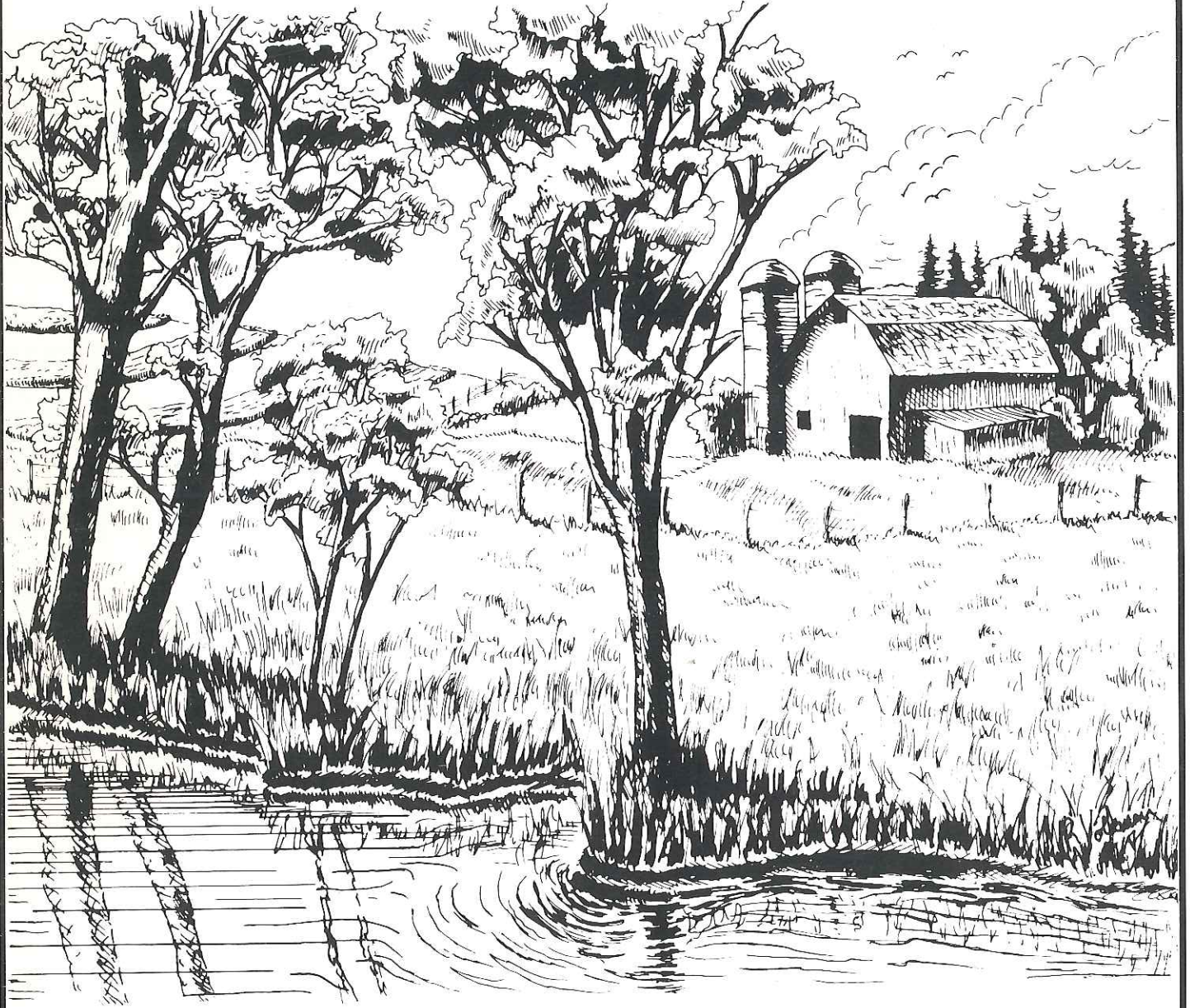


Nonpoint Source Control Plan for the Upper Yellow River Priority Watershed Project



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

Watershed Plan Organization Information

Natural Resources Board 1994

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Mary Jane Nelson
James E. Tiefenthaler, Jr.
Stephen D. Willett

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Roy Voight
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George Rau
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Wisconsin Department of Natural Resources

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Susan Sylvester, Administrator, Division for Environmental Quality
Bruce Baker, Director, Bureau of Water Resources Management
Rebecca Wallace, Chief, Nonpoint Source & Land Management Section

Wisconsin Department of Agriculture, Trade and Consumer Protection

Alan Tracy, Secretary
Nicholas Neher, Administrator, Division of Agriculture Resource Management
Dave Jelinski, Director, Bureau of Land and Water Resources
Keith Foye, Chief, Soil and Water Section

A NONPOINT SOURCE CONTROL PLAN FOR THE UPPER YELLOW RIVER WATERSHED

Wisconsin Nonpoint Source Water Pollution Abatement Program

July, 1994

Plan Cooperatively Prepared By:

Wisconsin Department of Natural Resources
Wisconsin Department of Agriculture, Trade & Consumer Protection
Wood County Land Conservation Department
Clark County Land Conservation Department
Marathon County Land Conservation Department

For copies of this document please contact:

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

Publication WR-369-94

WATERSHED PLAN ACKNOWLEDGEMENTS

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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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Cindy Hoffland, WDNR Bureau of Community Assistance
Don Aron, Wood County Land Conservation Department
Ken Lassa, Marathon County Land Conservation Department
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Tod Planer, Wood County University Extension
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Upper Yellow River Watershed Citizens Advisory Committee

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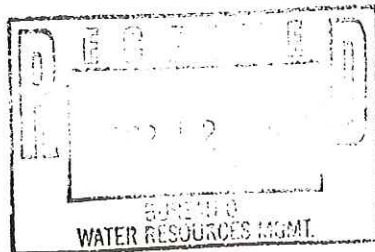
State of Wisconsin
Department of Agriculture, Trade and Consumer Protection

Alan T. Tracy, Secretary

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

April 2, 1993

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



Bruce
Dear Mr. Baker:

The Department of Agriculture, Trade and Consumer Protection has reviewed and approves A Nonpoint Source Control Plan for the Upper Yellow River Priority Watershed Project.

We look forward to assisting the Department of Natural Resources and the Land Conservation Committee and staff in Wood, Clark, and Marathon County 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
Land and Water Resources Bureau
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
(608) 273-6411

cc: Becky Wallace WR/2
Don Aron, Wood County Conservationist
Gregg Stangl, Clark County Conservationist
Dean Kaatz, Marathon County Conservationist



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 23, 1993

FILE REF: 2600

Mr. Ted Tellekson, Chair
County Board of Supervisors
307 South 7th Avenue
Wausau, Wisconsin 54401

Dear Mr. Tellekson,

It is my pleasure to approve A Nonpoint Source Control Plan for the Upper Yellow River Priority Watershed Project. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120 of the Wisconsin Administrative Code. The plan has been approved by Wood, Clark, and Marathon Counties and the Wisconsin Department of Agriculture, Trade and Consumer Protection. This letter completes the approval process set forth in Wisconsin Statutes and allows the granting of funds through the Nonpoint Source Water Pollution Abatement Program to implement the project.

I am also approving this plan as an amendment to the areawide water quality management plan for the Upper Wisconsin River, Southern sub-basin.

The start of this project is an exciting milestone in our cooperative effort to improve water quality throughout the Upper Wisconsin River Basin. This plan, prepared jointly by staff from the Department of Natural Resources, the Department of Agriculture, Trade and Consumer Protection, and the Wood, Clark, and Marathon County Land Conservation Departments, is an example of the cooperative efforts that can help improve and protect the streams, rivers, and wetlands of the Upper Yellow River watershed. I'm confident that the cooperative spirit shown throughout the development of this plan will continue during the implementation of this project.

Sincerely,

George E. Meyer
Secretary

cc: Dave Jelinski, Department of Agriculture, Trade and Consumer Protection
Dale Urso, DNR North Central District Director
Craig Karr, DNR Bureau of Community Assistance



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
FILE REF: 2600

April 23, 1993

Mr. Wayne Hendrickson, Chair
County Board of Supervisors
U4397 Badger Lane
Unity, Wisconsin 54488

Dear Mr. Hendrickson,

It is my pleasure to approve A Nonpoint Source Control Plan for the Upper Yellow River Priority Watershed Project. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120 of the Wisconsin Administrative Code. The plan has been approved by Wood, Clark, and Marathon Counties and the Wisconsin Department of Agriculture, Trade and Consumer Protection. This letter completes the approval process set forth in Wisconsin Statutes and allows the granting of funds through the Nonpoint Source Water Pollution Abatement Program to implement the project.

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Sincerely,

George E. Meyer
Secretary

cc: Dave Jelinski, Department of Agriculture, Trade and Consumer Protection
Dale Urso, DNR North Central District Director
Craig Karr, DNR Bureau of Community Assistance





George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
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TELEPHONE 608-266-2621
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FILE REF: 2600

April 23, 1993

Mr. Jesse Koran, Chair
County Board of Supervisors
1775 County Trunk GG
Nekoosa, Wisconsin 54457

Dear Mr. Koran, *Jesse*

It is my pleasure to approve A Nonpoint Source Control Plan for the Upper Yellow River Priority Watershed Project. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120 of the Wisconsin Administrative Code. The plan has been approved by Wood, Clark, and Marathon Counties and the Wisconsin Department of Agriculture, Trade and Consumer Protection. This letter completes the approval process set forth in Wisconsin Statutes and allows the granting of funds through the Nonpoint Source Water Pollution Abatement Program to implement the project.

I am also approving this plan as an amendment to the areawide water quality management plan for the Upper Wisconsin River, Southern sub-basin.

The start of this project is an exciting milestone in our cooperative effort to improve water quality throughout the Upper Wisconsin River Basin. This plan, prepared jointly by staff from the Department of Natural Resources, the Department of Agriculture, Trade and Consumer Protection, and the Wood, Clark, and Marathon County Land Conservation Departments, is an example of the cooperative efforts that can help improve and protect the streams, rivers, and wetlands of the Upper Yellow River watershed. I'm confident that the cooperative spirit shown throughout the development of this plan will continue during the implementation of this project.

Sincerely,

George

George E. Meyer
Secretary

cc: Dave Jelinski, Department of Agriculture, Trade and Consumer Protection
Dale Urso, DNR North Central District Director
Craig Karr, DNR Bureau of Community Assistance



#R-5-93

RESOLUTION
ADOPTING THE UPPER YELLOW RIVER
NONPOINT SOURCE PRIORITY WATERSHED PLAN

WHEREAS, the Upper Yellow River Watershed was designated by the Department of Natural Resources in 1990 under the Wisconsin Nonpoint Source Water Pollution Abatement Program, and

WHEREAS, the Wood, Clark and Marathon County Land Conservation Departments 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 1991 and 1992, 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 an official public hearing was conducted on January 4, 1993 and

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

WHEREAS, the implementation of this plan will provide both technical assistance and cost share monies to eligible landowners within the priority watershed for the installation of conservation practices designed to reduce the sources of nonpoint pollution and protect or improve the quality of Marathon County's water resources.

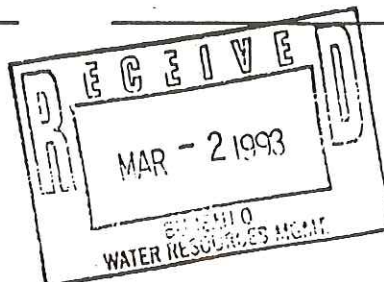
NOW, THEREFORE, BE IT RESOLVED, by the Board of Supervisors of the County of Marathon that the Upper Yellow River Watershed Nonpoint Source Priority Watershed Plan be adopted and the implementation of the plan begin as soon as possible.

DATED: This 26th day of January, 1993.

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

LAND CONSERVATION COMMITTEE

Robert Schauer
Walter Ezmann
Frank J. Jiro



8

RESOLUTION # 93-2-2

Introduced by Wood County Land Conservation Committee

	NO	YES	A
1 Schreiner, L			
2 Stargardt, G			
3 Reynolds, A			
4 Schneider, G			✓
5 Draves, D			
6 Schueller, W			
7 Fehrenbach, N			
8 Reigel, L			
9 Jirschele, M			
10 Zimmermann, K			
11 Breu, A			
12 Boehning, B			
13 Lang, G			
14 Gardner, W			✓
15 Voight, R			
16 Raubal, J			
17 Kumm, A			
18 Molepske, C			
19 Bowden, C			
20 Koran, J	✓		
21 Hofmeister, N			
22 Wvngaard, M			
23 Pascavis, G			
24 Verjinsky, V	✓		
25 Falkosky, C			
26 Conradi, J			
27 Zuege, R	✓		
28 Kronstedt, H			
29 Guth, L			
30 Brehm, R			
31 Goodness, W			
32 Gurtler, C			
33 Rosandick, L			
34 Braun, R	✓		
35 Dove, J			
36 Arnold, T			
37 Nash, J			
38 Matthews, C			

INTENT & SYNOPSIS:

To approve the Upper Yellow River Priority Watershed Plan for the control of nonpoint sources of pollution in the Watershed Project area and to protect and improve the water resources of Wood County.

FISCAL NOTE: Over the remaining 8 years of the project, Wood County would be eligible for a grant of up to 4.5 million dollars, if 75% of the landowners participate in the program. These state funds are for cost-sharing, easements, staff and educational activities. Wood County costs are estimated at \$14,400 over the remaining 8 years, or a continued budget of around \$1,800 annually.

Source of Money: Contingency Budget

WHEREAS, The Upper Yellow River Watershed was designated by legislature as a "priority watershed" in 1990 under the Wisconsin Nonpoint Source Water Pollution Abatement Program; and

WHEREAS, The Wood County Board of Supervisors through resolution No. 90-10-7, dated October 16, 1990, has expressed its support of the designation of the Upper Yellow River Watershed as a priority watershed project; and

WHEREAS, The inventory and planning phases of the project have been completed by the Land Conservation Department under the direction of the Wood County Land Conservation Committee in cooperation with the Wisconsin Department of Natural Resources, and Cooperative Extension Services; and

WHEREAS, a priority watershed plan has been prepared which assesses the existing water quality and watershed conditions, identifies the management practices and actions necessary to improve or protect the water quality of the watershed, outlines the tasks required and the agencies responsible for each, and establishes the time frame and cost estimates for the project; and

No: Yes: Absent: 2
Number of Votes Required: 10

Adopted by the County Board of Wood County, this 16 day of Feb 1993

County Clerk: [Signature] County Board Chairman: [Signature]



RESOLUTION# _____

ITEM # 2-2
DATE January 20, 1993
Effective Date February 16, 1993

Introduced by Wood County Land Conservation
_____ Committee

INTENT & SYNOPSIS:

Page two...

WHEREAS, a draft of the plan has been available for review and comments were accepted at a public hearing held January 04, 1993; and


WHEREAS, The implementation of this plan will provide both technical assistance and cost share monies to eligible landowners within the priority watershed for the installation of conservation practices designed to reduce the sources of nonpoint pollution and protect or improve the quality of Wood County's water resources.

NOW THEREFORE BE IT RESOLVED, by the Wood County Board of Supervisors, that the "Plan for the Control of Nonpoint Source Pollution in the Upper Yellow River Priority Watershed" be approved; and that the Land Conservation Committee be authorized to continue administering the Upper Yellow River Priority Watershed Project, on behalf of Wood County, as outlined in the aforementioned Plan with continuation of watershed staff position contingent upon 100% State funding.

STATE OF WISCONSIN)
)
COUNTY OF WOOD)

I, Anthony Ruesch, the duly elected County Clerk in and for Wood County, Wisconsin, hereby certify that the following is a true and correct copy of Resolution No. 93-2-2 adopted at the meeting of the Wood County Board of Supervisors on February 16, 1993.

Dated in Wisconsin Rapids, Wisconsin the 4th day of March, 1993.


Anthony Ruesch,
County Clerk

(Page 2)

Adopted by the County Board of Wood County, this _____ day of _____ 19_____

County Clerk

County Board Chairman

DIS.	NAME	
1	Frank L. Mikolay	
2	George Rau	
3	Carl Jakel	
4	George Eloranta	
5	Joan Alice Frost	
6	Ronald J. Kodl	
7	Carl Zajaek	
8	Randy Kadolph	
9	Biane Felten	
10	Ray Anderson	
11	Edward Lehnen	
12	Robert Huelak	
13	Bernard Martens	
14	Karl Stieglitz	
15	Ralph Landini	
16	Wayne Hendrickson	
17	David Clouse	
18	Erlin Dahl	
19	Robert Berglund	
20	Phillip Boshning	
21	Lawrence Behling	
22	Robert Opelt	
23	Howard Schultz	
24	Henry Janzich	
25	Wayne Felser	
26	Arden Hinkelmann	
27	Frederick Garbisch	
28	Elmer Hoesly	
29	Edison Mathis	

Approval of the Upper Yellow River Watershed Implementation Plan

WHEREAS, The Upper Yellow River Watershed was designated by legislature as a "priority watershed" in 1990 under the Wisconsin Nonpoint Source Water Pollution Abatement Program; and

WHEREAS, The Clark County Board of Supervisors through resolution No. 79-11-90, dated November 13, 1990 has expressed its support of the designation of the Upper Yellow River Watershed as a priority watershed project; and

WHEREAS, the inventory and planning phases of the project have been completed by the Land Conservation Department under the direction of the Clark County Land Conservation Committee in cooperation with the the Wisconsin Department of Natural Resources; and

WHEREAS, a priority watershed plan has been prepared which assesses the existing water quality and watershed conditions, identifies the management practices and actions necessary to improve or protect the water quality of the watershed, outlines the tasks required and the agencies responsible for each, and establishes the time frame and cost estimates for the project; and

WHEREAS, a draft of the plan has been available for review and comments were accepted at a public hearing held January 4, 1993; and

WHEREAS, the implementation of this plan will provide both technical assistance and cost share monies to eligible landowners within the priority watershed for the installation of conservation practices designed to reduce the sources of nonpoint pollution and protect or improve the quality of Clark County's water resources.

VOTE CH: AYES _____ NAYS _____ ABSENT _____

[Signature]
Corporation Counsel

FINANCIAL IMPACT STATEMENT: (current year)	Projected new positions	<u>1 existing</u>
	Anticipated revenues	<u>\$213,724.00</u>
	Wages & Benefits	<u>\$ 29,750.00</u>
	All other costs	<u>30% Office Supplies</u>
Space Requirements	<u>Existing Space is Adequate</u>	

CLERK'S CERTIFICATION: I, Barbara A. Petkovsek, Clerk for the County of Clark, hereby certify that Resolution #10-2-93 was adopted on a voice vote by the Board of Supervisors at their meeting held February 24, 1993.

Barbara A. Petkovsek
Barbara A. Petkovsek, County Clerk, Courthouse, Neillsville, WI
SEAL

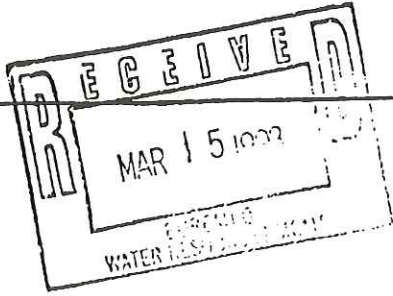


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SUMMARY

Introduction

The Upper Yellow River Priority Watershed Project plan assesses the nonpoint sources of pollution in the Upper Yellow River Watershed and guides the implementation of nonpoint source control measures. These control measures are needed to meet specific water resource objectives for the Upper Yellow River and its tributaries. Nonpoint sources of pollutants most commonly found in this watershed include: 1) polluted runoff from barnyards and feedlots; 2) sediment from cropland erosion; 3) sediment from eroding streambanks; and 4) runoff from winterspread manure. The purpose of this project is to reduce the amount of pollutants originating from nonpoint sources that reach surface water and groundwater within the Upper Yellow River Priority Watershed Project area.

