANT:

Refers to suspended solids, fecal coliforms, biochemical oxygen demand, and pH, as opposed to toxic pollutants

COST-EFFECTIVE:

A level of treatment or management with the greatest incremental benefit for the money spent.

CRITERIA:

See water quality standard criteria.

DATCP:

U.S. Department of Agriculture, Trade and Consumer Protection

DDT:

A chlorinated hydrocarbon insecticide that was banned because of its persistence in the environment.

DIOXIN (2,3,7,8-tetrachlorodibenso-p-dioxin):

A chlorinated organic chemical which is highly toxic.

DISINFECTION:

A chemical or physical process that kills organisms that cause disease. Chlorine is often used to disinfect wastewater.

DISSOLVED OXYGEN (DO):

Oxygen dissolved in water. Low levels of dissolved oxygen cause bad smelling water and threaten fish survival. Low levels of dissolved oxygen often result from inadequate wastewater treatment. The Department of Natural Resources considers 5 ppm DO necessary for fish and aquatic life.

DREDGING:

Removal of sediment from the bottom of water bodies.

ECOSYSTEM:

The interacting system of a biological community and its nonliving surrounding.

EFFLUENT:

Solid, liquid or gas wastes (byproducts) that are disposed on land, in water or in air. As used in the RAP, effluent generally means wastewater discharges.

EFFLUENT LIMITS:

The Department of Natural Resources issues WPDES permits establishing the maximum amount of pollutant to be discharged to a receiving stream. Limits depend on the pollutant and the water quality standards that apply for the receiving waters.

EMISSION:

A direct (smokestack particles) or indirect (busy shopping center parking lot) release of any contaminant into the air.

ENVIRONMENTAL PROTECTION AGENCY (USEPA):

The federal agency responsible for enforcing federal environmental regulations. The Environmental Protection Agency delegates some of its responsibilities for water, air and solid waste pollution control to state agencies.

ENVIRONMENTAL REPAIR FUND:

A fund established by the Wisconsin Legislature to deal with abandoned landfills.

EPIDEMIOLOGY:

The study of diseases as they affect populations rather than individuals, including the distribution and incidence of a disease mortality and morbidity rate, and the relationship of climate, age, sex, race and other factors. EPA uses such data to establish national air quality standards.

EROSION:

The wearing away of the land surface by wind or water.

EUTROPHIC:

Refers to a nutrient-rich lake. Large amounts of algae and weeds characterize a eutrophic lake (see also "Oligotrophic" and "Mesotrophic").

EUTROPHICATION:

The process of nutrient enrichment of a lake loading to increased production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

FACILITY PLAN:

A preliminary planning and engineering document that identifies alternative solutions to a community's wastewater treatment problems.

FECAL COLIFORM:

A group of bacteria used to indicate the presence of other bacteria that cause disease. The number of coliform is particularly important when water is used for drinking and swimming.

FISHABLE AND SWIMMABLE:

Refers to the water quality goal set for the nation's surface waters by Congress in the Clean Water Act. All waters were to meet this goal by 1984.

FLOURANTHENE:

A polyaromatic hydrocarbon (PHA) with toxic properties.

FLY ASH:

Particulates emitted from coal burning and other combustion, such as wood burning, and vented into the air from stacks, or more likely, collected by electrostatic precipitators.

FOOD CHAIN:

A sequence of organisms where each uses the next as a food source.

FURANS (2,3,7,8-tetra-chloro-dibenzpfurans):

A chlorinated organic compound which is highly toxic.

GREEN STRIPS:

See buffer strip.

GROUNDWATER:

Underground water-bearing areas generally within the boundaries of a watershed, which fill internal passageways of porous geologic formations (aquifers) with water that flows in response to gravity and pressure. Often used as the source of water for communities and industries.

HABITAT:

The place or type of site where a plant or animal naturally lives and grows.

HEAVY METALS:

Metals present in municipal and industrial wastes that pose long-tern environmental hazards if not properly disposed. Heavy metals can contaminate ground and surface waters, fish and other food stuffs. The metals of most concern are: arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and zinc (see also separate listings of these metals for their health effects).

HERBICIDE:

A type of pesticide that is specifically designed to kill plants and can also be toxic to other organisms.

HYDROCARBONS:

Any chemical of a large family of chemicals containing carbon and hydrogen in various combinations.

INCINERATOR:

A furnace designed to burn wastes.