The plan was prepared by the Wisconsin Department of Natural Resources (DNR), the Department of Agriculture, Trade and Consumer Protection (DATCP) and the Wood, Clark and Marathon County Land Conservation Departments (LCDs), with assistance from the University of Wisconsin-Extension. The DNR selected the Upper Yellow River Watershed as a priority watershed project through the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1990. It joined approximately 50 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 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 DNR and DATCP. The Wood, Clark and Marathon County Land Conservation Committees administer the project on the local level with assistance from UW-Extension and the Soil Conservation Service (U.S. Department of Agriculture).

General Watershed Characteristics

The Upper Yellow River Watershed drains 224 square miles of land in Wood, Clark and Marathon counties in north central Wisconsin. The watershed is part of the Upper Wisconsin River-Southern Sub-Basin. The Yellow River is a tributary of the Wisconsin River which in turn contributes flow to the Mississippi River drainage system. The Upper Yellow River Watershed was divided into 11 smaller drainage areas, called subwatersheds, for this planning effort (Map 2-1).

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 small—approximately 9,200 people. Most of the watershed population lives outside incorporated areas, in small enclaves of residential development or on farmsteads.

Table S-1. Land Use in the Upper Yellow River Watershed

Land Use	% of Watershed
Agricultural	
pasture	3
cropland	61
grazed woodlots	4
Grassland	4
Woodland	23
Developed	3
Wetlands	2

Water Quality

The Upper Yellow River supports a diverse warmwater sport fishery, as does Puff Creek, portions of Rocky Creek, and the East and South Branches of the Yellow River. Beaver Creek, Cat Creek, Owl Creek and portions of the East Branch of the Yellow River support a warmwater forage fishery. The streams are not reaching their highest potential use due to pollution from point and nonpoint sources. Eroding croplands and streambanks and improperly managed livestock operations are the major nonpoint sources of pollution in the watershed.

An inventory of groundwater quality was done in conjunction with the animal lot inventories. Results show that of the well samples collected, 8% had nitrate levels over the enforcement standard of 10 mg/l and 42% had nitrate levels between 2, the preventative action limit, and 10 mg/l. These nitrate levels are significant.

Triazine sampling showed that 1% of the samples collected had triazine levels over 3.0 $\mu\text{g/l}$, the enforcement standard for triazine. Triazine is a manmade compound which when present in groundwater indicates atrazine contamination. Eleven percent of the samples collected had triazine levels between 0.3 and 3.0 $\mu\text{g/l}$. The preventative action limit for triazine is 0.3 $\mu\text{g/l}$.

Sources of Water Pollution

The Wood, Clark and Marathon County LCDs 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 creek was calculated. The amount of sediment reaching streams from eroding agricultural lands and streambanks was also determined. In the Upper Yellow River Watershed, 99% of the sediment deposited in streams annually is derived from agricultural upland erosion. Less than 1% of the sediment reaching creeks originates from streambank erosion. Approximately 1% of total sediment is contributed from gullies.

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

1. Barnyard Runoff Inventory Results:

- 255 barnyards were inventoried
- 93 barnyards were found to contribute 70% of the phosphorus from barnyard runoff that reaches surface waters

2. Manure Spreading Inventory Results:

- 219 farms were inventoried
- About 19,600 total acres have manure applied
- About 3,000 unsuitable acres have high pollution potential
- About 90 landowners spread manure on 2,300 or more unsuitable acres which have a high pollution potential

3. Streambank Erosion Inventory Results:

- 586 stream miles were inventoried
- 480 tons of sediment reach streams from eroding sites (< 1% of total sediment)
- There are 45 miles of sites that are either eroding, slumping or have cattle access (< 10% of streambanks inventoried)

4. Upland Sediment Inventory Results:

- 146,143 acres were inventoried
- 54,282 tons of sediment are delivered to streams from upland land uses: (99% of total sediment)
 - sixty-one percent from cropland
 - five percent from grazed woodlots
 - three percent from pastures
 - 89,551 cropland acres deliver 81% of total sediment

5. **Gully Erosion Inventory Results:**

- 27 tons of sediment are delivered to streams from active, inventoried gullies (<1% of total sediment)

6. **Wetland Inventory Results:**

- 19,360 acres of wetlands inventoried
- 1775 pastured wetland acres
- 1232 cropped/drained wetland acres
- 3007 total restorable wetland acres

Pollutant Reduction Goals

Sediment Goal: Reduce overall sediment delivered by 35%.

To meet this goal, the following is needed:

- Thirty-five percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- Twenty-five percent reduction in streambank sediment delivered to all streams and a 50% overall repair of bank habitat in all subwatersheds.

Phosphorus Goal: Reduce overall phosphorus load by 45%.

To meet this goal, the following is needed:

- Sixty-five percent reduction in phosphorus from barnyards in the North Branch, South Branch, Rocky Creek, Cat Creek, Otter Creek, Puff Creek, and Beaver Creek subwatersheds.
- Fifty percent reduction in phosphorus from barnyards in the Lower Yellow, Owl Creek, East Branch and Middle Yellow subwatersheds.
- Sixty-five percent reduction in phosphorus from winterspread manure on "unsuitable" acres in all subwatersheds.
- Achievement of the sediment goal identified above.
- In addition this plan calls for a restoration of 30% of degraded or prior converted wetlands and control of gullies producing over one ton of sediment/site/year.

Achievement of these pollutant reduction goals for sediment and phosphorus will help achieve water quality objectives for Castle Rock Lake, the 5th largest inland lake in Wisconsin, and an eutrophic impoundment. The Yellow River drains to Castle Rock Lake, which is to be managed as part of the Petenwell/Castle Rock Comprehensive Management Plan.

Management Actions

Management actions are described in terms of Best Management Practices (BMPs) 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 Best Management Practices. As shown in Table S-2, cost-share rates range from 50 to 70%.

All landowners eligible to receive cost-share funds will be contacted by the Wood, Clark and Marathon County Land Conservation Departments during project implementation. If a landowner wishes to participate in any aspect of the program and has Category I sources of nonpoint source pollutants, they must be controlled. 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 Category II is not mandatory for a landowner to receive cost-sharing for controlling other sources.

The Wood, Clark and Marathon County Land Conservation Departments will assist landowners in applying Best Management Practices. 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. Participation in the program is voluntary.

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

Agricultural Lands

All agricultural lands contributing sediment to streams at a rate greater than 0.5 tons/acre/year will be eligible for cost sharing and must be brought down to a rate of 0.3 tons/acre/year. This involves an estimated 38,913 critical acres of cropland, or 33% of the land in the watershed.

An additional five percent of the sediment load delivered to the stream will be controlled through Category II, which includes an estimated 22,809 acres. Category II includes those landowners with fields delivering sediment at a rate between 0.5 and 0.3 tons/acre/year.

Table S-2. Best Management Practices Eligible for Cost Sharing Through the Upper Yellow River Priority 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)	\$45/acre ¹
Critical Area Stabilization	70% ^{*,+}
Grade Stabilization Structures	70% ⁺
Agricultural Sediment Basins	70% ^{*,+}
Shoreline and Streambank Stabilization	70% ⁺
Shoreline Buffers	70% ^{*,+}
Barnyard Runoff Management	70%
Animal Lot Relocation	70% ⁺
Manure Storage Facilities	70% ^{**}
Livestock Exclusion From Woodlots	50%
Wetland Restoration	70%
Nutrient and Pesticide Management	50%

* 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.

** Maximum cost-share amount is \$20,000.

+ With a matching local share, the state share cost-sharing level may be increased up to 80%.

¹ Cost-sharing is \$15/year for three consecutive years.

For practical purposes, all fields delivering more than 0.5 tons/acre/year of sediment will be combined for each landowner. This figure will be the total amount of sediment which must be controlled on the farm in order to receive cost-share funds from the watershed project. A landowner may be able to meet the overall sediment reduction goal for his/her farm by applying controls to field with sediment delivery rates below the identified target control

level of 0.5 tons/acre/year. The best way to meet the individual's sediment reduction goals will be determined during the farm planning process.

The Best Management Practices identified by the Wood, Clark and Marathon 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

High Control Subwatersheds: The highest level of control is needed for animal lots in the North Branch of the Yellow, South Branch of the Yellow, Rocky Creek, Cat Creek, Otter Creek, Puff Creek and Beaver Creek subwatersheds. All barnyards in these subwatersheds contributing more than 45 pounds of phosphorus annually will be Category I for cost sharing, and participating landowners will bring down the pounds of phosphorus to 15-pounds or less. Category II barnyards, those which contribute between 25 and 45 pounds of phosphorus, will be eligible for cost sharing.

Category IIA barnyards, those which contribute between 15 and 25 pounds of phosphorus, will be eligible for cost sharing. Remedies for half of the barnyards in Categories II and IIA will be limited to **low-cost alternatives**. Simply stated, forty-five of the ninety barnyards in Categories II and IIA will be eligible just for barnyard runoff systems, diversions or other low cost alternatives to full barnyard runoff systems. In Categories II and IIA participating landowners will need to bring phosphorus loads down to the 15-pound level or less.

Medium Control Subwatersheds: Medium control will be needed in the East Branch of the Yellow, Owl Creek and Middle Yellow subwatersheds. Participating landowners with barnyards in these subwatersheds which contribute more than 60 pounds of phosphorus annually will be Category I for cost sharing will need to be brought down to the 25-pound phosphorus level or less. Category II barnyards, those which contribute between 25 and 60 pounds of phosphorus, will be eligible for cost sharing, and participating landowners will need to be brought down to the 25-pound phosphorus level or less.

Manure-Spreading and Storage

The Upper Yellow River project participants who winterspread manure on more than 30 acres of critical land will be targeted as Category I for control measures. Category II landowners are those who winterspread on between 15 and 30 critical acres. Both Category I and II participants are required to implement and adhere to a Soil Conservation Service "590 Nutrient Management Plan." In this project "unsuitable" lands for winter manure spreading are those lands with greater than four percent slope or which are flood prone. The Wood, Clark and Marathon County LCDs 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.

In addition, Wood County is required to enact a manure storage ordinance implementing requirements outlined by DATCP. Clark County has a manure storage ordinance and Marathon County is in the process of revising their current ordinance.

Streambanks

Project participants with identified sites eroding at a rate of 0.5 tons/site per year or over 250 feet of trampled sites will be Category I. Those with erosion rates between 0.3 and 0.5 tons per site and any other animal access sites will be Category II.

Funds Needed For Cost Sharing, Staffing and Educational Activities

Grants will be awarded to Wood, Clark and Marathon 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 Upper Yellow River Watershed, assuming a 75% participation rate of eligible landowners.

Table S-3. Cost Estimates for the Upper Yellow River Priority Watershed Project

Eligible Activity	Total Cost*	State Share'
Cost Sharing	\$7,765,205	\$4,259,886
Easements	\$1,099,000	\$824,250
Wood, Clark and Marathon LCD Staffing	\$1,022,539	same
Educational Activities	\$92,547	same
Totals	\$9,979,291	\$6,199,222

Project Implementation Schedule

Project implementation is scheduled to begin in early 1993. The first 3 years of implementation is the period for participants to sign cost-share agreements. There is a 5-year period for practice installation. While an eligible landowner or operator has 3 years to determine whether to participate in the program, the installation of practices can usually begin as soon as a landowner has signed a cost-share agreement with the Wood, Clark and Marathon County LCC's.

Information and Education

An information and education program will be conducted throughout the project period with the Wood, Clark and Marathon County LCDs having overall responsibility for the program. University of Wisconsin-Extension staff in the county will provide assistance. This program will be most intensive during the first 4 years of the project and the activities will taper off during the rest of the project. The activities will include Best Management Practice demonstrations, tours, newsletters and public meetings.

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:

Administrative

This category includes the progress in providing technical and financial assistance to eligible landowners, and carrying out education activities identified in the plan. Progress in this area will be tracked by the LCD and reported to the DNR and DATCP quarterly.

Pollutant Reduction Levels

Reductions in nonpoint source pollutant loadings resulting from voluntary changes in land use practices will be calculated by the LCD and reported to DNR and DATCP at an annual review meeting.

Water Resources

Changes in water quality, habitat and water resource characteristics will be monitored by the DNR in 1995 and at the end of the project period.

CHAPTER ONE

Introduction, Purpose and Legal Status

Wisconsin Nonpoint Source Water Pollution Abatement Program

The Wisconsin Nonpoint Source Water Pollution Abatement Program was created in 1978 by the State Legislature. The goal of the program is to improve and protect the water quality of streams, lakes, wetlands and groundwater by reducing pollutants from urban and rural nonpoint sources. The 224-square-mile Upper Yellow River Watershed, located in Wood (60%), Clark (30%) and Marathon Counties (10%), was designated a "priority watershed" in October 1990.

Nonpoint sources of pollution include: eroding agricultural lands, streambanks, roadsides, and developing urban areas, runoff from livestock wastes and gullies. Pollutants from nonpoint sources are carried to the surface water or groundwater through the action of rainfall runoff, snow melt and seepage.

The following is an overview of the Program:

- The Program is administered by the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (DATCP). It focuses on critical hydrologic units called priority watersheds. The program is implemented through priority watershed projects and locally administered by county Land Conservation Committees (LCCs).
- A priority watershed project is guided by a plan prepared cooperatively by the DNR, DATCP and local units of government, with input from a local citizen's advisory committee. Project staff evaluate the conditions of surface water and groundwater, and inventory the types of land use and nonpoint sources of pollution throughout the watershed. The priority watershed plan assesses nonpoint and other sources of water pollution and identifies Best Management Practices needed to control pollutants to meet specific water resource objectives. The plan guides implementation of these practices in an effort to improve water quality.
- Upon approval by state and local authorities, the plan is implemented by local units of government. Water quality improvement is achieved through voluntary implementation

of nonpoint source controls (Best Management Practices) and the adoption of ordinances. Landowners, land renters, counties, cities, villages, towns, sanitary districts, lake districts and regional planning commissions are eligible to participate.

- Technical assistance is provided to aid in the design of Best Management Practices. State level cost-share assistance is available to help offset the cost of installing these practices. Eligible landowners and local units of government are contacted by the County Land Conservation Departments to determine their interest in voluntarily installing the Best Management Practices identified in the plan. Cost-share agreements are signed listing the practices, costs, cost-share amounts and a schedule for installation of management practices.
- Informational and educational activities are developed to encourage participation.
- The DNR and DATCP review the progress of the counties and other implementing units of government, and provide assistance throughout the 8-year project. The DNR monitors improvements in water quality resulting from control of nonpoint sources in the watershed.

Legal Status of the Nonpoint Source Control Plan

The Upper Yellow River Priority Watershed Plan was prepared under the authority of the Wisconsin Nonpoint Source Water Pollution Abatement Program described in Section 144.25 of the Wisconsin Statutes and Chapter NR 120 of the Wisconsin Administrative Code. It was prepared under the cooperative efforts of DNR, DATCP, the Wood, Clark and Marathon County Land Conservation Departments, local units of government and the Upper Yellow River 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.

Plan Organization

The remainder of this plan is divided into three parts: The Watershed Assessment, A Detailed Program for Implementation and Project Evaluation. The contents of each part are described below:

Part One – The Watershed Assessment

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

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

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

Part Two – Detailed Program for Implementation

Chapter Five. "County Implementation Program" describes the means by 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 Upper Yellow River Watershed.

Part Three – Project Evaluation

Chapter Eight. "Progress Assessments" discusses the means for assessing the amount of nonpoint source control gained through installation of best management practices in the watershed.

Chapter Nine. "Evaluation Monitoring" presents a strategy and schedule for monitoring to determine the water quality impacts of implementing nonpoint source controls in the Upper Yellow River Watershed.

CHAPTER TWO

General Watershed Characteristics

Location

The Upper Yellow River Watershed is a 224-square-mile drainage basin located in central Wisconsin, west of the city of Marshfield (population approximately 20,000). The watershed encompasses portions of Wood, Clark and Marathon Counties (Map 2-1). The Upper Yellow Watershed is a part of the Upper Wisconsin River—Southern Sub-Basin. The Yellow River drains to Castle Rock Lake, the fifth largest inland water body in the state. Castle Rock Lake is a flowage of the Wisconsin River. (See Map 2-2.)

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

Cultural features

Civil Divisions

The Upper Yellow River watershed lies within portions of 20 townships, two cities (Marshfield and Pittsville) and seven towns. Public lands include: North Wood County Park, a 172-acre park with 100 camping units and two small lakes; Lake Dexter Park, a 1,235-acre park with 96 camping units and Lake Dexter, a 298-acre flowage; and a portion of the DNR Sandhill Wildlife Area which includes four flowages: Bullgrass, Middle Marsh, Corner Marsh and East Pots Flowage. Additional small parks include Ebbe Park and the Pittsville City Park.

Population Size and Distribution

The 1991 Watershed population is estimated to be about 9,200 persons. Most of the watershed population, with the exception of the Marshfield area residents, lives outside incorporated areas, in small enclaves of residential development or on farmsteads. Approximately one-eighth of the city of Marshfield is within the watershed. Population growth rates in the watershed increased at a rate of 15% since 1970, and 5% since 1980 in Wood County. Clark Counties population has increased just slightly, at 3% over the last 20 years.

Land Uses

Rural land uses predominate in the watershed. Agricultural and related open space are the most important land uses, comprising 70%. Dairy farming is the primary enterprises, with the average farm size being 160 to 200 acres. Beef herds have become more numerous in recent years. Wood County ranks first statewide in cranberry production. Woodlands are abundant and cover 23% of the land area. Urban land uses occupy less than 3% of the watershed. (See Table 2-1.)

Table 2-1. Summary of Land Uses in the Upper Yellow Watershed

Land Uses	Acres	percent
Agricultural		
pasture	5,082	3%
cropland	89,551	61%
grazed woodlots	6,094	4%
Woodland	33,256	23%
Developed	4,399	3%
Wetland*	2,020	2%
Grassland	5,393	4%

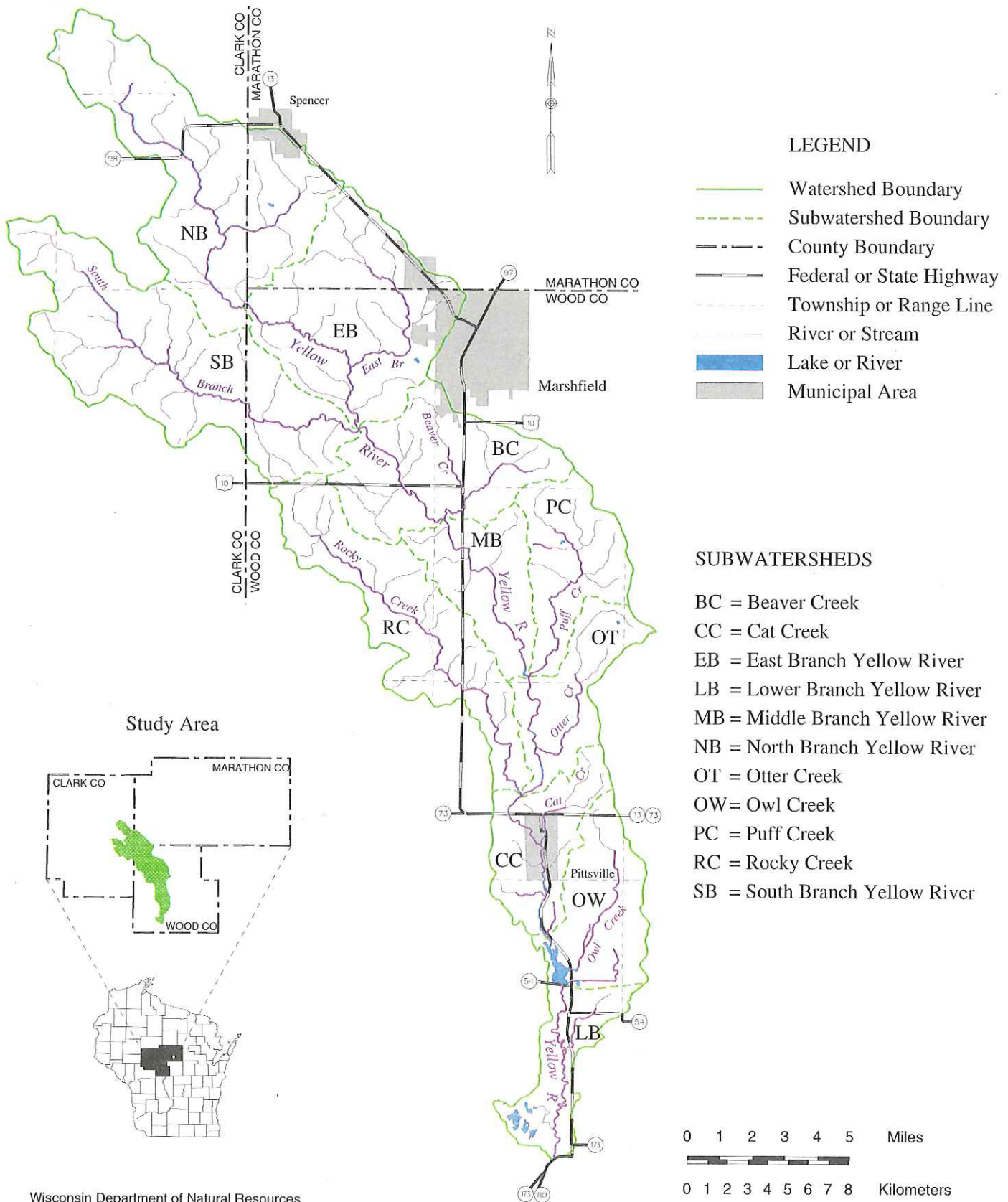
* These are estimates of wetland acres based on WIN inventory data. The estimates are of actual wetland acres, not cropped wet fields. See wetland section in this chapter for a more comprehensive estimate of wetland acreages.

Source: Wood, Clark and Marathon County Land Conservation Departments.

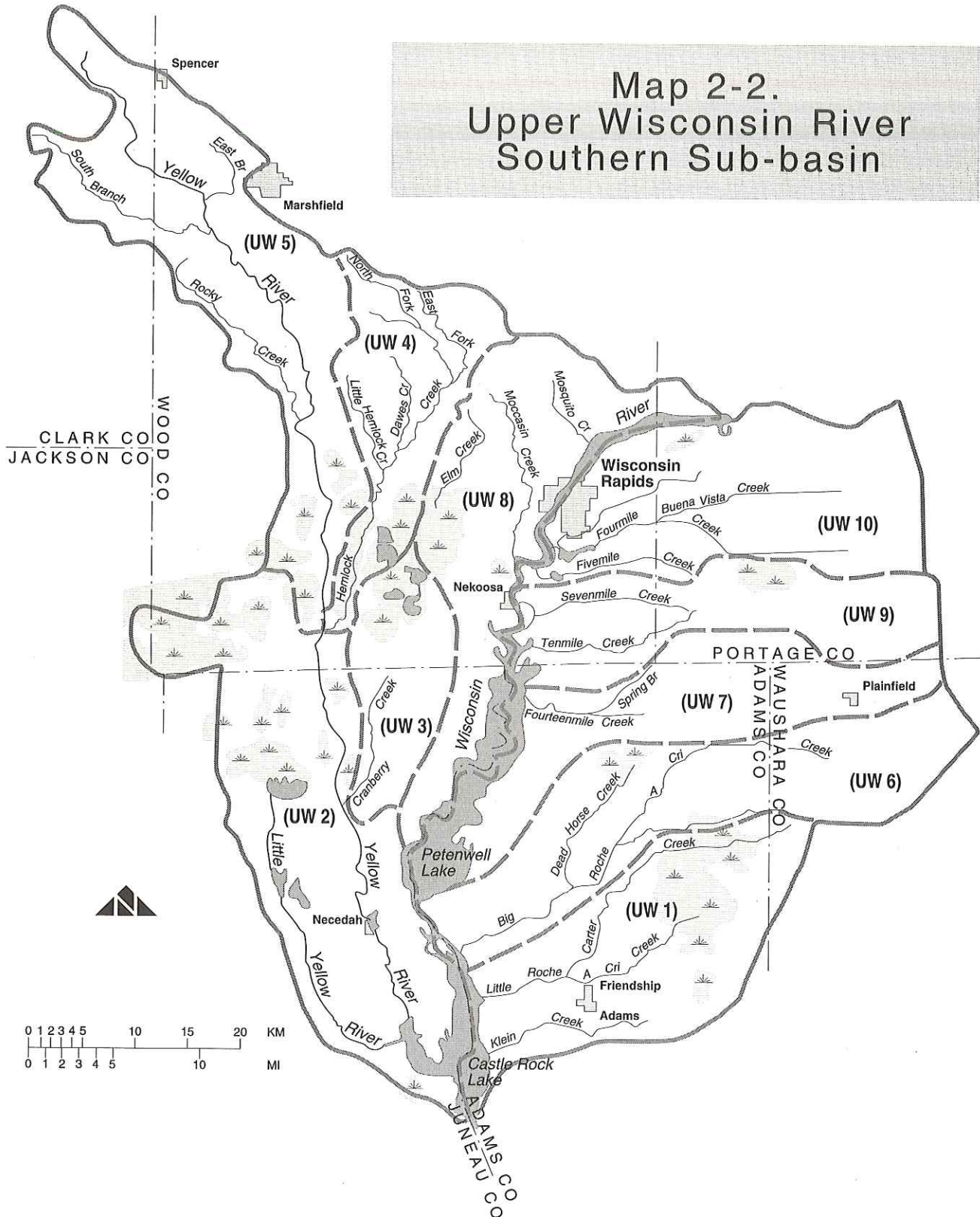
Special Land Uses

Cranberries are Wisconsin's number one fruit crop. The Upper Yellow River Watershed (southern portion) lies just west of an area known as Cranmoor, an intensive cranberry production area (approximately 42 sq. miles). There is just one known cranberry operation in the Upper Yellow River watershed. This operation will be the site of a water quality demonstration project. There will be an overall assessment of the cranberry operation, as with all other types of agriculture, and an evaluation of which best management practices are appropriate.

Map 2- 1. Upper Yellow River Watershed



Map 2-2. Upper Wisconsin River Southern Sub-basin



Watersheds

- | | | | |
|------|--------------------------|-------|-------------------------------|
| UW 1 | Little Roche A Cri Creek | UW 6 | Big Roche A Cri Creek |
| UW 2 | Lower, Yellow River | UW 7 | Fourteen Mile Creek |
| UW 3 | Cranberry Creek | UW 8 | Wisconsin Rapids |
| UW 4 | Hemlock Creek | UW 9 | Seven mile and Tenmile Creeks |
| UW 5 | Upper, Yellow Creek | UW 10 | Fourmile and Fivemile Creeks |

In addition, the priority watershed project has stimulated the formation of a technical advisory committee whose charge will be to evaluate both how the nonpoint source program and the cranberry growers can cooperate to reduce nonpoint source pollution and which best management practices are most appropriate. Members of this committee will be from Wood County Extension, the Wisconsin Cranberry Growers Association, the DATCP and the DNR.

Physical Setting

Climate and Precipitation

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

Topography, Geology and Soils

The Upper Yellow River watershed lies predominantly within the Northern Highlands Region. The southern portion of the watershed is part of the Central Sand Plain.

The Upper Yellow River watershed lies within the southern portion of the Canadian Precambrian Shield, which consists of granite and undifferentiated igneous and metamorphic rocks. These formations are estimated to be 5,000 to 15,000 feet in thickness. Most of the watershed wasn't covered by the most recent glacial advance and as a result, there are none of the natural lakes typical of glaciated areas.

The Yellow River riparian area has organic/alluvial soils. These soils are nearly level and poorly drained sandy and loamy soils that have a sandy and loamy subsoil, and are formed in recent alluvium on the flood plain of streams.

The soils of the Yellow River originate from three major sources: continental glaciation, bedrock weathering and fluvial action. The northern two thirds of the watershed are underlain with soils of the Withee Marshfield Santiago Association. Generally, these soils are silty or loamy, are nearly level to sloping and commonly have restricted permeability in the subsoil, which allows for a high runoff potential.

In the southern portion of the watershed, soils are of the Newson-Meehan association. They are nearly level, poorly drained and somewhat poorly drained, and excessively drained soils that have a sandy subsoil, formed in deep sandy outwash, on outwash plains. This allows for high erosion rates in this region.

Water Resources

Land drainage patterns in the Upper Yellow River Watershed are delineated as 11 individual subwatersheds. All convey surface water directly or via tributaries to the Upper Yellow River. Major tributaries, associated streams, lakes, wetlands and subwatershed divides are shown in Map 2-1. See Table 2-2: General Conditions of Major Water Resources in the Upper Yellow River Watershed.

Table 2-2. General Conditions of Major Water Resources in the Upper Yellow River Watershed

Water Body	Biological Use		Problems Related to Nonpoint Source Pollution
	Current	Potential	
Rivers and Streams			
Beaver Creek	Warmwater Forage Fishery	Same	Nutrients
Cat Creek	Warmwater Forage Fishery	Same	Nutrients
E. Br. Yellow River	Warmwater Sport Fishery	Same	Nutrients
Owl Creek	Warmwater Forage Fishery	Same	Nutrients
Puff Creek	Warmwater Sport Fishery	Same	Nutrients
Rocky Creek	Warmwater Sport Fishery	Same	Nutrients
S. Br. Yellow River	Warmwater Sport Fishery	Same	Silt/Nutrients
Yellow River	Warmwater Sport Fishery	Same	Nutrients/Silt/Flow
Lakes and Impoundments			
Lake Dexter	Warmwater Sport Fishery	Same	Silt/Nutrients
E. Potts Flowage	Warmwater Forage Fishery	Same	None Identified
Bullgrass Flowage	Warmwater Forage Fishery	Same	None Identified
Middle Marsh	Warmwater Forage Fishery	Same	None Identified

Subwatersheds in the Upper Yellow River Watershed

North Branch Yellow River	(NY)
East Branch Yellow River	(EY)
South Branch Yellow River	(SY)
Beaver Creek	(BC)
Rocky Creek	(RC)
Middle Branch Yellow River	(MY)
Puff Creek	(PC)
Otter Creek	(OT)
Cat Creek	(CC)
Owl Creek	(OC)
Lower Branch Yellow River	(LY)

The Yellow River drains to Castle Rock Lake, a 16,000-acre (at full pool) eutrophic impoundment. Castle Rock Lake is the fifth largest inland water body in the state. Castle Rock Lake is part of the Petenwell/Castle Rock Comprehensive Management Plan which began in October of 1991. See the Integrated Resource Management Chapter (Seven) for more detail on the Petenwell/Castle Rock Management Plan.

Streams

Perennial and intermittent streams are the predominant surface water features. Perennial streams, which have a combined length of about 52 miles, maintain at least a small continuous flow throughout most of the year. The Yellow River is the longest perennial stream in the watershed. Other primary streams in the watershed are Beaver Creek, Cat Creek, the South, East and North Branches of the Yellow River, Puff Creek and Rocky Creek. The Yellow River and many other 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 pollution in the watershed. The Yellow River supports a warmwater sport fishery. The fishery status in the remaining streams in the watershed includes warmwater forage fisheries, warmwater sport fisheries and a coldwater fishery.

The watershed has a "flashy" nature which is due to the long slope lengths and the high runoff potential of the soils, soil types and the long, narrow shape of the watershed and subsequent short time of concentration. This creates excessive natural streambank erosion, leaving fish populations vulnerable to flood flows in this 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. Their dynamic nature does allow rapid improvement, however, if pollution sources are reduced.

Lakes

Lake Dexter, a 298-acre eutrophic impoundment in the southern portion of the watershed at Dexterville, has problems with excessive aquatic plant growth, algae blooms and sedimentation. Lake Dexter gets heavy recreational use for picnicking, boating and year-round fishing. There are two small lakes in North Wood County Park: Lake Manakiki and Lake Kaunewinne; and four small flowages in the Sandhill State Wildlife Area: Bullgrass, Middle Marsh, Corner Marsh and East Pots Flowage.

Wetlands

Wetlands are valuable natural resource features. Their values include wildlife habitat, fish spawning and rearing, recreation, attenuation of runoff and flood flows and removal of pollutants. Wetlands are a prominent feature of the landscape in the Upper Yellow River Watershed. Floodplain wetlands, which are mainly south of Lake Dexter in the Yellow River floodplain, support furbearers and water fowl populations and may provide seasonal habitat for sportfish. Wetlands account for 19,360 acres or about 13% of the watershed area.

The wetland areas include wet meadows, marshes, bogs and swamps. They range in size from less than 1 acre to several hundreds of acres. Many of these wetlands have been altered both physically and biologically by agricultural land use practices. Pastured wetlands or wetlands that have been ditched, plowed, or loaded with sediment are common. Drastic vegetational changes have also occurred producing monotypic weed communities with greatly reduced environmental diversity. The loss or alteration of wetlands in the watershed has contributed to increased surface water runoff rates which result in flush loadings of nutrients and sediments to streams and a general destabilization of in-stream habitat conditions. Riparian wetlands are abundant in all of the subwatersheds; however, many of these wetlands have been degraded to the point where they no longer function to moderate flooding or trap nutrients from upland runoff.

A wetland inventory was done to identify existing and modified or converted wetlands for the purpose of protection from degradation or for potential restoration. Information gathered for the inventory included wetland type, cover type, acres, converted or farmed, hydric soils, land use and presence of shoreline buffer. Data were collected on 19,361 wetland acres. Data were gathered from SCS maps, air photos and the Wisconsin Wetland Inventory, hence is a more comprehensive estimate than indicated in Table 2-1. The wetland inventory conducted in the Clark and Wood County portions of the watershed found that of the 19,360 acres of wetlands present, 1,775 acres are degraded due to cattle access. An additional 1,232 acres have been severely degraded or destroyed by conversion to cropland. Fencing/restoring these wetland acres should be a high priority, especially in the North, South and East Branches of the Yellow River and Beaver Creek. See Table 2-3 for Wetland Inventory Summary.

Guidelines for wetland restoration, which will be a component of this project, are outlined in Chapter Four.

Table 2-3. Wetland Inventory Summary: Upper Yellow River Watershed

Subwatershed	Pastured Wetland Acres	Cropped/ Drained Wetland Acres	Total Restorable Wetland Acres	Total Wetland Acres
North Yellow	393	184	577	3,058
South Yellow	268	207	475	1,508
East Yellow	249	184	433	1,340
Beaver Creek	89	180	269	866
Rocky Creek	349	72	421	1,736
Middle Yellow	6	117	123	306
Puff Creek	165	82	247	630
Otter Creek	171	175	346	711
Cat Creek	85	31	116	646
Owl Creek	—	—	—	2,460
Lower Yellow	—	—	—	6,100
Total Acres	1,775	1,232	3,007	19,361

Groundwater Resources

Groundwater in the Upper Yellow River watershed is pumped from aquifers in the Precambrian and Cambrian rock formations and glacial drift. This water meets most of the domestic, livestock and irrigation needs in the watershed.

Regional Aquifers

Groundwater is the main source of drinking water in the Upper Yellow River Priority 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 well is simply 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. Geologic logs and Driller

Construction reports for wells located in the watershed indicate that three major aquifers are used to obtain drinking water. These aquifers consist of the following from the surface down: 1) the Pleistocene aged glacial sand and gravel aquifer; 2) the Cambrian aged sandstone aquifer; and 3) the Precambrian aged granite aquifer.

Driller construction reports indicate that the glacial aquifer is used as a source of shallow groundwater throughout the watershed. Thick, sand and gravel, glacial end moraine deposits occur as hills around the city of Marshfield and to the east. Glacially deposited sand and gravel layers also occur sporadically on hill tops in the northern two thirds of the watershed. Private wells drawing water from glacial till deposits yield between 5 and 500 gallons per minute (gpm).

South of Pittsville, the glacial deposits become sandier. These fine grained sands are lake bottom sediments deposited in glacial lake Wisconsin—a large shallow lake that received glacial meltwater until about 15,000 years ago when it began to dry up.

Below the glacial deposits is a discontinuous Cambrian aged sandstone aquifer identified as the Mount Simon formation in geologic logs. Driller construction reports indicate that the sandstone aquifer is used as a source of water west and south of the Upper Yellow River. Wells open to the sandstone aquifer produce between 3 and 20 gpm.

Construction reports indicate that the granite aquifer is used as a source of groundwater between Pittsville and Bakerville. Groundwater occurs only in fractures in the granite, limiting the amount of water available to private wells. Grus, sometimes called "rotten granite" is present where the granite has been broken up in to coarse fragments by wind and rain. Wells drawing water from the granite produce between less than 1 to 150 gpm.

Direction of Groundwater Flow

Water table maps constructed from driller construction reports (Batten 1989 and Lippelt 1981) show that regional groundwater flow is generally toward the southeast. Localized groundwater flow within the Upper Yellow River watershed appears to be generally southeast toward the Wisconsin River. Depth to groundwater in the watershed varies depending on the aquifer being used for water supply and sometimes the topography. Driller construction reports show depth to groundwater varies between 1 and 115 feet below the ground surface.

Groundwater Quality

Groundwater quality in the Upper Yellow River Watershed is generally considered good.

As part of the Upper Yellow River Watershed Water Quality Appraisal, private well samples were collected and analyzed for nitrates and triazine. Sample analytical results are summarized in Table 2-4. Samples analyzed for nitrate showed concentrations ranging from not detectable to 24.9 milligrams per liter (mg/l). One milligram per liter is comparable to one drop in a 10-gallon fish tank. The groundwater quality enforcement standard (ES) or health advisory level for nitrate is 10 mg/l as defined in Chapter NR 140, Wis. Adm. Code. Nitrate concentrations above 2 mg/l exceed the states preventative action limit (PAL).

**Table 2-4. Well Sampling Results: Upper Yellow River Watershed
Nitrate Sample Analytical Results: Fall 1991**

Subwatershed	Number of Nitrate Samples					
	Less Than 2.0 mg/l	percent	Between 2.0 and 10.0 mg/l	percent	Greater Than 10.0 mg/l	percent
North Branch	28	63	15	33	2	4
South Branch	20	34	30	52	8	14
Beaver Creek	16	48.5	16	48.5	1	3
Middle Yellow	12	60	7	35	1	5
Otter Creek	6	67	1	11	2	22
Puff Creek	10	67	4	27	1	6
Cat Creek	9	37.5	15	62.5	24	—
Owl Creek	5	50	2	20	3	30
East Branch	10	44	11	48	2	8
Rocky Creek	11	69	4	25	1	6
Totals	127	46	105	38	45	16

Triazine Sample Analytical Results: Fall 1991

Subwatershed	Number of Triazine Samples					
	Less Than 0.3 µg/l	percent	Between 0.3 and 3.0 µg/l	percent	Greater Than 3.0 µg/l	percent
North Branch	44	100	—	—	—	—
South Branch	57	98	1	2	—	—
Beaver Creek	29	90	3	10	—	—
Middle Yellow	19	95	—	5	1	—
Otter Creek	5	56	3	33	1	11
Puff Creek	12	80	3	20	—	—
Cat Creek	17	71	7	29	—	—
Owl Creek	6	67	2	22	1	11
East Branch	21	95	1	5	—	—
Rocky Creek	13	81	3	19	—	—
Totals	223	90	23	9	3	1

Enforcement Standard (ES): (Health Advisory Level) The concentration of a contaminant at which the enforcing agency, either the Department of Industry and Human Relations, the DATCP or the 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 (8.1%) sample analytical results exceeded the 10 mg/l ES and 104 (42.1%) exceeded the 2 mg/l PAL. Results so far do not indicate a pattern of groundwater contamination that can be linked to specific sources of nitrate.

Concentrations of triazine in the Upper Yellow River Watershed ranged from not detectable to 5.5 micrograms per liter ($\mu\text{g/l}$). One microgram per liter is comparable to one drop in 10,000 gallons (a small swimming pool). Two sample analytical results (1%) exceeded the ES for atrazine of 3.0 $\mu\text{g/l}$. Twenty four (10.6%) sample analytical results exceeded the PAL of 0.3 $\mu\text{g/l}$ for triazine. As with the nitrate contamination, no specific source of contamination is indicated by the results.