INFLUENT:

Influent for an industry would be the river water that the plant intakes for use in its processing. Influent to a municipal treatment plant is untreated wastewater.

IN-PLACE POLLUTION:

As used in the RAP, refers to pollution from contaminated sediments. These sediments are polluted from post discharges from municipal and industrial sources.

INTERNATIONAL JOINT COMMISSION (IJC):

An agency formed by the United States and Canada to guide management of the Great Lakes and resolve border issues.

ISOROPYLBIPHENYL:

A chemical compound used as a substitute for PCB.

LANDFILL:

A conventional sanitary landfill is "a land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading solid wastes in thin layers, materials at the end of each operating day". Hazardous wastes frequently require various types of pretreatment before they

are disposed of, i.e., neutralization chemical fixation encapsulation. Neutralizing and disposing of wastes should be considered a last resort. Repurifying and reusing waste materials or recycling them for another use may be less costly.

LC-1:

The concentration that results in 1% mortality of the test animal populations exposed to the contaminant.

LC_{50}:

Lethal concentration for 50% of the test population exposed to a toxicant substance.

LCD:

County Land Conservation Department

LD_{50}:

Lethal dose for 50 percent of the test population exposed to a toxicant substance.

LEACHATE:

The contaminated liquid which seeps from a pile or cell of solid materials and which contains water, dissolved and decomposing solids. Leachate may enter the groundwater and contaminate drinking water supplies.

LOAD:

The total amount of materials or pollutants reaching a given locale.

MACROPHYTE:

A rooted aquatic plant.

MASS:

The amount of material a substance contains causing it to have weight in a gravitational field.

MASS BALANCE:

A study that examines all parts of the ecosystem to determine the amount of toxic or other pollutant present, its sources, and the processes by which the chemical moves through the ecosystem.

MESOTROPHIC:

Refers to a moderately fertile nutrient level of a lake between the oligotrophic and eutrophic levels. (See also "Eutrophic" and "Oligotrophic.")

MILLIGRAMS PER LITER (mg/1):

A measure of the concentration of substance in water. For most pollution measurement this is the equivalent of "parts per million".

MITIGATION:

The effort to lessen the damages caused, by modifying a project, providing alternatives, compensating for losses or replacing lost values.

MIXING ZONE:

The portion of a stream or lake where effluent is allowed to mix with the receiving water. The size of the area depends on the volume and flow of the discharge and receiving water. For streams the mixing zone is one-third of the lowest flow that occurs once every 10 years for a seven day period.

NONPOINT SOURCE POLLUTION (NSP):

Pollution whose sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach water bodies in runoff, which can best be controlled by proper land management.

NPS:

See nonpoint source pollution.

OLIGOTROPHIC:

Refers to an unproductive and nutrient-poor lake. Such lakes typically have very clear water. (See also "Eutrophic" and "Mesotrophic.")

OUTFALL:

The mouth of a sewer, drain, or pipe where effluent from a wastewater treatment plant is discharged.

PATHOGEN:

Any infective agent capable of producing disease. It may be a virus, bacterium, protozoan, etc.

PELAGIC:

Referring to open water portion of a lake.

PESTICIDE:

Any chemical agent used to control specific organisms, such as insecticides, herbicides, fungicides, etc.

PH:

A measure of acidity or alkalinity, measured on a scale of 0 to 14 with 7 being neutral and 0 being most acid, and 14 being most alkaline.

PHENOLS:

Organic compounds that are byproducts of petroleum refining, textile, dye, and resin manufacture. High concentrations can cause taste and odor problems in fish. Higher concentration can be toxic to fish and aquatic life.

PHOSPHORUS:

A nutrient that, when reaching lakes in excess amounts, can lead to overfertile conditions and algae blooms.

PLANKTON:

Tiny plants and animals that live in water.

POINT SOURCES:

Sources of pollution that have discrete discharges, usually from a pipe or outfall.

POLLUTION:

The presence of materials or energy whose nature, location, or quantity produces undesired environmental effects.

POLYCHLORINATED BIPHENYLS(PCBs):

A group of 209 compounds, PCBs have been manufactured since 1929 for such common uses as electrical insulation and heating/cooling equipment, because they resist wear and chemical breakdown. Although banned in 1979 because of their toxicity, they have been detected on air, land and water. Recent surveys found PCBs in every section of the country, even those remote from PCB manufacturers.

POLYCHLORINATED ORGANIC COMPOUNDS:

A group of toxic chemicals which contain several chlorine atoms.