No samples were collected for coliform bacteria or hazardous substances such as volatile organic compounds. Coliform bacteria can be a drinking water problem where a 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 and used.

Potential Groundwater Quality Problems

Tables 2-5a through 2-5d list sites located within or near the Upper Yellow River Priority Watershed which can cause or threaten to cause groundwater contamination according to the WDNR's Solid and Hazardous Waste Program. Specific information on the sites is available from the DNR's North Central District office located in Rhinelander.

Superfund

The Spickler Landfill Superfund site, located near Spencer, has known groundwater contamination by barium, chromium, mercury, toluene and ethylbenzene. Municipal and industrial waste were disposed of in the landfill starting in 1970. The site was closed in 1976 and is currently being used as a tree farm.

Table 2-5a. Potential Groundwater Contamination Sources: Superfund (August 1992)

Site Name	Location	Status	Substance
Spickler Landfill	Spencer	National Priority List	Hydrocarbons and Heavy Metals

Solid and Hazardous Waste Disposal Sites

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 both 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.

Table 2-5b. Potential Groundwater Contamination Sources: Waste Disposal Sites (February 1990)

Site Name	Location
Town of Spencer	City of Spencer
Dickman Homes Landfill	City of Spencer
The Lamplighter	City of Spencer
Village of Spencer	City of Spencer
Village of Spencer (Munc. Waste)	City of Spencer
Village of Arpin-Doug Brockman	Town of Arpin
Ocean Spray Cranberries	Town of Remington
Town of Dexter	Town of Dexter
WI DNR Deer Pit	Town of Dexter
Town of Lincoln	Town of Lincoln
Town of Lincoln-Town of Spencer	Town of Lincoln
City of Marshfield	City of Marshfield
WI DNR	Town of Remington
Ocean Spray Cranberries	Town of Remington
Town of Richfield-Town of Cameron	Town of Richfield
Town of Rock	Town of Rock
Consolidated Badger Coop	Town of Rock
City of Pittsville	Town of Wood
Town of Wood	Town of Wood
Town of Sherman	Town of Sherman
Town of Unity	Town of Unity
Wood County Park	Town of Richfield

Leaking Underground Storage Tank Sites

Active Leaking Underground Storage Tank (LUST) sites are listed in Table 2-5c. 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 2-5c. Potential Groundwater Contamination Sources: Leaking Underground Storage Tanks (April 1992)

Site Name	Location	Status	Substance
Burnette Services	Spencer	Remedial Action	Diesel
Geldernick Property	Spencer	Investigation	Multiple
Jensen Motors	Spencer	Investigation	Multiple
Marathon County	Spencer	Investigation	Other
Spencer High School	Spencer	Investigation	Other
Dexterville Park	Dexter	No Action	Unleaded Gas
Bill's Mini Mart	Pittsville	Investigation	Multiple
Huebl's Service	Pittsville	Unknown	Multiple
Jensen Service	Pittsville	Unknown	Multiple
Chili Corners	Chili	Investigation	Other
Chili Corners	Chili	Investigation	Other
Chili Corners	Chili	Investigation	Other

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.

Reported Spill Sites

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

Table 2-5d. Potential Groundwater Contamination Sources: Spills (April 1991)

Location	Action	Substance
Spencer	No Action	Fuel Oil
Spencer	Cleanup	Diesel Fuel
Spencer	Cleanup	Gasoline
Spencer	No Action	#6 Fuel
Spencer	Investigation	LC-30 Phosphoric Acid
Spencer	Investigation	Diesel Fuel
Spencer	No Action	LC-30 Phosphoric Acid
Spencer	No Action	Sodium Hydroxide Solution
Spencer	Investigation	Diesel Fuel
Spencer	No Action	Diesel Fuel
Spencer	No Action	Hot Vegetable Oil
Spencer	No Action	Waste Oil
Spencer	No Action	Motor Oil
Unity	Investigation	Fuel Oil
Unity	Investigation	Whey
Unity	No Action	Transformer Oil (PCB)
Unity	No Action	PCB Transformer Oil

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.

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 for participation in the program. As a result, the federal Historic Preservation Act of 1966, as amended, and the state historic preservation statute, s. 44.40, Stats., have been blended to produce a cultural resource management program which is both compatible to preserving cultural sites and implementing the watershed project.

Archaeological sites within the Upper Yellow River 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. As discussed above, state and federal laws require preservation of archaeological resources within the framework of the Priority Watershed Program.

The Upper Yellow River Priority Watershed Project will address these concerns with the following procedures:

- Counties will obtain State Historical Society inventory maps from the regional State Historical Society office, and 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.
- Landowners interested in project participation will be asked to complete questionnaires—which will then be sent to the State Historical Society for a 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 Nonpoint Source Coordinator will also be involved in this determination.
- 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 best management practices may need to be considered both before and after the results of the survey.

- 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.

Endangered Resources

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

It should be noted that comprehensive endangered resource surveys have not been completed for the entire Upper Yellow River Priority Watershed. The lack of additional occurrence records does not preclude the possibility that other endangered resources are present in the watershed.

In addition, the Bureau's endangered resource files are continuously updated from ongoing fieldwork. 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. Updates or revisions of this watershed plan should be reviewed by the Bureau of Endangered Resources to include new records.

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 Department of Natural Resources to be in jeopardy on the basis of scientific evidence.

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

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.

The following rare species are found within the Upper Yellow River Priority Watershed:

Wisconsin Endangered Species:

Falco peregrinus anatum, American peregrine falcon*
Sistrurus catenatus, eastern massasauga rattlesnake
Tyto alba, barn owl

Wisconsin Threatened Species:

Buteo lineatus, red-shouldered hawk
Casmerodius albus, great egret
Emydoidea blandingii, Blanding's turtle
Haliaeetus leucocephalus, bald eagle**
Incisalia irus, frosted elfin
Lythrurus umbratilis, redfin shiner

Wisconsin Special Concern Species:

Accipiter cooperii, Cooper's hawk
Botrychium oneidense, blunt-lobed grape fern
Clinostomus elongatus, redbside dace
Hemileuca maia, buck moth
Lycaeides melissa samuelis, Karner blue butterfly***
Satyrium liparops strigosum, striped hairstreak

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

** This species is also on the Federal Endangered Species list as Threatened. A federally Threatened species is any species or subspecies which is likely within the foreseeable future to become endangered throughout all or a significant portion of its range.

*** This species is also a candidate for federal listing.

Natural Areas

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

Bethel Woodlot	Northern dry-mesic forest, northern mesic forest
Black River Floodplain and Sedges	Floodplain forest, northern sedge meadow
Cary Sedge Meadow	Northern sedge meadow, shrub-carr
Cary Wetlands	Northern sedge meadow, stream (fast, soft, cold)
Dexterville Bottoms	Floodplain forest, northern dry-mesic forest
Linsey Bluffs	Northern dry-mesic forest
Marathon Corner Maples	Northern mesic forest
North Wood County Park	Southern mesic forest

Rattlesnake Bog	Northern wet forest, northern sedge meadow
Remington Pines	Northern wet forest, northern sedge meadow, northern dry-mesic forest
Salix Sedge Meadows	Northern sedge meadow, shrub-carr
Seneca Bog and Pines	Northern wet forest
Spencer Bog	Northern wet forest, open bog

If specific locational or other information is needed about these species or natural communities, contact the Bureau of Endangered Resources. 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 are responsible for the degraded conditions of the 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.

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 in the water which fish and other aquatic life require to survive. Also, manure contains nitrogen which can form ammonia in the streams and lakes. In high concentrations the ammonia is toxic to fish and other aquatic life. The nutrients in manure (including nitrogen and phosphorus) also promote nuisance algal and aquatic plant growth in the streams and lakes. Finally, the bacteria found in livestock manure are potentially harmful to livestock drinking the water and to humans using the water for recreation. The sources of manure in this watershed are runoff from barnyards and runoff from field-spread manure.

Slopes and narrow valleys present special manure management problems. Many barnyards and manure-spreading sites are located in close proximity to streams or on steep slopes. In either case, organic loading to streams is usually significant if manure is spread on the surface of the land.

Sediment

Sediment adversely impacts the water resources in many ways. It degrades habitat for fish and aquatic insects which support fish and other forms of aquatic life. High sediment concentrations abrade fish gills making the fish more susceptible to disease. In addition, high sediment concentrations reduce the visibility of fish, which makes it difficult for them to see prey. Suspended sediment also causes the water to be warmer in the summer, and warmwater cannot hold as much oxygen as coldwater. The sources of sediment in this watershed are upland erosion from croplands, streambank erosion and shoreline erosion. Heavy or long term sediment deposits are less problematic in upland streams 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, streambank erosion is the most common form of habitat destruction.

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 levels of nitrates may also indicate other contaminants in the drinking water. 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

Streams

Named streams in this watershed include the Upper Yellow River, Beaver Creek, Cat Creek, the South, East and North Branches of the Yellow River, Rocky Creek, Puff Creek, Owl Creek and Otter Creek. The Upper Yellow River is the primary stream in the watershed. It begins as an intermittent stream in southeastern Clark County and flows southeasterly for approximately 52 miles, where it empties into Castle Rock Lake, a flowage of the Wisconsin River. The Upper Yellow River is classified as a warmwater sport fishery and is known for its variation in flow.

Rocky Creek has a small segment of Class I trout stream. Puff Creek, portions of Rocky Creek and the East and West Branches of the Yellow River support a warmwater sport fishery. Beaver Creek, Cat Creek, portions of the East Branch Yellow River and Owl Creek are classified as warmwater forage fishery.

Recreational Uses

The watershed's streams, wetlands and lakes offer diverse recreational opportunities. The most popular activities are fishing, picnicking and canoeing on Lake Dexter and on the lakes in North Wood County Park. Lake Dexter is used for a wide range of recreational activities. It is of regional importance because it draws people from the surrounding area where there are very few lakes large enough for most boating or deep enough to support a quality fishery. Recreational facilities on the lake include a Lake Dexter Park which has campgrounds, picnic areas and several boat landings.

Water Quality Objectives

The DNR staff with assistance from the Wood, Clark and Marathon County staff and the DATCP 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 Upper Yellow River Appraisal Monitoring Report (Herman, 1992).

Following are the general objectives for streams and lakes:

1. **Protection**—Protection refers to maintaining the present biological and recreational uses supported by a stream or the reservoir. For example, if a stream supports a healthy coldwater fishery and is used for full-body contact recreational activities, the objective seeks to maintain those uses.
2. **Enhancement**—Enhancement refers to a change in the overall condition of a stream or lake within its given biological and recreational use category. For example, if a stream supports a warmwater fishery whose diversity could be enhanced, the objective focuses on changing those water quality conditions which keep it from achieving its full biological potential.
3. **Improvement**—Improvement refers to upgrading the existing capability of the resource to support a higher category of biological use. An example would be a stream which historically supported healthy populations of warmwater game fish, but no longer does. This objective seeks to improve conditions allowing viable populations of forage and warmwater game fish species to become reestablished.

The water quality conditions needed to support the 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.

Subwatershed Discussions

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

COLD = Coldwater Communities; include surface waters capable of supporting a community of coldwater fish and other aquatic life or serving as a spawning area for coldwater fish species.

WWSF = Warmwater Sport Fish Communities; include surface waters capable of supporting a community of warmwater sport fish and/or serving as a spawning area for warmwater sport fish.

WWFF = Warmwater Forage Fish Communities; include surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.

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 Upper Yellow River watershed.

North Branch Yellow River (NY)

Subwatershed Description

The North Branch of the Yellow River subwatershed is located in east central Clark County and southwest Marathon County. Principle surface waters include the mainstream of the Yellow River, 4 perennial streams and 15 intermittent tributaries. There are approximately 38 miles of stream and tributary in this subwatershed. The North Branch of the Yellow River drains 35.2 square miles of which 25.2 miles are in Clark County and 10 miles are in

Marathon County. From its source, the North Branch of the Yellow River flows through a series of large wetlands in Unity township of Clark County. The North Branch continues to flow through wetlands, small woodlots and agricultural areas until it reaches the East Branch of the Yellow River. Many of the intermittent streams are essentially agricultural waterways. (See Map 3-1.)

Map 3- 1. North Branch Yellow River Subwatershed

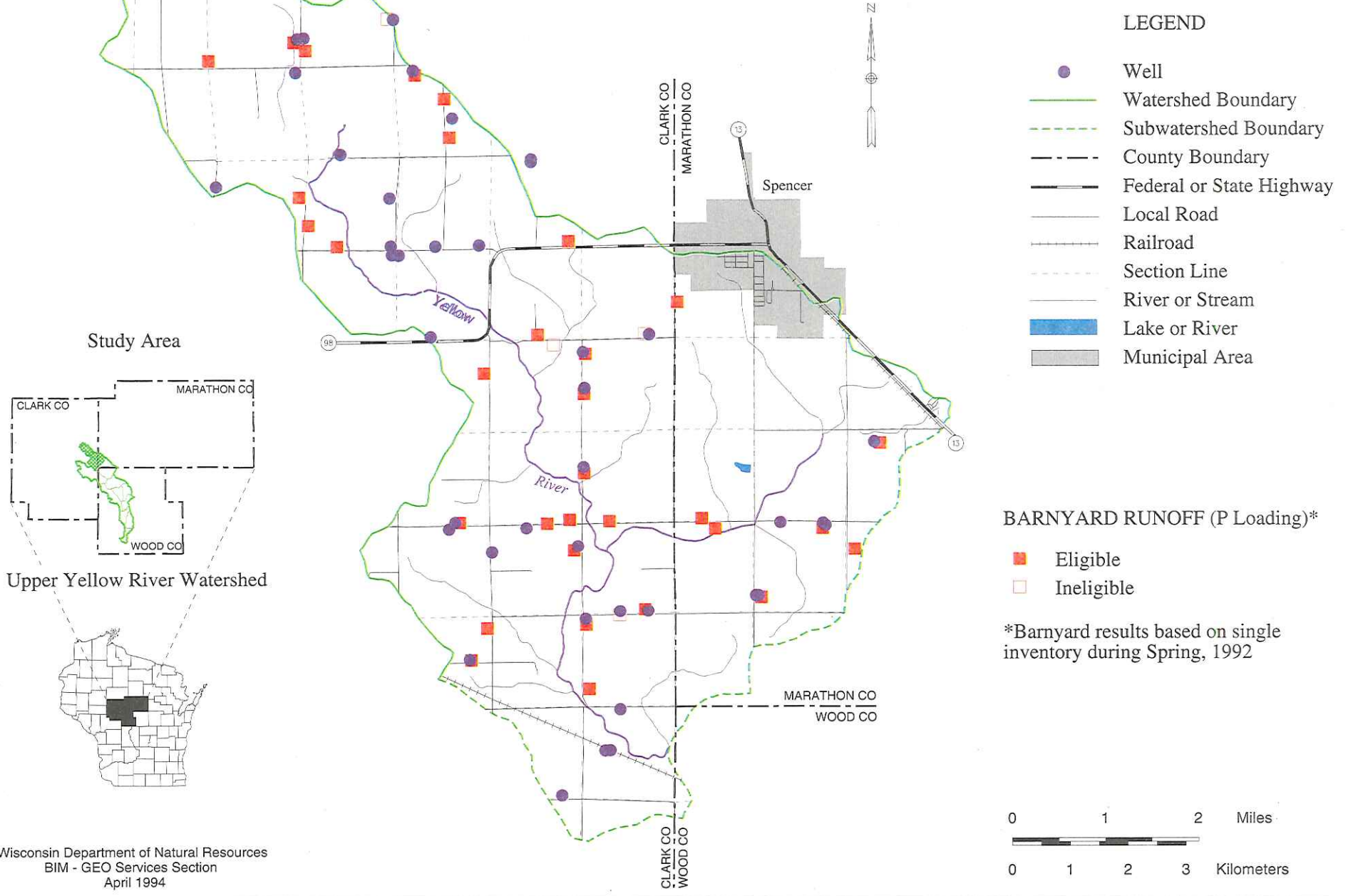


Table 3-1. Water Resource Conditions and Objectives for the Upper Yellow River Watershed

Stream Name	Length (Miles)	Supporting Biological Use* Current Use/Miles	Potential Use/Miles	Observed Potential Use Fully-Part-Not (Miles)	Use Classification	Limiting Factors***	Or Potential Sources***	Water Resource Goals
Beaver Creek	0-4	WWFF/4.0*	Same		DEF	CL/NUT		
Cat Creek	0-4	WWFF/2.0 ^f	Same		DEF	CL,SD,PWL,PSB,BY/NUT		
East Branch Yellow River	0-7.0	WWSF/7.0 ^f	Same	7.0	DEF	CL,SB,PWL,BY,URB/NUT		
	7.0-9.0	WWFF/2.0 ^f	Same	2.0	DEF			
Owl Creek	0-5	WWFF/5.0*	Same		DEF			
Puff Creek	0-8	WWSF/8.0*	Same	8.0	DEF	CL,PWL,BY/NUT		
Rocky Creek	0-14	WWSF/14.0 ^f	Same	14	DEF	CL,BY,PWL/NUT	17/.25	
	14.0-14.3	COLD/0.3 ^b	Same	0.3	ERW			
	14.3-17.0	Class I WWSF/2.7	Same	2.7	DEF			
South Branch Yellow River	0-18	WWSF/18.0*	Same	18.0	DEF	CL/BY,PWL/NUT		
Yellow River	39.0-99.0	WWSF/60.0*	Same	60.0	FAL	CL,BY,PWL,SB,PSB/SILT, BUT,PSM/	60/1.89	
UN Creek (T23N, R3E, S10, SESW)	0-3.0	LFF ^a /3.0	Same	3.0	LFF	BY,PWL/NUT,DBAM/HAB, FLOW,PSM/		
	3.0-5.0	LAL ^a /2.0	Same	2.0	LAL			
UN Ditch (T22N, R3E, S23, NENW)	0-2.0	Unknown/2.0			DEF	CM/		
20 UN Creeks	0-33							
8 UN Ditches	0-8.0							
Subtotals		COLD/0.3 WWSF/109.7 WWFF/13.0 LFF/3.0 LAL/2.0 UNKNOWN/43	COLD/0.3 WWSF/109.7 WWFF/13.0 LFF/3.0 LAL/2.0 UNKNOWN/43					
Totals				5.0 112				
38 Streams	171 miles			Unknown 54.0			171/2.04	

Table 3-1. Water Resource Conditions and Objectives for the Upper Yellow River Watershed

LEGEND:

- ^a The existing use classification listed in NR 104.
- ^b Trout stream identified in the "blue" Trout Stream Book (DNR, 1990).
- ^c A formal classification or classification review has been completed and approved. (These are classifications that have been completed but for one reason or another will not appear in NR 104.)
- ^d A formal classification or classification review has been completed. Based on this analysis the current NR 104 is incorrect and should be changed the next time NR 104 is revised.
- ^e Recent studies or the professional judgement of a fish manager or aquatic biologist familiar with the water indicates this is the biological use the stream is currently meeting or has the potential to meet.
- ^f Other information used.
- ⁻ Biological Use, Existing: This column indicates the existing biological use supported by the stream as defined in NR 102 (04)(3) under fish and aquatic life uses.

- COLD - coldwater communities
- WWSF - warmwater sport fish communities
- WWFF - warmwater forage fish communities
- LFF - limited forage fishery (intermediate surface waters)

Biological Use, Potential: This column indicates the biological use a stream or stream segment could meet if it was well managed and pollution sources controlled. In many cases the potential use is the same as the existing use. In other streams potential use may be higher than the existing use. Abbreviations are the same as those used in the existing use columns. The sources of information are indicated by footnotes on each table. The classifications for trout streams came from "Wisconsin Trout Streams" (DNR Publ. 6-3600(80)).

Supporting Potential Use: This column indicates whether a stream is fully, partially, or not meeting its potential biological use. An entry in any of the columns indicates the relationship between actual stream use and potential use. For example, if the entire length of a stream is listed under the "Fully" column, the stream has no problems which can be controlled. When a portion or all of a stream length is listed under another heading the stream is affected by some manageable factor, and the biological use of the stream can probably be improved.

LEGEND:

Limiting Factors

- HAB - Habitat (lack of cover, sedimentation scouring etc.)
- SED - Sedimentation (filling in of pools)
- TEMP - Temperature (extreme high for trout)
- DO - Dissolved Oxygen (to low)
- FLOW - Flooding or fluctuating water levels
- ALG - Algae (abundant)
- NUT - Nutrient enrichment
- TURB - Turbidity
- BAC - Bacteria (MMFCC/100ml)

Observed or Potential Sources

- NPS - Unspecified nonpoint sources
- CL - Cropland erosion
- SL - Shoreline erosion
- SB - Streambank erosion
- PSB - Streambank pasturing
- BY - Barnyard or exercise lot runoff
- PSM - Point source, municipal treatment plant discharge
- PSI - Point source, industrial discharge (rotten granite pit dewatering)

Water Quality Conditions

Natural conditions that hamper fish communities in this subwatershed include low flows and low stream gradients. Biotic index values from 1978 and 1990 were poor. The North Branch of the Yellow River is classified as a warmwater sport fishery.

Nonpoint Source Pollutants

- The North Branch Yellow River subwatershed contains 38 animal lots, which add 1,891 pounds of phosphorus annually. This represents 18% of the phosphorus from the entire watershed.
- Upland sediment delivery in the North Branch subwatershed is 8,540 tons annually, or 16% of the entire watershed load. Cropland, which is the major sediment source, contributes 84% of the upland sediment delivered in this subwatershed.
- Streambank erosion contributes 2 tons of sediment annually. This is 0.4% of the total streambank erosion in the watershed.

Water Resource Objectives

Enhance the warmwater sport fish population by:

- Reducing phosphorus loading by a high level.
- Reducing sediment delivery to subwatershed streams by a medium level.
- Restoring eroded and/or trampled streambanks and maintain stream corridors by a low level.
- Restoring drained and/or degraded wetlands.

South Branch Yellow River (SY)

Subwatershed Description

The South Branch of the Yellow River subwatershed is located in east central Clark County and northwest Wood County. Principle surface waters include the South Branch of the Yellow River, 3 perennial and 22 intermittent tributaries to the South Branch. There are approximately 49 miles of stream and tributaries that drain this subwatershed. From its origin in Loyal and Fremont townships in Clark County, the South Branch of the Yellow flows southeast through wetland and agricultural areas until it joins the Beaver Creek subwatershed. The upper portion of the subwatershed has more wetland areas and lesser densities of cattle. The lower portion of the South Branch and its tributaries flow through the upland agricultural areas of Southern Lincoln township, thus there is more erosion and trampled areas due to cattle access. (See Map 3-2.)

Water Quality Conditions

The South Branch of the Yellow River is classified as a warmwater sport fishery. The 1990 biotic index was good.

Nonpoint Source Pollutants

- The South Branch subwatershed contains 54 animal lots which contribute 2,444 pounds of phosphorus annually. This represents 23 % of the phosphorus for the entire watershed.
- The upland sediment delivery in the South Branch subwatershed is 10,542 tons annually, or 19% of the entire watershed load. Cropland, which is the major sediment source in this subwatershed, contributes 91 % of the upland sediment delivered in this subwatershed.
- Gully erosion contributes 3 tons of sediment annually.
- Streambank erosion contributes 5 tons of sediment annually. This is 1 % of the total streambank erosion in the watershed.

Water Resource Objectives

Enhance the warmwater sport fish population by:

- Reducing the phosphorus loading by a high level.
- Reducing sediment delivery to subwatershed streams by a medium level.
- Restoring eroded and/or trampled streambanks and maintaining stream corridors by a medium level.

East Branch Yellow River (EY)

Subwatershed Description

The East Branch of the Yellow River subwatershed is in southwest Marathon and northwest Wood Counties. Much of the land in this area is used for agricultural purposes. Wetlands are numerous, especially in the upper reaches of the subwatershed, while the lower portions drain many highly erodible areas. Streams include the Main Branch of the Yellow River and East Branch of the Yellow River and 37 intermittent tributaries. Many of the tributaries are now agricultural waterways. Stream length in this subwatershed is 39 miles. These streams drain 28.2 square miles. Several tributary streams drain portions of urban and developing areas of the city of Marshfield. There are also several segments of stream in this subwatershed that have experienced severe degradation due to cattle access. (See Map 3-3.)

Map 3- 2. South Branch Yellow River Subwatershed

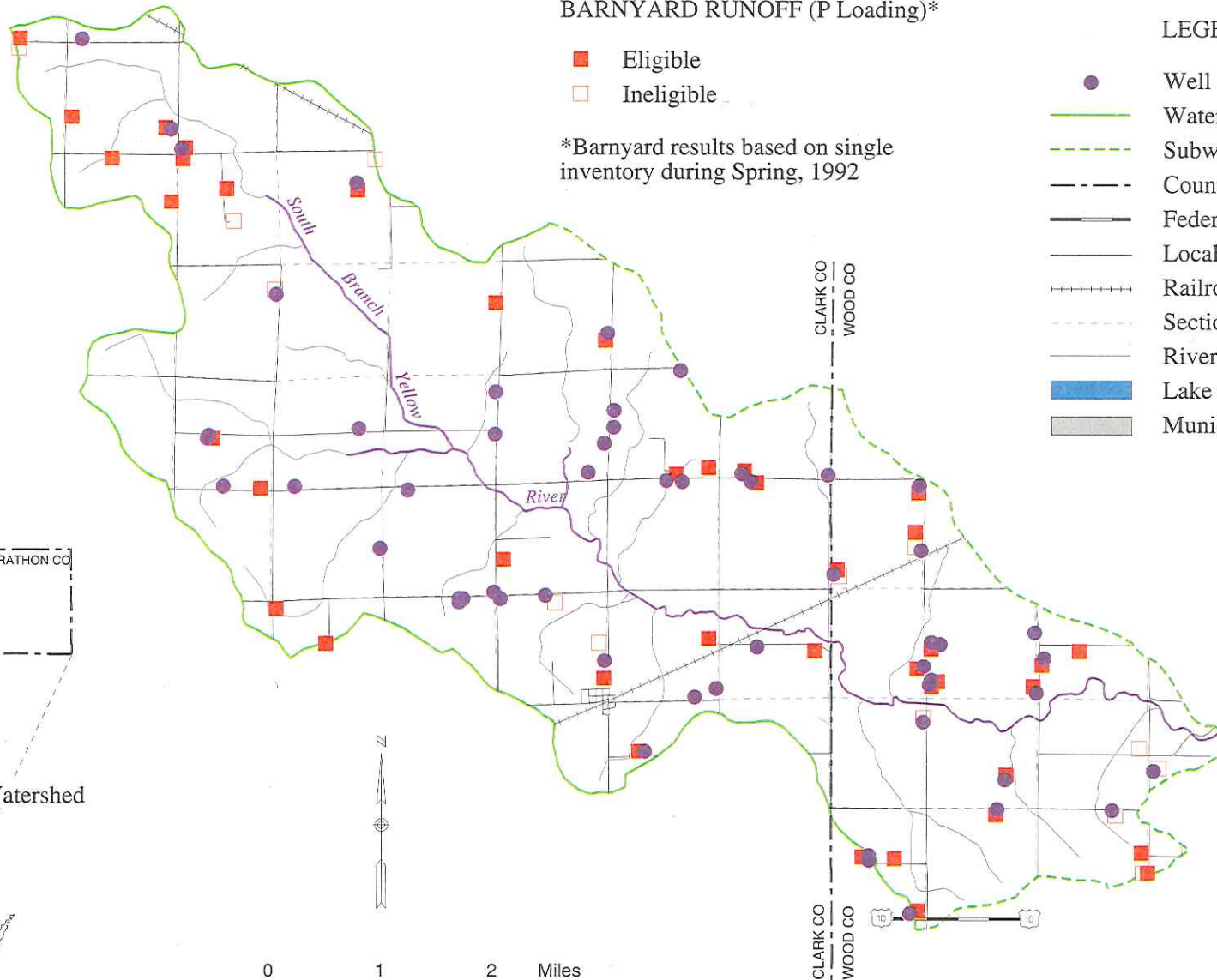
BARNYARD RUNOFF (P Loading)*

- Eligible
- Ineligible

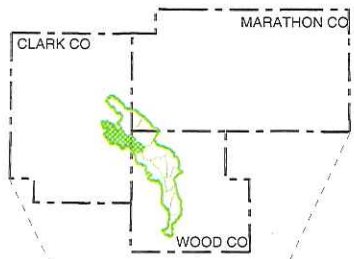
*Barnyard results based on single inventory during Spring, 1992

LEGEND

- Well
- Watershed Boundary
- - - Subwatershed Boundary
- - - County Boundary
- Federal or State Highway
- Local Road
- ++++ Railroad
- - - Section Line
- River or Stream
- Lake or River
- Municipal Area



Study Area



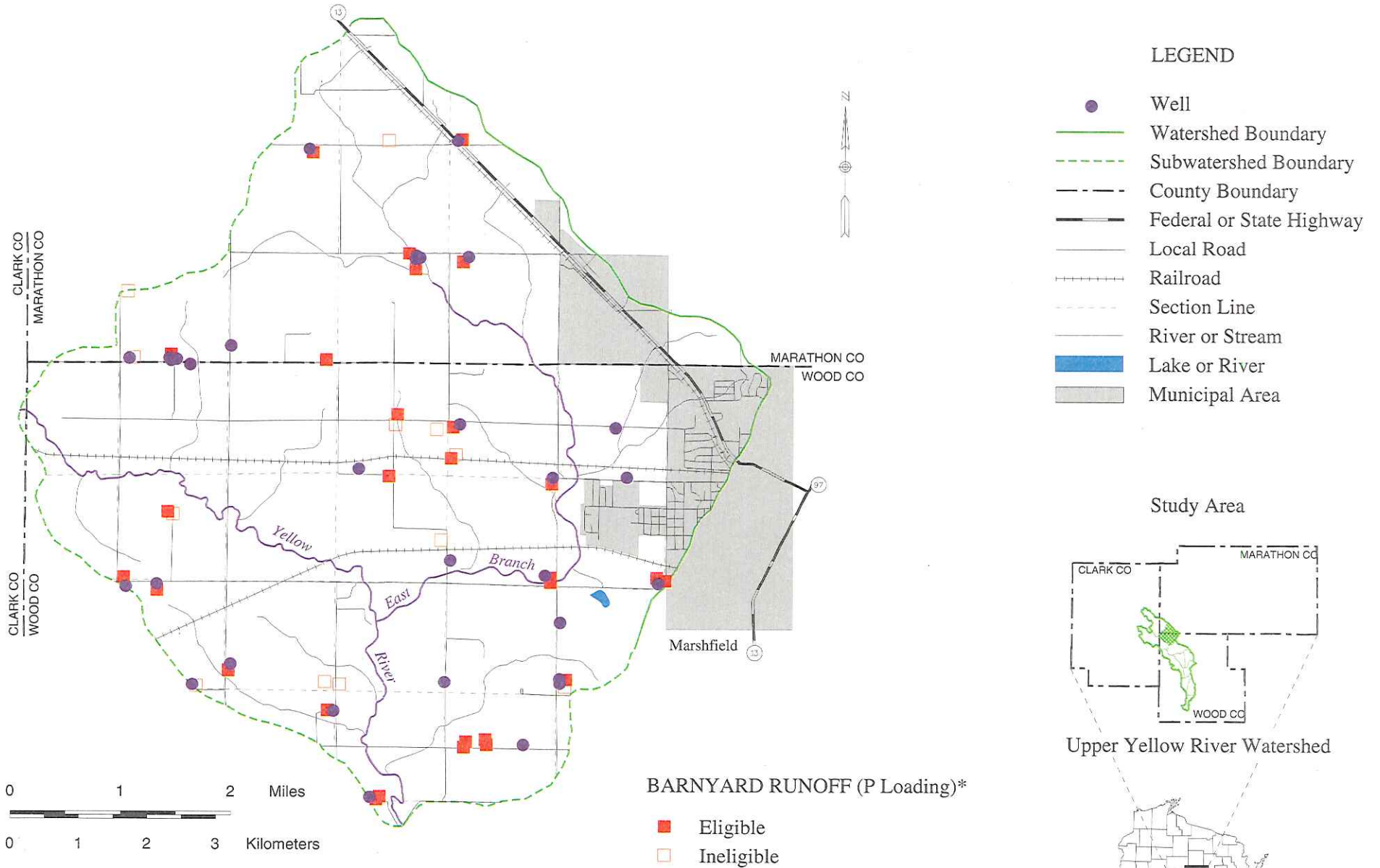
Upper Yellow River Watershed



0 1 2 Miles

0 1 2 3 Kilometers

Map 3- 3. East Branch Yellow River Subwatershed



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

*Barnyard results based on single inventory during Spring, 1992

Water Quality Conditions

The upper portions of the East Branch are listed as warmwater forage fishery, while the lower portion is classified as a warmwater sport fishery. Biotic index values range from fair to good in sampling done in 1989–1991.

Nonpoint Sources

- The East Branch subwatershed contains 38 animal lots which contribute 1,957 pounds of phosphorus annually. This represents 18% of the phosphorus load of the entire watershed.
- Upland sediment delivery in the East Branch subwatershed is 9,558 tons/year, or 18% of the entire watershed load. Cropland, which is the major sediment source in this subwatershed, contributes 81% of the upland sediment delivered in this subwatershed.
- Gully erosion contributes 7 tons of sediment annually.
- Streambank erosion contributes 22 tons of sediment annually. This is 4.6% of the total streambank erosion in the watershed.

Urban nonpoint sources include construction site erosion and runoff from paved surfaces.

Water Resource Goals and Objectives

Enhance the warmwater sport fish population by:

- Reducing the phosphorus loading by a medium level.
- Reducing sediment delivery to subwatershed streams by a high level.
- Restoring eroded and/or trampled streambanks and maintaining stream corridors by a high level.

Beaver Creek (BC)

Subwatershed Description

The Beaver Creek subwatershed is located in northwest Wood County. Principle surface waters include Beaver Creek, one perennial tributary, 10 intermittent tributaries, as well as portion of the main stem of the Yellow River. Total stream and tributary length is 27 miles. These streams drain 20.8 square miles. Beaver Creek originates in and travels through predominantly agricultural lands. (See Map 3-4.)

Water Resource Conditions

The Upper portion of Beaver Creek's main stem is intermittent, with only stagnant pools remaining throughout much of the summer. This condition limits the biological classification of Beaver Creek to warmwater forage fishery. The portion of the Yellow River in this subwatershed is classified as a warmwater sport fishery; however, low flows and lack of cover severely limit fishery potential. Biotic indices range from fair to good. Samples taken in 1991-1992 indicate high bacteria levels.

Nonpoint Sources

- Beaver Creek has 32 animal lots which contribute 1,417 pounds of phosphorus annually. This is 13% of the total watershed phosphorus load.
- Upland sediment contributes 5,202 tons annually, which is 10% of the entire watershed sediment load. Cropland, which is the major sediment source in this subwatershed, contributes 90% of the upland sediment delivered in this subwatershed.
- Streambank erosion in Beaver Creek contributes 1 ton of sediment annually. This is 0.2% of the total sediment in the watershed.

This subwatershed has one of the highest upland erosion rates in the entire watershed. Beaver Creek and several of its tributaries also are degraded due to cattle access in some segments.

Water resource problems include streambank pasturing, streambank erosion, cropland erosion and flashy flow conditions. Bacteria levels can be high (1100/100 ml) indicating organic loading. Nutrients are also causing abundant filamentous algae growth.

Water Resource Goals and Objectives

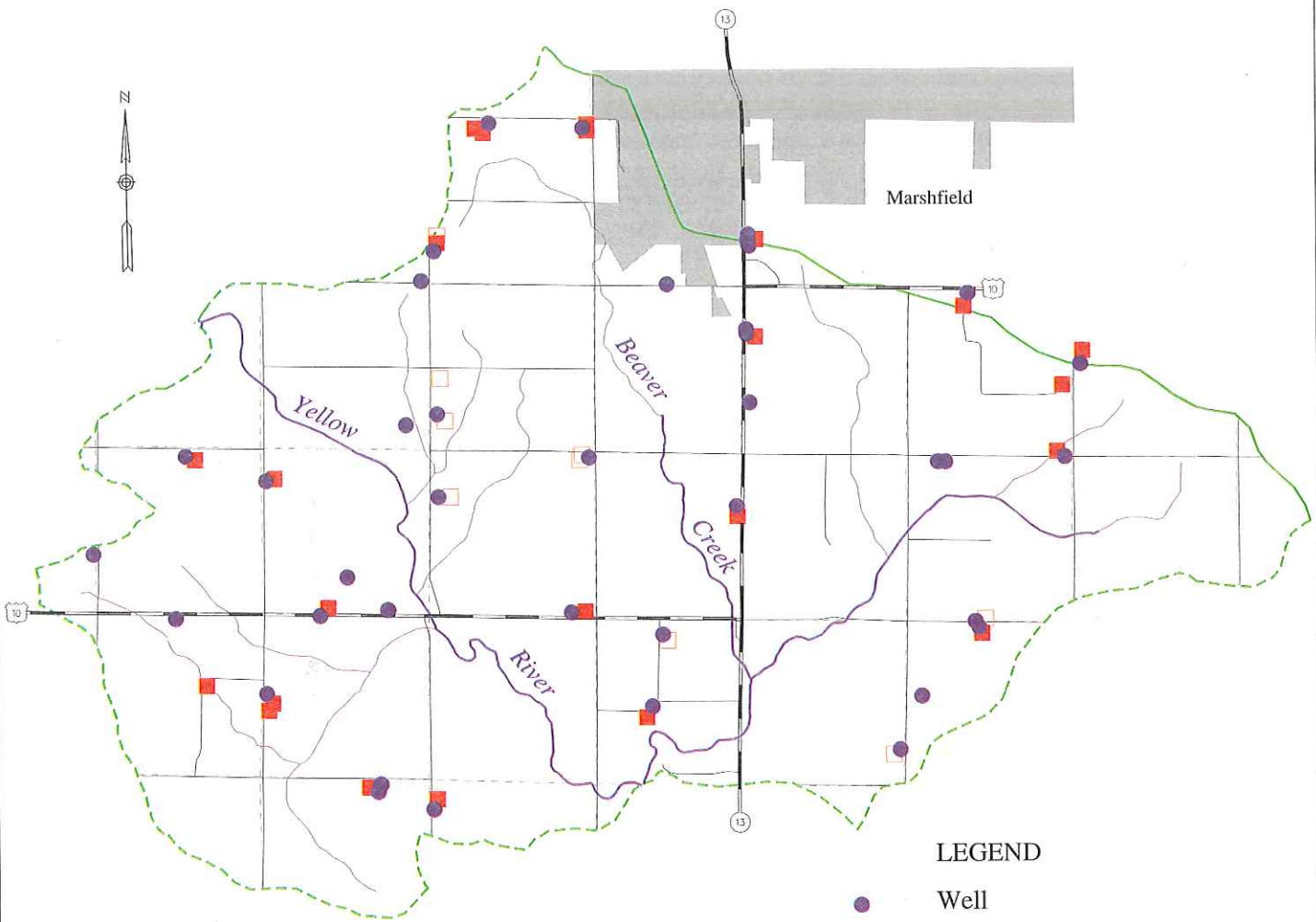
Enhance the warmwater sport fish population by:

- Reducing the phosphorus loading by a high level.
- Reducing sediment delivery to subwatershed streams by a high level.
- Restoring eroded and/or trampled streambanks and maintaining stream corridors by a medium level.
- Improving dissolved oxygen levels by reducing BOD loadings.