PRETREATMENT:

A partial wastewater treatment required from some industries. Pretreatment removes some types of industrial pollutants before the wastewater is discharged to a municipal wastewater treatment plant.

PRIORITY POLLUTANT:

A list of toxic chemicals identified by the federal government because of their potential impact in the environment and human health. Major dischargers are required to monitor all or some of these chemicals when their WPDES permits are reissued.

PRIORITY WATERSHED:

A drainage area about 100,000 acres in size selected to receive Wisconsin Fund money to help pay the cost of controlling nonpoint source pollution. Because money is limited, only watersheds where problems are critical, control is practical, and cooperation is likely are selected for funding.

PRODUCTIVITY:

A measure of the amount of living matter which is supported by an environment over a specific period of time. Often described in terms of algae production for a lake.

PUBLIC LAW 92-500 (CLEAN WATER ACT):

The federal law that sets national policy for improving and protecting the quality of the nation's waters. The law set a timetable for the cleanup of the nation's waters and stated that they are to be fishable and swimmable. This also required all dischargers of pollutants to obtain a permit and meet the conditions of the permit. To accomplish this pollution cleanup, billions of dollars have been made available to help communities pay the cost of building sewage treatment facilities. Amendments in the Clean Water Act were made in 1977 by passage of Public Law 95-217, and in 1987.

PUBLIC PARTICIPATION:

The active involvement of interested and affected citizens in governmental decision-making.

PUBLICLY OWNED TREATMENT WORKS (POTW):

A wastewater treatment plat owned by a city, village or other unit of government.

RAP:

See Remedial Action Plan.

RECYCLING:

The process that transforms waste materials into new products.

REMEDIAL ACTION PLAN:

A plan designed to restore beneficial uses to a Great Lakes Area of Concern.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RF/FS):

An investigation of problems and assessment of management options conducted as part of a superfund project.

RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA):

This federal law amends the Solid Waste Disposal Act of 1965 and expands on the Resource Recovery Act of 1970 to provide a program that regulates hazardous wastes, to eliminate open dumping and to promote solid waste management programs.

RETRO-FIT:

The placement of an urban structural practice in an existing urban area, which may involve rerouting existing storm sewers and/or relocating existing buildings or other structures.

RIPARIAN:

Belonging or relating to the bank of a lake, river or stream.

RIPRAP:

Broken rock, cobbles, or boulders placed on the bank of a stream to protect it against erosion.

RULE:

Refers to Wisconsin administrative rules. See Wisconsin Administrative Code.

RUNOFF:

Water from rain, snowmelt, or irrigation that flows over the ground surface and returns to streams. Runoff can collect pollutants from air or land and carry them to receiving waters.

SCS:

U.S. Soil Conservation Service

SECONDARY IMPACTS:

The indirect effects that an action can have on the health of the ecosystem or the economy.

SECONDARY TREATMENT:

Two-stage wastewater treatment that allows the coarse particles to settle out, as in primary treatment, followed by biological breakdowns of the remaining impurities. Secondary treatment commonly removes 90% of the impurities. Sometimes "secondary treatment" refers simply to the biological part of the treatment process.

SEDIMENT:

Soil particles suspended in and carried by water as a result of erosion.

SEICHES:

Changes in water levels due to the tipping of water in an elongated lake basin whereby water is raised in one end of the basin and lowered in the other.

SEPTIC SYSTEM:

Sewage treatment and disposal for homes not connected to sewer lines. Usually the system includes a tank and drain field. Solids settle to the bottom of the tank. Liquid percolates through the drain field.

SLUDGE:

A byproduct of wastewater treatment; waste solids suspended in water.

SOLID WASTE:

Unwanted or discharged material with insufficient liquid to be free flowing.

STANDARDS:

See water quality standards.

STORM SEWERS:

A system of sewers that collect and transport rain and snow runoff. In areas that have separated sewers, such stormwater is not mixed with sanitary sewage.

SUPERFUND:

A federal program that provides for cleanup of major hazardous landfills and land disposal areas.

SUSPENDED SOLIDS (SS):

Small particles of solid pollutants suspended in water.

SYNERGISM:

The total effect is greater than the sum of the individual effects. For example, the characteristic property of a mixture of toxicants that exhibits a greater-than-additive cumulative toxic effect.

TACs:

Technical advisory committees that assisted in the development of the Remedial Action Plan.

TERTIARY TREATMENT:

See advanced wastewater treatment.