Meet NR 102 Water Quality Standards for Wisconsin Surface Waters for "recreational use" by:

- Reducing bacterial levels to meet the standard: membrane filter fecal count may not exceed 200 per 100ml as a geometric mean based on not less than five samples per month, nor exceed 400 per 100 ml in more than 10% of all samples during any month.

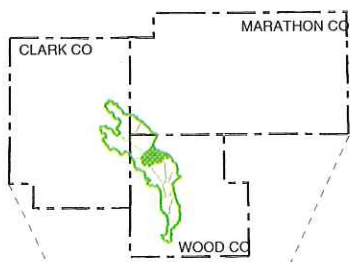
Map 3- 4. Beaver Creek Subwatershed



LEGEND

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

Study Area



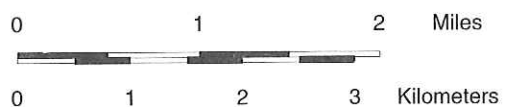
Upper Yellow River Watershed



BARNYARD RUNOFF (P Loading)*

- Eligible
- Ineligible

*Barnyard results based on single inventory during Spring, 1992



Rocky Creek (RC)

Subwatershed Description

The Rocky Creek subwatershed is located in northwest and west central Wood County. Principle surface waters include the main stem of Rocky Creek, 4 perennial tributaries and 19 intermittent tributaries. Streams and tributaries in this subwatershed have a total length of 31 miles and drain 23 square miles.

Rocky Creek originates from spring seepage and surface runoff in northwest Wood County and flows southeasterly before reaching the Yellow River. Land use intensity varies greatly in this subwatershed. The creek travels through large wooded and wetland areas interspersed with a few areas of relatively high intensity agricultural use. (See Map 3-5.)

Water Quality Conditions

Native Brook Trout have been found in Rocky Creek in isolated spring fed areas; however, much of the stream is classified as a warmwater sport fishery. Beaver activity has also impacted Rocky Creek to the extent of reducing suitable habitat for Brook Trout. Biotic indices range from fair to good in samples taken between 1978 and 1991.

Nonpoint Source Pollutants

- The Rocky Creek subwatershed has 18 barnyards which contribute a total of 781 pounds of phosphorus annually. This is 7% of the total phosphorus load for the watershed.
- The subwatershed delivers 4,465 tons of upland sediment annually, which is 8% of the entire watershed sediment load. Cropland, which is the major sediment source in this subwatershed, contributes 79% of the upland sediment delivered in this subwatershed.
- Streambank erosion produces 5 tons of sediment annually, which is 1% of the total sediment load.

Streambank erosion is not as significant in this subwatershed as in others, although, there are areas that have been significantly degraded due to cattle trampling the streambank. Upland erosion is also significant in the upper reaches of this subwatershed. There appears to be a problem with the number of beavers in this subwatershed, which may be affecting trout populations.

Water Resource Goals and Objectives

Enhance the warmwater sport fish population by:

- Reducing the phosphorus loading by a high level.
- Reducing sediment delivery to subwatershed streams by a high level.
- Restoring eroded and/or trampled streambanks and maintaining stream corridors by a high level.

Management of the beaver population will help revive the trout population of Rocky Creek.

Middle Branch of the Yellow River (MY)

Subwatershed Description

The Middle Branch of the Yellow River subwatershed is located in west central Wood County. Principle surface waters include the mainstream of the Yellow River as well as two intermittent tributaries. The River and tributaries in this subwatershed have a total length of 13 miles and drain 12 square miles. The Middle Branch subwatershed starts downstream of the confluence of the Yellow River and Beaver Creek, and continues to the confluence of the Yellow River and Puff Creek. (See Map 3-6.)

Generally, agricultural land use is on the decline in this subwatershed although, there are some negative impacts as a results of agricultural land use practices. There is no cattle access directly to the Yellow River in this subwatershed.

Water Resource Conditions

The Middle Branch of the Yellow River is classified as a warmwater sport fishery.

Lake Kaunewinne is an impoundment on the Yellow River located in North Wood County Park. The lake is 4.8 acres in size and maximum depth is 6.5 feet. It supports a Bass/panfish fishery. The lake is connected to an adjacent swimming area in which fecal bacteria counts have exceeded state recreational use standards. Biotic index values from samples taken from 1989-1991 were good.

Map 3- 5. Rocky Creek Subwatershed

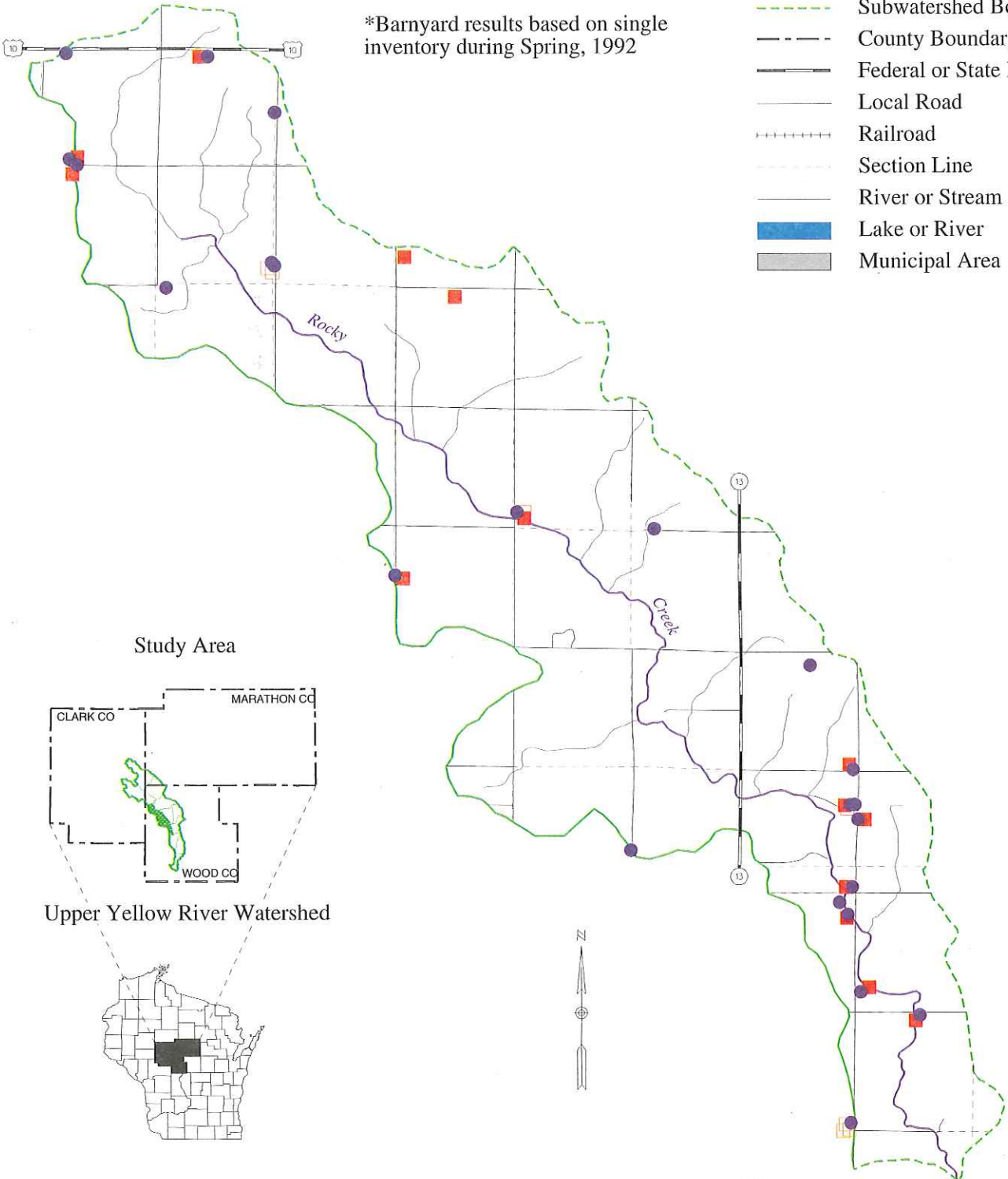
BARNYARD RUNOFF (P Loading)*

- Eligible
- Ineligible

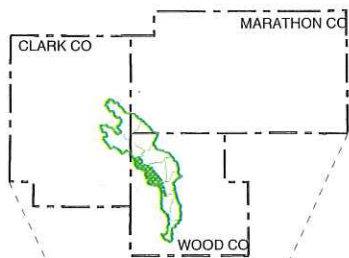
*Barnyard results based on single inventory during Spring, 1992

LEGEND

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



Study Area



Upper Yellow River Watershed



0 1 2 Miles

0 1 2 3 Kilometers

Nonpoint Sources

- The Middle Yellow subwatershed has 15 barnyards which contribute 625 pounds of phosphorus annually. This is 6% of the total phosphorus load in the entire watershed.
- Upland sediment erosion in the Middle Yellow is 1,864 tons annually, which is 3% of the sediment load from the entire watershed. Cropland, which is the major sediment source in this subwatershed, contributes 76% of the upland sediment delivered in this subwatershed.
- Streambank erosion is not a contributor of sediment in this subwatershed.

Generally, agricultural land use is on the decline in this subwatershed although, there are some negative impacts as a result of agricultural practices. There is no cattle access directly to the Yellow River in this subwatershed.

Water Resource Goals and Objectives

Enhance the warmwater sport fish population by:

- Reducing the phosphorus loading by a medium level.
- Reducing sediment delivery to subwatershed streams by a medium level.

Continue to meet NR 102 Water Quality Standards for Wisconsin Surface Waters for "recreational use" by:

- Reducing bacterial levels to meet the standard: membrane filter fecal count may not exceed 200 per 100 ml as a geometric mean based on not less than five samples per month, nor exceed 400 per 100 ml in more than 10% of all samples during any month.

Puff Creek (PC)

Subwatershed Description

The Puff Creek subwatershed is located in west central Wood County. Principle surface waters include the main stem of Puff Creek, one perennial and seven intermittent tributaries. Total stream and tributary length is 17 miles. Streams in this subwatershed drain 13 square miles. From its origin, Puff Creek flows through predominantly agricultural lands until it reaches Lake Manakiki on the Yellow River in North Wood County Park. (See Map 3-6.)

Water Resource Conditions

Puff Creek is listed as a warmwater sport fish community. 1990 biotic index values were good.

Nonpoint Source Pollutants

- There are 17 barnyards in the Puff Creek subwatershed, which contribute 482 pounds of phosphorus annually. This is 4% of the total watershed-wide phosphorus load.
- Upland sediment contributes 821 tons of sediment annually, which is 2% of the watershed-wide sediment load. Cropland, which is the major sediment source in this subwatershed, contributes 50% of the upland sediment delivered in this subwatershed.
- Streambank erosion is not a contributor of sediment in this subwatershed.

There is heavy agricultural land use throughout the upper portion of the Puff Creek subwatershed. Sections of the Creek are significantly impacted by cattle trampling and subsequent erosion. A large wooded wetland system adjacent to the lower portion of the stream appears to help restore water quality on the stream.

Water Resource Goals and Objectives

Enhance the warmwater sport fish population by:

- a) Reducing the phosphorus loading by a high level.
- b) Reducing sediment delivery to subwatershed streams by a medium level.
- c) Restoring eroded and/or trampled streambanks and maintaining stream corridors by a high level.

Otter Creek (OT)












Subwatershed Description

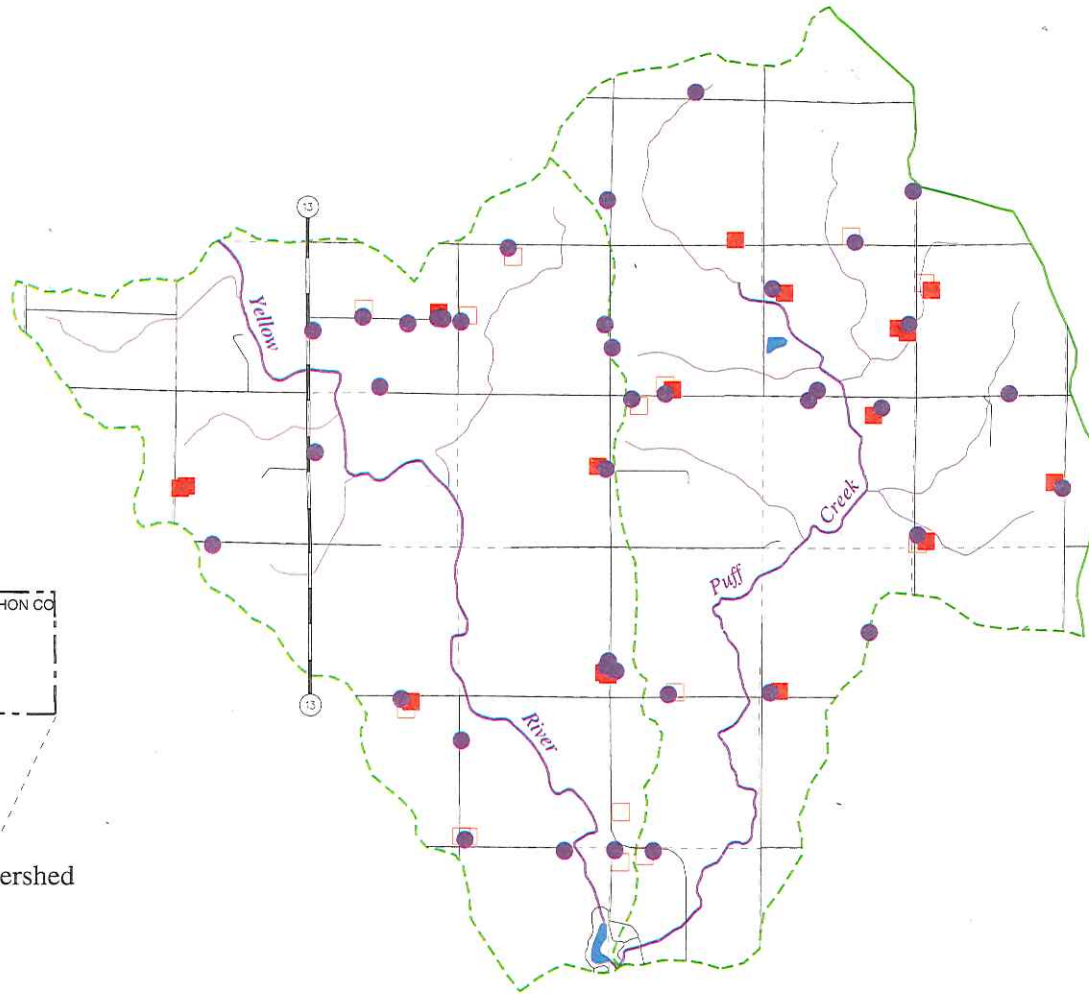
Otter Creek subwatershed is located in north central Wood County. Principle surface waters include the main stem of Otter Creek, a portion of the Yellow River, which includes Lake Manakiki and seven intermittent tributaries. Total stream and tributary length in this subwatershed is 14 miles. The streams in this subwatershed drain 11 square miles. From its source, Otter Creek flows southwest through agricultural lands to its confluence with the Yellow River. (See Map 3-7.)

Map 3- 6. Middle Branch Yellow River and Puff Creek Subwatersheds





LEGEND

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

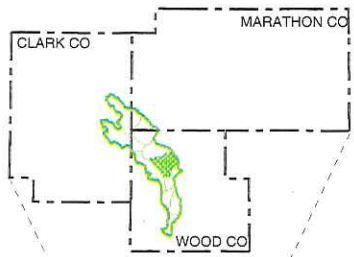


BARNYARD RUNOFF (P Loading)*

-  Eligible
-  Ineligible

*Barnyard results based on single inventory during Spring, 1992

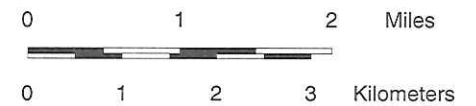
Study Area



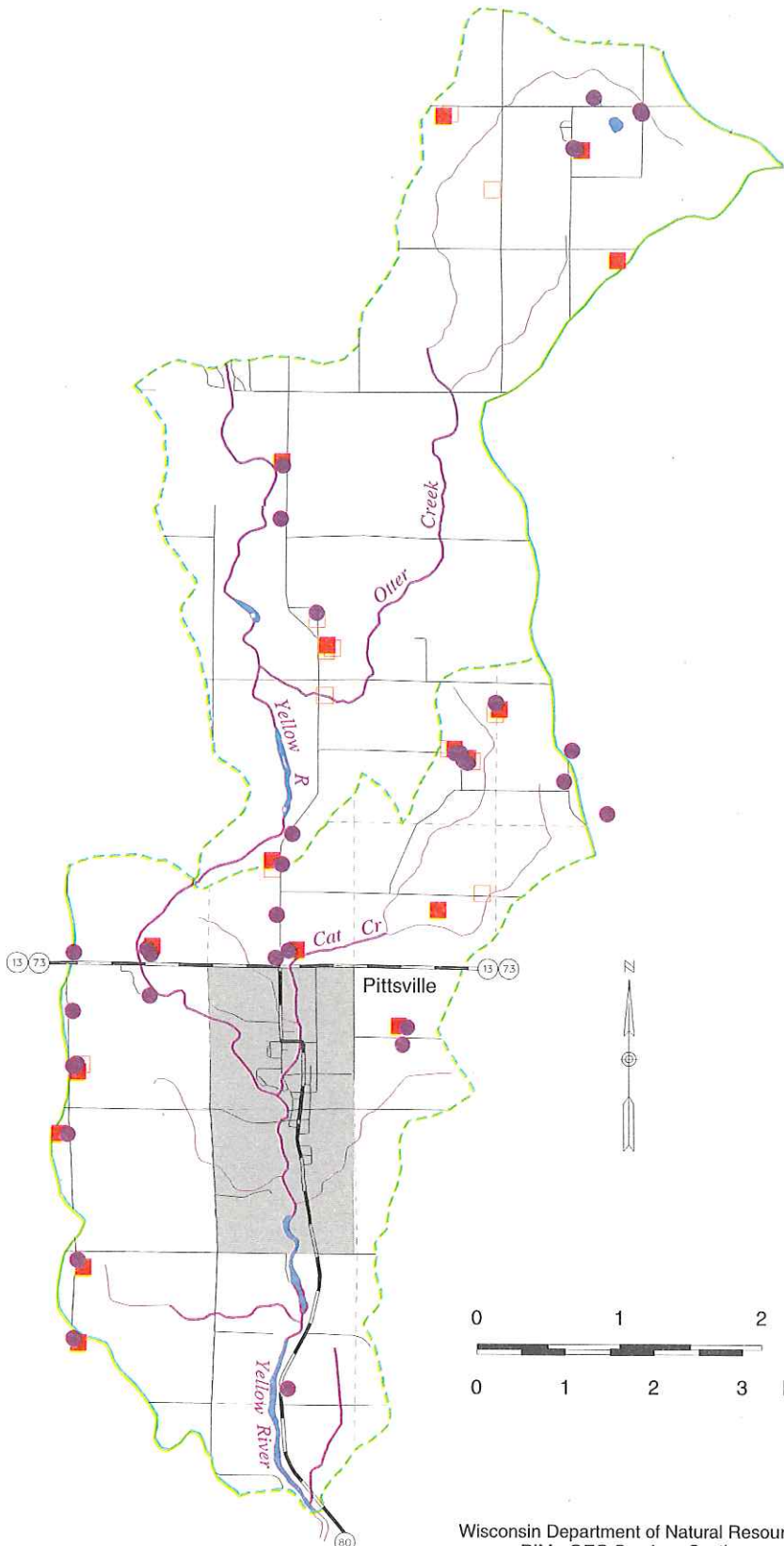
Upper Yellow River Watershed



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April 1994



Map 3- 7. Otter Creek and Cat Creek Subwatersheds



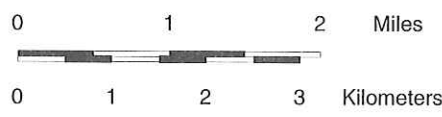
LEGEND

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

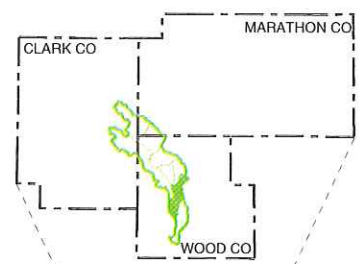
BARNYARD RUNOFF (P Loading)*

- Eligible
- Ineligible

*Barnyard results based on single inventory during Spring, 1992



Study Area



Upper Yellow River Watershed



Water Quality Conditions

Springs in the headwater sections of the stream keep it from drying up completely during low flow periods; however, flows become low enough that the stream can only support a limited forage fishery classification.