TOP-DOWN MANAGEMENT:

A management theory that uses biomanipulation, specifically the stocking of predator species of fish to improve water quality.

TOTAL MAXIMUM DAILY LOADS:

The maximum amount of a pollutant that can be discharged into a stream without causing a violation of water quality standards.

TOXIC:

An adjective that describes a substance which is poisonous, or can kill or injure a person or plants and animals upon direct contact or long-term exposure. (Also, see toxic substance.)

TOXIC SUBSTANCE:

A chemical or mixture of chemicals which, through sufficient exposure, or ingestion, inhalation of assimilation by an organism, either directly from the environment or indirectly by ingestion through the food chain, will, on the basis of available information cause death, disease, behavioral or immunologic abnormalities, cancer, genetic mutations, or development of physiological malfunctions, including malfunctions in reproduction or physical deformations, in organisms or their offspring.

TOXICANT:

See toxic substance.

TOXICITY:

The degree of danger posed by a toxic substance to animal or plant life. Also see acute toxicity, chronic toxicity and additivity.

TOXICITY REDUCTION EVALUATION:

A requirement for a discharger that the causes of toxicity in an effluent be determined and measures taken to eliminate the toxicity. The measures may be treatment, product substitution, chemical use reduction or other actions that will achieve the desired result.

TREATMENT PLANT:

See wastewater treatment plant.

TROPHIC STATUS:

The level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration.

TURBIDITY:

Lack of water clarity. Turbidity is usually closely related to the amount of suspended solids in water.

UDC:

Uniform Dwelling Code, a building code consisting of statewide regulations for electrical heating, ventilation, fire, structural, plumbing, construction site erosion and other related practices, generally used by communities of at least 2,500 inhabitants.UNIVERSITY OF WISCONSIN-EXTENSION (UWEX):
A special outreach, education branch of the state university system.

VARIANCE:

Government permission for a delay or exception in the application of a given law, ordinance or regulation. Also, see water quality standard variance.

VOLATILE:

Any substance that evaporates at a low temperature.

WASTELOAD ALLOCATION:

Division of the amount of waste a stream can assimilate among the various dischargers to the stream. This limits the amount (in pounds) of chemical or biological constituent discharged from a wastewater treatment plant to a water body.

WASTEWATER:

Water that has become contaminated as a byproduct of some human activity. Wastewater includes sewage, washwater and the water-borne wastes of industrial processes.

WASTE:

Unwanted materials left over from manufacturing processes, refuse from places of human habitation or animal habitation.

WASTEWATER TREATMENT PLANT:

A facility for purifying wastewater. Modern wastewater treatment plants are capable of removing 95% of organic pollutants.

WATER QUALITY AGREEMENT:

The Great Lakes Water Quality agreement was initially signed by Canada and the United States in 1972 and was subsequently revised in 1978 and 1987. It proves guidance for the management of water quality, specifically phosphorus and toxics, in the Great Lakes.

WATER QUALITY LIMITED SEGMENT:

A section of river where water quality standards will not be met if only categorical effluent standards are met.

WATER QUALITY CRITERIA:

A measure of the physical, chemical or biological characteristics of a water body necessary to protect and maintain different water uses (fish and aquatic life, swimming, etc.).

WATER QUALITY STANDARDS:

The legal basis and determination of the use of a water body and the water quality criteria, physical, chemical, or biological characteristics of a water body, that must be met to make it suitable for the specified use.

WATER QUALITY STANDARD VARIANCE:

When natural conditions of a water body preclude meeting all conditions necessary to maintain full fish and aquatic life and swimming, a variance may be granted.

WATERSHED:

The land area that drains into a lake or river.

WETLANDS:

Areas that are inundates or saturated by surface or groundwater at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas.

WINHULSE:

A computer model for evaluating sediment delivery to surface waters from agricultural lands. It was developed by DNR with assistance from SCS.

WISCONSIN ADMINISTRATIVE CODE:

The set of rules written and used by state agencies to implement state statutes. Administrative codes are subject to public hearing and have the force of law.

WISCONSIN FUND:

A state program that helps pay the cost of reducing water pollution. Funding for the program comes from general revenues and bonds and is based on a percentage of the state's taxable property value. The Wisconsin Fund includes these programs:

Point Source Water Pollution Abatement Grant Program - Provides grants for 60% of the cost of constructing wastewater treatment facilities. Most of this program's money goes for treatment plant construction, but three percent of this fund is available for repair or replacement of private, onsite sewer systems.

Nonpoint Source Water Pollution Abatement Grant Program - Funds to share the cost of reducing water pollution. Nonspecified sources are available in selected priority watersheds.

Solid Waste Grant Program - Communities planning for solid waste disposal sites are eligible for grant money. $500,000 will be available each year to help with planning costs.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:

A state cost-share program established by the State Legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES):

A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

Priority Watershed Projects in Wisconsin
1993

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

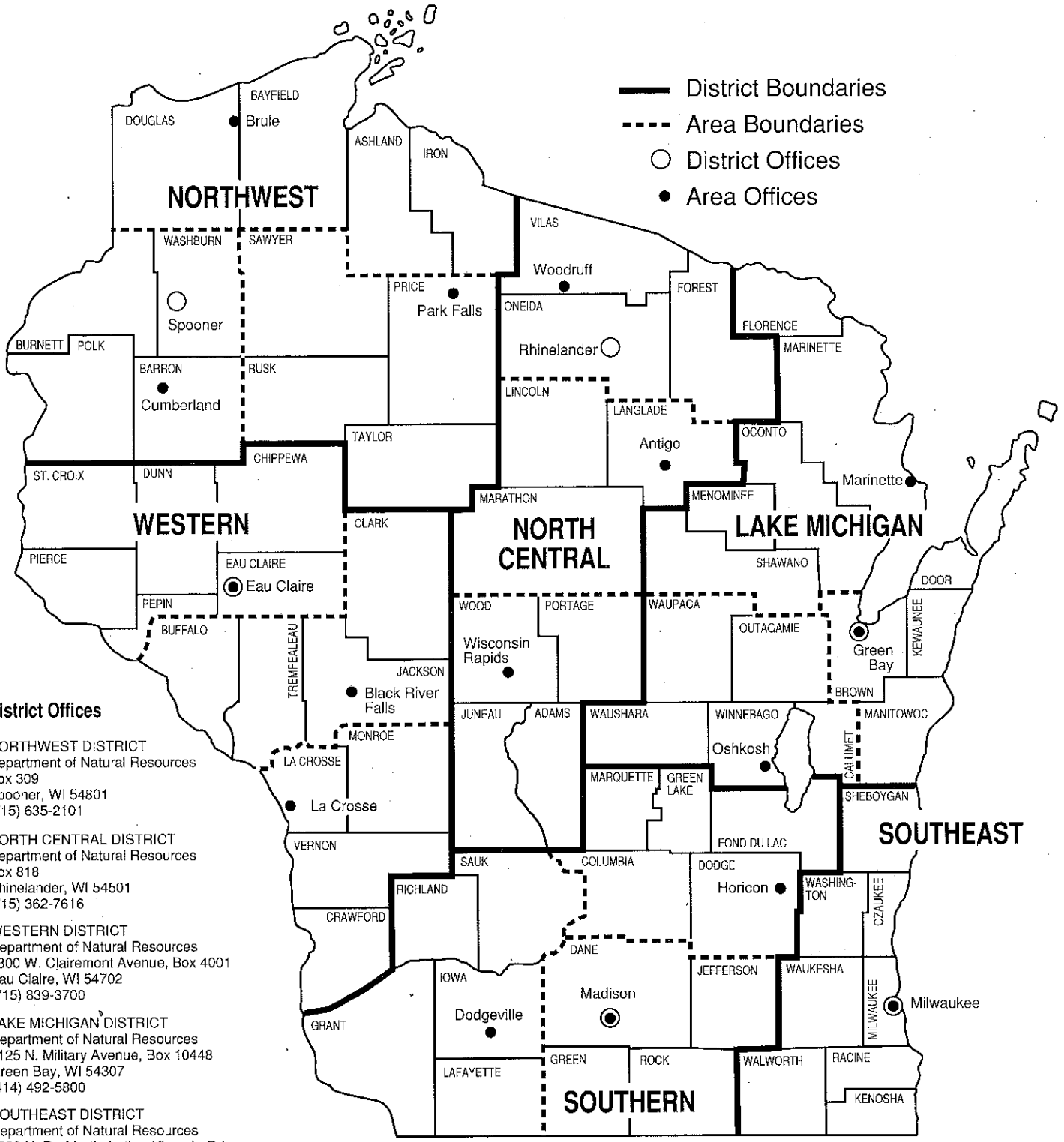
Year Selected-Map Number	Small-scale Priority Watershed Project	County(ies)
SS-1	Bass Lake*	Marinette
SS-90-1	Dunlap Creek	Dane
SS-90-2	Lowes Creek	Eau Claire
SS-90-3	Port Edwards - Groundwater Prototype	Wood
SS-91-1	Whittlesey Creek	Bayfield
SS-91-2	Spring Creek	Rock