Lake Manakiki in North Wood County Park is an impoundment on the Yellow River. It is 7.5 acres in size with a maximum depth of 6 feet. Lake Manakiki supports a Bass/panfish fishery.

Nonpoint Source Pollutants

- There are 17 barnyards in the Otter Creek subwatershed, which contribute 441 pounds of phosphorus annually. This is 4% of the total watershed-wide phosphorus load.
- Upland sediment contributes 1,319 tons of sediment annually, which is 2% of the watershed-wide sediment load. Cropland, which is the major sediment source in this subwatershed, contributes 65% of the upland sediment delivered in this subwatershed.
- Streambank erosion contributes 37 tons of sediment annually, which is 7.7% of the overall streambank erosion.

Otter Creek subwatershed has varied land use intensity. There are sections of the stream trampled and eroded due to cattle access interspersed with large areas of wild land.

Water Resource Objectives

Enhance the warmwater sport fish population by:

- a) Reducing the phosphorus loading by a high level.
- b) Reducing sediment delivery to subwatershed streams by a medium level.
- c) Restoring eroded and/or trampled streambanks and maintaining stream corridors by a medium level.

Cat Creek (CT)

Subwatershed Description

The Cat Creek subwatershed is located in central Wood County. Principle surface waters include the main stem of Cat Creek as well as the portion of the Yellow River from its confluence with Rocky Creek downstream to Lake Dexter. Also included are 1 perennial and 10 intermittent tributaries to the Yellow River. A total of 18.5 miles of stream drain this 12 square mile subwatershed. (See Map 3-7.)

Water Quality Conditions

Cat Creek is classified as warmwater forage fishery while the Yellow River is listed as a warmwater sport fishery. The Yellow River is very rocky in this segment and maintains a more stable year-round flow than in upstream sections. In 1982–1991 biotic indices were fair to excellent.

Nonpoint Source Pollutants

- The Cat Creek subwatershed has 20 barnyards which contribute a total of 462 pounds of phosphorus annually. This is 4% of the total phosphorus load for the watershed.
- The subwatershed delivers 1,892 tons of upland sediment annually, which is 3% of the entire watershed sediment load. Cropland, which is the major sediment source in this subwatershed, contributes 72% of the upland sediment delivered in this subwatershed.
- Streambank erosion produces 1 ton of sediment annually, which is 0.2% of the total sediment load.

Agricultural land uses in this subwatershed are concentrated in the Cat Creek drainage area. There are some areas where cattle access has severely degraded the stream. There is very little agricultural activity immediately adjacent to the Yellow River itself.

In this subwatershed, both Cat Creek and the Yellow River receive stormwater runoff from the village of Pittsville. The Yellow River receives sewage treatment plant discharges as well - the wastewater treatment plant operates under a WPDES permit. See page 70 for more detail.

Water Resource Objectives

Enhance the warmwater sport fish population by:

- a) Reducing the phosphorus loading by a high level.
- b) Reducing sediment delivery to subwatershed streams by a high level.
- c) Restoring eroded and/or trampled streambanks and maintaining stream corridors by a high level.

Lower Yellow (LY)

Subwatershed Description

The Lower Yellow River subwatershed is located in south central Wood County. It includes the segment of the Yellow River from the Lake Dexter dam downstream to the bridge where Highways 173 and 80 cross the river. This segment of the river is 12 miles long and drains 9 square miles. A portion of the Sandhill Wildlife Area is in this subwatershed. (See Map 3-8.)

Water Quality Conditions

The Lower Yellow River is classified as a warmwater sport fishery. Water quality is not impacted by agricultural activity within this watershed, however there is excessive natural erosion taking place. Biotic index values were fair in 1989.

Nonpoint Source Pollutants

- The Lower Yellow subwatershed has no barnyards which contribute phosphorus.
- The subwatershed delivers just 0.3 tons of upland sediment annually, which is less than 1% of the entire watershed sediment load.
- Streambank erosion produces 408 tons of sediment annually, which is 84.8% of the total sediment load.

Land use for agricultural purposes is not intense in this subwatershed, with most of the land being wooded. There is a significant amount of erosion in this subwatershed, caused in part by the operation of the Lake Dexter Dam. When water is discharged during periods of high retention, downstream flows have been reported to increase by several feet in less than an hour. Due to the drastic fluctuations in water levels, the banks cannot contain the river within them and a very large area is flooded. This causes the sandy clay soils to erode away. Another problem caused by the erosion and flooding is the number of trees that have fallen in the river. This adds to the flooding and eroding that is occurring. Thus creating a wetland forest area. Therefore, while agricultural nonpoint pollutants are not a high concern, several other erosion sources are.

Water Resource Objectives

Enhance the warmwater sport and forage fish populations by:

- a) Reducing the upstream watersheds phosphorus by a medium level.
- b) Reducing the upstream watersheds sediment delivery by a high level.
- c) Improving dissolved oxygen levels by reducing upstream BOD loadings.

Owl Creek (OC)

Subwatershed Description

The Owl Creek subwatershed is located in south central Wood County. Principle surface waters include Owl Creek, Little Owl Creek and Lake Dexter. A total of 13 miles of stream drain this 13 square mile subwatershed. Both Owl and Little Owl Creek drain into Lake Dexter.

Water Quality Conditions

Owl and Little Owl are listed as warmwater forage fish communities. Lake Dexter is a shallow 298-acre impoundment on the Yellow River. Average depth is 5 feet. The lake supports a productive Bass, Northern Pike and Bluegill fishery. The water is dark stained and low in alkalinity. It is believed that there could be a weed problem if the water were more transparent, allowing more sunlight penetration.

There have been a few instances of partial fish kills since the lake was created in the 1960s. Those were presumably due to low oxygen levels. Fecal coliform counts have also exceeded State recreation standards twice in the last 10 years.

Nonpoint Source Pollutants

- The Owl Creek subwatershed has 6 barnyards which contribute a total of 275 pounds of phosphorus, annually. This is 3% of the total phosphorus load for the watershed.
- The subwatershed delivers 1,394 tons of upland sediment annually, which is 3% of the entire watershed sediment load. Cropland, which is the major sediment source in this subwatershed, contributes 70% of the upland sediment delivered in this subwatershed.
- Streambank erosion does not contribute sediment in this subwatershed.

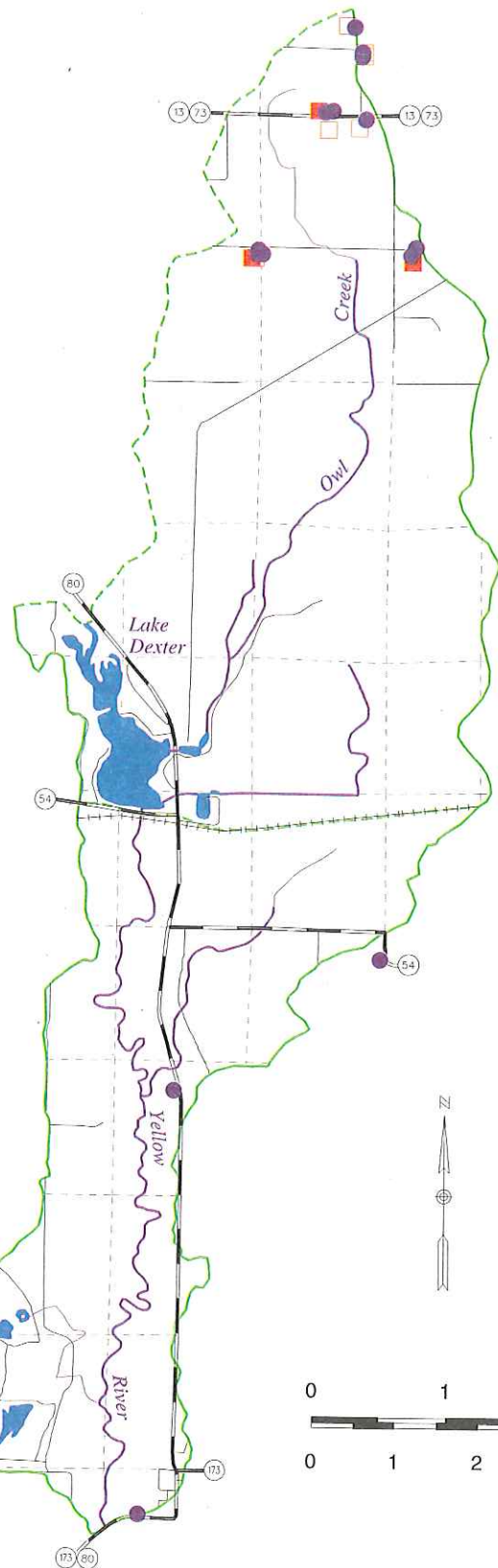
There is one cranberry operation that drains water to Little Owl Creek. Agricultural activity is confined to the very northern portion of the subwatershed, the remainder of land is undeveloped and is in county ownership due to the extremely slow drainage of this area and the wetland forest type habitat.

Water Resource Objectives












Enhance the warmwater sport and forage fish populations by:

- a) Reducing the upstream watersheds phosphorus by a medium level.
- b) Reducing the upstream watersheds sediment delivery by a high level.
- c) Improving dissolved oxygen levels by reducing upstream BOD loadings.



Map 3- 8. Lower Branch Yellow River and Owl Creek Subwatersheds



LEGEND

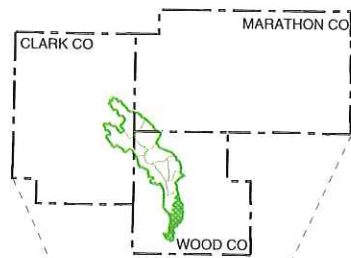
-  Well
-  Watershed Boundary
-  Subwatershed Boundary
-  County Boundary
-  Federal or State Highway
-  Local Road
-  Railroad
-  Section Line
-  River or Stream
-  Lake or River
-  Municipal Area

BARNYARD RUNOFF (P Loading)*

-  Eligible
-  Ineligible

*Barnyard results based on single inventory during Spring, 1992

Study Area



Upper Yellow River Watershed



0 1 2 Miles



0 1 2 3 Kilometers

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 Upper Yellow River Watershed. Livestock operations comprised of 255 animal lots are a source of 10,776 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.

Table 3-2. Barnyard Inventory Results: Upper Yellow River Watershed

Subwatershed	Number of Barnyards	Total Phosphorus* (lbs.)	% Watershed Phosphorus Load
North Branch Yellow	38	1,891	18
South Branch Yellow	54	2,444	23
East Branch Yellow	38	1,957	18
Beaver Creek	32	1,417	13
Rocky Creek	18	781	7
Middle Yellow	15	625	6
Puff Creek	17	482	4
Otter Creek	17	441	4
Cat Creek	20	462	4
Owl Creek	6	275	3
Lower Yellow	0	0	0
Internally Drained Areas			
Totals	255	10,776	100

* Based on annual phosphorus loads.

Source: Department of Natural Resources

Upland Sediment

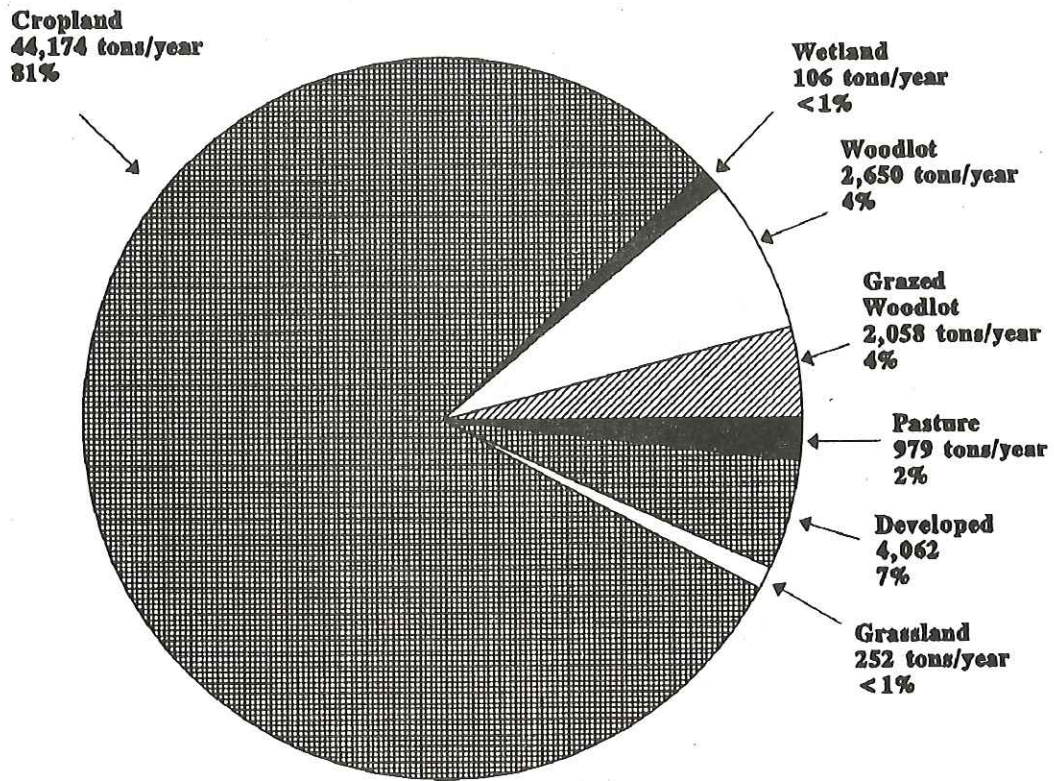
Intensive agricultural practices have caused considerable amounts of eroded soil to reach streams, ponds and wetlands in the Upper Yellow River Watershed. Upland erosion is the major source of the sediments that are carried downstream, beyond individual subwatershed boundaries.

Upland sediment sources were evaluated through subarea sampling and extrapolation for the entire watershed (224 square miles). The results of this inventory are summarized in Table 3-3. An estimated 44,174 tons of soil per year are delivered to wetlands or streams in the watershed from croplands. An additional 5,939 tons/year are delivered from grassland, pastures and woodlots. Uplands are the source of 99% of the sediment delivered to surface waters. Figure 3-1 summarizes upland sediment loading by land use for all subwatersheds.

Table 3-3. Summary of Upland Sediment Loading by Land Use: Upper Yellow River Watershed

Subwatershed		Cropland	Developed	Grassland	Pasture	Gr. Woodl	Woodlot	Wetland	Totals
Beaver Creek	Acres	10,739	338	299	480	231	942	293	13,322
	(BC) Sediment	5,202	321	17	86	50	101	20	5,797
Cat Creek	Acres	5,242	421	2	369	543	1,039	0	7,617
	(CT) Sediment	1,892	360	0.17	64	217	90	0	2,622
East Yellow	Acres	20,957	1,687	176	343	122	5,325	0	28,610
	(EY) Sediment	9,558	1,590	10	65	47	460	0	11,730
Lower Yellow	Acres	35	0	134	0	0	5,522	0	5,691
	(LY) Sediment	0.31	0	2	0	0	282	0	284
Middle Yellow	Acres	4,350	382	1,231	0	226	1,452	0	7,641
	(MY) Sediment	1,864	294	55	0	93	140	0	2,446
North Yellow	Acres	14,403	188	0	929	1,729	2,625	1,283	22,157
	(NY) Sediment	7,207	143	0	192	656	278	64	8,540
Owl Creek	Acres	3,541	176	466	569	104	3,610	0	8,466
	(OC) Sediment	1,394	144	24	113	32	297	0	2,004
Otter Creek	Acres	2,954	492	754	595	496	1,906	0	7,195
	(OT) Sediment	1,319	250	29	118	154	167	0	2,037
Puff Creek	Acres	2,657	203	969	755	334	3,191	0	8,111
	(PC) Sediment	821	151	63	143	141	309	0	1,628
Rocky Creek	Acres	7,165	529	1,362	379	184	5,031	40	14,690
	(RC) Sediment	4,465	660	52	70	54	364	2	5,667
South Yellow	Acres	16,508	331	0	663	2,125	2,613	403	22,643
	(SY) Sediment	10,452	150	0	129	614	162	19	11,526
Totals	Acres	88,551	4,747	5,393	5,082	6,094	33,256	2,019	146,143
	Sediment	44,174	4,062	252	979	2,058	2,650	106	54,282

Figure 3-1. Upland Sediment Loading by Land Use—Upper Yellow River Watershed:
All Subwatersheds



Source: Department of Natural Resources

Streambank Erosion

Streambank erosion contributes just 1% of the total sediment to surface waters in the Upper Yellow River Watershed. Approximately 586 miles of streams were evaluated. Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 45 miles of streambank. An estimated 480 tons of sediment are eroding into streams annually. See Table 3-4 for streambank inventory results.

Table 3-4. Streambank Inventory Results: Upper Yellow River Watershed

Subwatershed	Inventoried Streambank Length (feet)	Eroded Sites (feet)	Trampled Sites (feet)	Slumped Sites (feet)	Cattle Access (feet)	Total Sediment Loss (tons/year)	% of Total Bank Erosion in Watershed
North Branch Yellow	154,371	285	11,270	200	16,498	2	0.4
South Branch Yellow	278,140	459	6,242	400	28,591	4.3	1
East Branch Yellow	531,954	1,035	3,169	—	65,624	22	5
Beaver Creek	464,338	15	756	—	4,796	1	0.2
Rocky Creek	441,103	170	1,212	—	27,615	5	1
Middle Yellow	191,146	0	0	—	0	0	0
Puff Creek	225,890	0	271	—	4,940	0	0
Otter Creek	195,724	756	1,630	—	35,596	37	8
Cat Creek	296,361	77	184	—	11,940	10	0.2
Owl Creek	192,974	0	420	—	500	0	0
Lower Yellow	122,952	11,074	0	580	0	408	85
Totals	3,094,953	13,871	25,154	1,180	196,100	489.3	100

Shoreline Erosion

Shoreline erosion was not identified as a significant problem on Lake Dexter, therefore an inventory of shoreline erosion was not done as part of this project.

Gully Erosion

There was an inventory of gully erosion done in the Wood County portion of the watershed. Gully erosion in Clark and Marathon counties was deemed to be insignificant; therefore, an inventory was not done in these counties. See Table 3-5 for inventory results.

Table 3-5. Gully Erosion Inventory: Upper Yellow River Watershed

Subwatershed	Number of Sites	Total Length of Gullies (feet)	Soil Erosion (tons)
South Branch Yellow	2	33	3
East Branch Yellow	3	41	7
Otter Creek	1	32	3
Cat Creek	1	45	14
Totals	7	151	27

This is a partial inventory. Fieldwork in Clark County subwatersheds showed insignificant erosion from gullies.