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

** Project completed*

Priority Watershed Projects in Wisconsin
1993

DNR Field Districts and Areas



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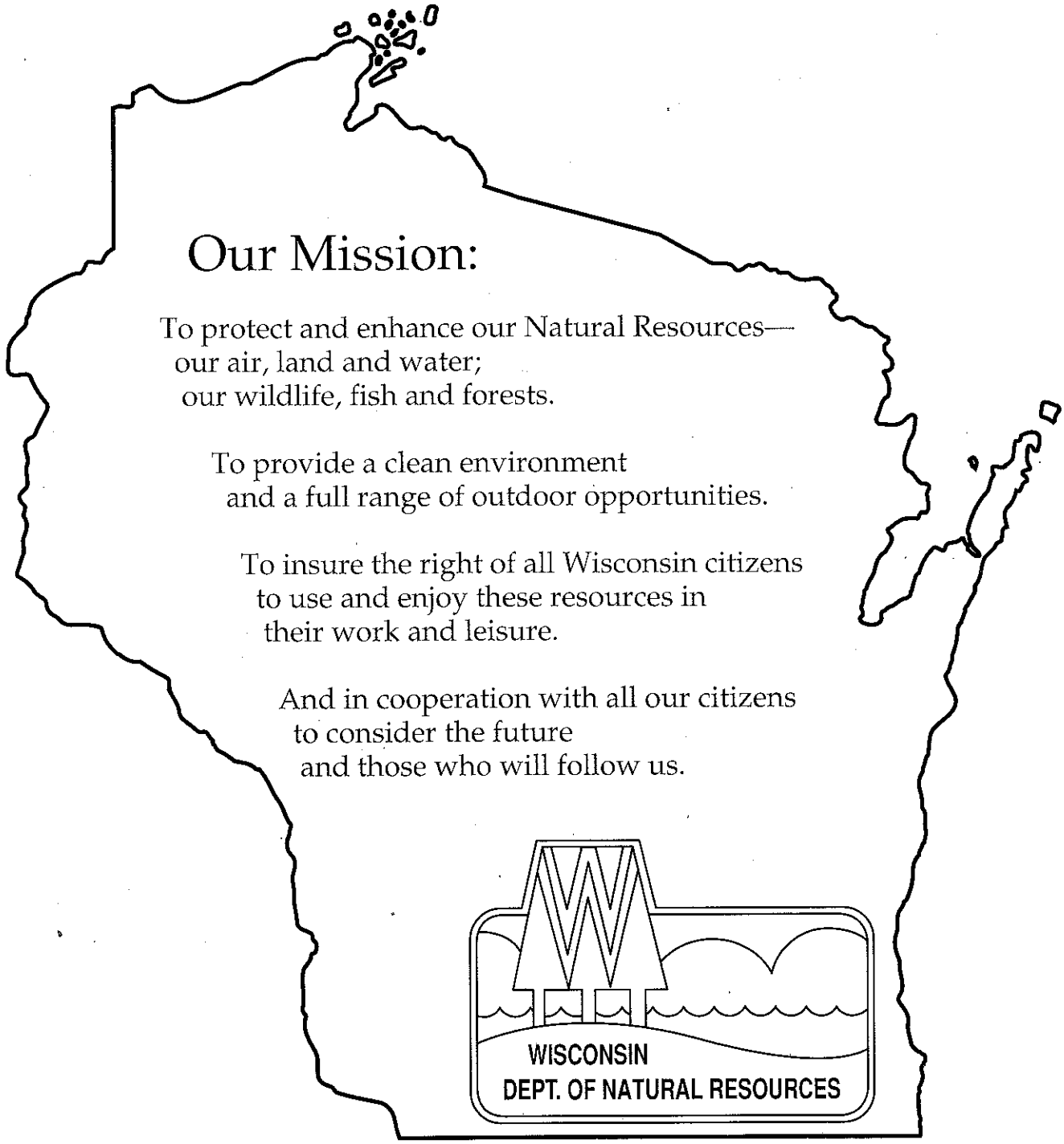

Our Mission:

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.

WISCONSIN
DEPT. OF NATURAL RESOURCES

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