Winterspreading of Manure

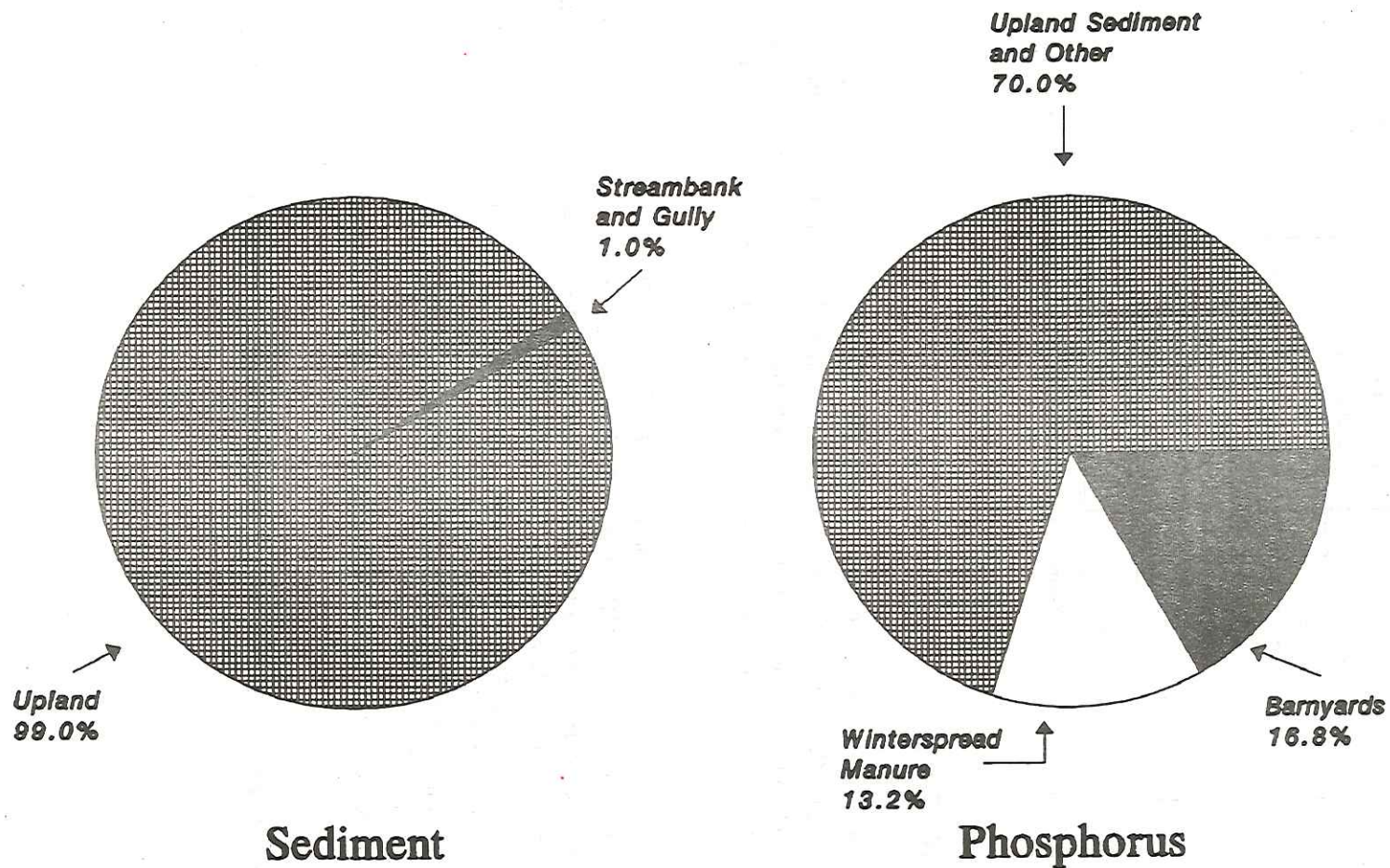
The most significant water quality problems associated with the spreading of livestock waste occurs when wastes are spread on "critical" areas such as steeply sloped frozen ground, land in flood plains, areas adjacent to surface waters, or areas with shallow depth to groundwater. Estimates indicate that livestock waste from 219 operations in the watershed is spread on 19,561 acres of land.

Of these 219 operations 3,036 acres were deemed as critical acres. The total critical acres from these 219 operations produce 691,310 pounds of phosphate. These "critical" acres pose a high potential for runoff to convey pollutants to both surface and groundwater. Estimates also indicate that operations with higher numbers of "critical" acres have a higher potential to deliver pollutants than those with lower critical acres. A further breakdown shows that 87 landowners spread manure on 2,289 "critical" acres which produce 433,028 pounds of the total phosphate which is landspread during the critical winterspreading period.

Detailed results of the inventory can be found in the section: Manure Storage System Eligibility in Chapter Four.

See Figure 3-2 for summary of nonpoint sources of sediment and phosphorus in the Upper Yellow River watershed.

Figure 3-2. Nonpoint Sources of Sediment and Phosphorus: Upper Yellow River



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Sources:
Sediment data was taken directly from nonpoint source inventory.
Phosphorus proportions were based on research by Moore, 1979.

Pollutant Reduction Goals

Sediment Goal: Reduce overall sediment delivered by 35%.

To meet this goal, the following is needed:

- Thirty-five percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- Twenty-five percent reduction in streambank sediment delivered to all streams and a 50% overall repair of bank habitat in all subwatersheds.

Phosphorus Goal: Reduce overall phosphorus load by 45%.

To meet this goal, the following is needed:

- Sixty-five percent reduction in phosphorus from barnyards in the North Branch, South Branch, Rocky Creek, Cat Creek, Otter Creek, Puff Creek, and Beaver Creek.
- Fifty percent reduction in phosphorus from barnyards in the Lower Yellow, Owl Creek, East Branch and Middle Yellow subwatersheds.
- Sixty-five percent reduction in phosphorus from winterspread manure on "unsuitable" acres in all subwatersheds.
- Achievement of the sediment goal identified above.
- In addition this plan calls for a restoration of 15% of degraded or prior converted wetlands and control of gullies producing over one ton of sediment/site/year.

Achievement of these pollutant reduction goals for sediment and phosphorus will help achieve water quality objectives for Castle Rock Lake, the 5th largest inland lake in Wisconsin, and an eutrophic impoundment. The Yellow River drains to Castle Rock Lake, which is to be managed as part of the Petenwell/Castle Rock Comprehensive Management Plan.

Other Pollution Sources

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

Municipal and Industrial Point Sources of Pollution

Control of discharges of wastewater from permitted municipal and industrial sources are important considerations for improving and protecting surface water resources. These sources of water pollution are termed point sources. The village of Chili and the city of Pittsville have municipal wastewater treatment plants that discharge to surface water. Chapter 147, Stats., requires any person discharging pollutants into the waters of the state to obtain a Wisconsin Discharge Elimination System (WPDES) Permit.

Chili Sanitary District #1 Municipal Wastewater Treatment Plant: Chili is located in northeastern Clark County in the Upper Yellow River watershed. The WWTP discharges to a wetland tributary of the South Branch Yellow River. This treatment system includes a stabilization pond/fill and draw. It was built in 1968 and designed to serve 500 people. The system is presently operating within its design capacity.

Pittsville Water and Sewer Department Municipal Wastewater Treatment Plant: Pittsville lies in west central Wood County, along the Yellow River. The WWTP discharges to the main stem of the Upper Yellow River. The system was built or last improved in 1984 and includes trickling filters and seepage cells with an underdrain system which collects the filtered wastewater and discharges to the Yellow River. Surface water quality effluent limits are being met by this facility. The system was designed to serve 1,145 people. The 1990 population of Pittsville was 830, hence the system is currently operating within its design capacity.

Nasonville Cheese Factory: Nasonville Cheese is located in the Rocky Creek subwatershed, 4 miles southwest of Marshfield. Nasonville Dairy, Inc. produces approximately 14,000 pounds of cheese per day. As a by-product of the cheese-making process, about 126,000 pounds per day (15,000 gallons/day) of whey are generated. The whey is discharged to a tank on-site until a contractor picks it up. The 7,000 to 10,000 gallons/day of washwater that are generated flow through a series of five septic tanks and then is pumped up to a pair of 1.2-acre holding ponds. During the summer the washwater from the holding ponds is spray irrigated on surrounding fields. The five septic tanks are pumped out once every three months and sludge is fieldspread by a contract hauler. The plant also discharges 500-1,000 gpd of cooling water and boiler blowdown to a drainage ditch that eventually leads to a wetland near the Yellow River.

Riveredge Country Club: Riveredge Country Club is located in northwestern Wood County, just southwest of Marshfield. The club's wastewater treatment plant discharges to a seepage pond, and subsequently to groundwater. This plant includes an activated sludge-general/and absorption pond. The system was built in 1969 and designed to handle wastes from the country club. There is no evidence that the design capacity is being exceeded.

Bethel Living Center: The Bethel Living Center is located in central Wood County, 3 miles west of Arpin in the Upper Yellow River watershed. The waste water treatment plant discharges to an unnamed tributary of the Yellow River. This system includes a stabilization pond system built in 1955. It was designed for 235 people and shows no evidence that design capacity is being exceeded.

Refer to the Upper Wisconsin River (Southern Sub-Basin) Areawide Water Quality Management Plan for additional details on municipal and industrial pollution sources.

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

The Phosphorus Rule was passed in June, 1992 by the DNR Board. It is expected to be approved by the legislature in Fall, 1992. The Rule will require many municipal and industrial point sources with surface water discharge points to remove phosphorus from their effluents to 1.0 part per million. Industries that discharge 60 pounds of phosphorus per month and municipalities that discharge 150 pounds per month must comply. It will take 3 to 8 years before all facilities are in compliance.

Failing Septic Systems

Septic systems consist of a septic tank and a soil absorption field. Septic systems may prematurely fail due to soil type, location of system, poor design or maintenance. According to the Soil Survey of Wood County, 75% of Wood County soils are severely limited for septic filter fields. The dense glacial till associated with Withee Soil Series do not accept enough moisture for an effective absorption system. As a result, throughout the watershed there are many surface discharge systems where soil absorption systems have failed. This presents surface water quality and health problems. Landspreading septage waste during the winter months can also create surface water quality problems. Pollutants from septic system discharges include nitrates, bacteria, phosphorus, viruses, and hazardous materials from household products.

Marathon, Wood and Clark Counties are using the Wisconsin Fund. 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 grant program applies to principle residences and small businesses built prior to July 1, 1978, and is subject to income and size restrictions. Seasonal homes are not eligible for participation in this program. Interested individuals should contact their county zoning department or the DILHR for more information.

Superfund Sites

The Spickler Landfill Superfund site, located near Spencer has known groundwater contamination. Municipal and industrial wastes were disposed of in the landfill starting in 1970. Water quality-based effluent limitations were recommended in July, 1992 for the proposed direct discharge from the Spickler Landfill superfund site to a tributary of the East Branch of the Yellow River. The proposed discharge is to a 15-acre wetland area which drains northward, forming the headwaters of a tributary to the East Branch of the Yellow River. The site was closed in 1976 and is currently being used as a tree farm. See Chapter Two for more details.

Solid Waste Disposal Sites

There are 21 solid and hazardous waste disposal sites within the Upper Yellow River watershed. See Chapter Two for site names and locations. The Registry of Waste Disposal Sites in Wisconsin (February 1990) lists these sites. The list includes both active, inactive and abandoned sites.

Petroleum Storage: Leaking Underground Storage Tank (LUST) Sites

There are twelve sites listed within the watershed. See Table 2-5c in Chapter Two for locations, project status and substances found.

The Wisconsin Remedial Response Site Evaluation Report lists the sites identified through the LUST program.

Other Contaminated Sites

The Wisconsin Remedial Response Site Evaluation Report also has the Inventory of Sites or Facilities Which May Cause or Threaten to Cause Environmental Pollution and the Spills Program List which includes sites or facilities identified under the Hazardous Substance Spill Law. See Chapter Two, Table 2-5d for list of spill sites.

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%). 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 typically 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 Wisconsin Administrative Codes NR 214 and NR 204. These Rules require a WPDES permit, site

criteria, minimum separation distances from wells and application rates to ensure that environmental and public health concerns such as proper soil types, depth to groundwater, distance from surface water and the type of crop to be grown on sludge amended fields are taken into consideration when the DNR approves agricultural fields for sludge application.

There have been a growing number of public complaints and investigations by the Wood County Office of Planning and Zoning regarding land application of municipal and industrial wastes. Increased land spreading and over-application of Cheese industry waste has resulted in a number of violations and land use concerns throughout most of the western townships.

There are 48 sites in the Upper Yellow River watershed that accept and spread municipal sludge on a total of 1,101 acres.

There are no sites in the watershed that accept and spread industrial sludge.

Land Application of Septage and State Permitted Land Disposal Sites

Land disposal of septage by both commercial and farmer exempt parties is one of the major concerns of the Wood County Planning and Zoning office, as well as, with the Marshfield Metropolitan Sanitary Commission which was recently formed to address wastes generated from private sewage systems.

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. 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 nonpoint source pollution site (barnyards, manure spreading, upland fields, streambank erosion or streambank habitat degradation sites). Management categories define which nonpoint sources are eligible for financial and technical assistance under the priority watershed project. Categories are based on the amount of pollution generated by a source and the feasibility of controlling the source.

Management category eligibility criteria are expressed in terms of: **tons of sediment** delivered to surface waters from eroding uplands and streambanks **pounds of phosphorus** delivered to surface waters, annually **the number of unsuitable acres** winterspread with manure annually; 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 the site. A source may change management categories depending on the conditions found at the time of the site visit. A source may be revised up to the point that a landowner signs a cost-share agreement. Any sources, created by a landowner, requiring controls after the signing of a cost-share agreement must be controlled at the landowners expense for a period of 10 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 Upper Yellow River Appraisal Monitoring Report (Herman, 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: Upland erosion represents 99% (54,282 tons) of the total sediment load to streams in the watershed. A 35% reduction in sediment from eroding fields is targeted for agricultural lands. This translates into bringing all lands that are delivering sediment to streams at a rate greater than 0.5 tons/acre/year down to 0.3 tons/acre/year. To be in Category I, landowners' fields must be delivering greater than 0.5 tons/acre/year of sediment. The average sediment delivery rate for all subwatersheds is 0.3 tons/acre/year. This category will control an estimated 38,913 "critical" acres of cropland, 33% of the watershed's total sediment load (54,282 tons).

An additional 5% of the sediment load delivered to surface water from cropland will be controlled through Category II, which includes an estimated 22,809 critical acres, involving 2,614 tons. Category II includes those landowners with fields delivering sediment between 0.5 and 0.3 tons/acre/year. See Table 4-1.

For practical purposes, all fields delivering more than 0.5 tons/acre/year of sediment will be combined for each landowner. This figure will be the total amount of sediment which must be controlled on the farm in order to receive cost-share funds from the watershed project. A landowner may be able to meet the overall sediment reduction goal for his/her farm by applying controls to field with sediment delivery rates **below** the identified target control level of 0.5 tons/acre/year. The best way to meet the individual's sediment reduction goals will be determined during the farm planning process.

Table 4-1. Upland Sediment Erosion Eligibility Criteria in the Upper Yellow River Watershed

Upland Erosion		
Eligibility Criteria		
Management Category	Sediment Delivery (tons/acre/year)	percent Control
I	at or above 0.5	33
II	between 0.5 and 0.3	5
III	at or below 0.3	—

* The average sediment delivery rate of all subwatersheds is 0.3 tons/acre/year.

See Table 4-2 for Rural Uplands Targeted for Sediment Control.

Gully Erosion: Gully erosion represents less than 1% of the total sediment load to streams in the watershed. The gully inventory was conducted in the Wood County portion of the watershed only as erosion from gullies was identified as an insignificant source, particularly in Clark and Marathon Counties. There will be no Category I gullies. Category II gullies will be those gullies that are active for more than 1 year consecutively.

Animal Lot Runoff

A high level of control of animal lot runoff is required in order to achieve the water quality objectives in the Upper Yellow River watershed project. Landowners receiving cost sharing for animal lot runoff will be required to do a nutrient management plan for their operation.

Table 4-2. Rural Uplands Targeted for Sediment Control in the Upper Yellow River Watershed

Subwatershed	Total Load (tons/year)	Management Category I			Management Category II			Estimated Control** %
		Acres	Control (tons/year)	Control%	Acres	Control (tons/year)	Control %	
Beaver Creek	5,797	3,686	2,176	38	2,597	246	4	40
Cat Creek	2,622	705	335	13	2,356	213	8	17
East Yellow	11,730	9,144	3,737	32	2,684	330	3	34
Lower Yellow	284	—	—	—	—	—	—	—
Middle Yellow	2,446	1,125	445	18	1,899	227	9	23
North Yellow	8,540	7,016	2,433	28	4,801	504	6	31
Owl Creek	2,004	747	261	13	1,986	171	9	18
Otter Creek	2,037	797	479	24	1,102	93	5	27
Puff Creek	1,627	284	191	12	200	13	1	13
Rocky Creek	5,667	3,323	2,547	45	1,813	176	3	47
South Yellow	11,526	12,085	5,041	44	3,371	641	6	47
Totals	54,282	38,912	17,645	33%	22,809	2,614	5%	36%

** The estimated control is assumed to be one-half of the Category II fields and all of the Category I fields.

High Control Subwatersheds: A 65% reduction of organic loading is necessary from barnyards in the following subwatersheds: North Branch, South Branch, Rocky Creek, Cat Creek, Otter Creek, Puff Creek and Beaver Creek, to meet stated objectives. Category I landowners are those whose operations produce over 45 pounds of phosphorus annually. These landowners will need to reduce loads down to 25 pounds or less in order to reach water quality goals. Sixty-seven landowners fall into this category, yielding 50% control. Category II landowners are those whose operations produce between 45 and 25 pounds phosphorus. These landowners will need to reduce this load to 15 pounds or less to be eligible for cost sharing. Forty-four landowners fall into this category, yielding 14% control.

In addition, there will be a Category IIA for high control subwatersheds. This category will make eligible barnyards which contribute between 15 and 25 pounds of phosphorus. Remedies for half of the barnyards in Categories II and IIA will be limited to **low-cost alternatives**. In Categories II and IIA, participating landowners will need to bring phosphorus loads down to the 15-pound level or less.

Medium Control Subwatersheds: A 50% reduction of organic loading is necessary from barnyards to meet stated objectives in the following subwatersheds: Lower Yellow, Owl Creek, East Branch, and Middle Yellow. Category I landowners are those whose operations produce over 60 pounds of phosphorous, annually. These landowners will need to reduce loads down to 25 pounds or less in order to reach water quality goals. Nineteen landowners fall into this category, yielding 17% control. Category II landowners are those whose operations produce between 60 and 25 pounds phosphorous will need to reduce this load to 25 pounds or less to be eligible for cost sharing. Sixteen landowners fall into this category, yielding 7% control.

Table 4-3. Animal Lot Runoff Eligibility Criteria

Management Category	Phosphorus Load Per Barnyard	Number of Barnyards	Phosphorus Reduction
HIGH CONTROL SUBWATERSHEDS			
I	greater than 45 lbs.	67	50%
II	between 45 and 25 lbs.	44	14%
IIA	between 25 and 15 lbs.	32	7%
III	less than 15 lbs.	52	—
MEDIUM CONTROL SUBWATERSHEDS			
I	greater than 60 lbs.	19	17%
II	between 60 and 25 lbs.	16	7%
III	less than 25 lbs	25	

See Table 4-4 for Barnyards Targeted for Runoff Control.

Manure Storage System Eligibility

A computer model (RANKIT) was developed to evaluate farming operations in the Upper Yellow River Watershed based on an inventory of acres spread with manure during the winter. The model outlines a system of rating operations that are likely to produce excessive manure runoff from cropland due to lack of suitable spreading sites. The model will identify which of the 219 operations inventoried are eligible to receive financial and technical assistance for manure storage systems under the Priority Watershed Project.

Operations determined to have greater than 30 acres of cropland classified as "critical" for winter spreading (approximately 30) are a Category I. Category II operations (approx. 60) are those with 15 to 30 critical acres. See Table 4-5 for estimated acres and operations that will be eligible for cost-sharing through this program.

A critical acre is derived from a direct comparison of unsuitable acres and acres needed for landspreading to the total spreadable acres available to the operation to landspread. As part of this comparison, an unsuitable acre is defined as all surface waters, waterways, flood prone areas and fields greater than 4% slope. This direct comparison will define a "critical acre" and enable watershed staff to develop both an eligibility list and a contact list. Runoff from these acres has a high potential to contribute phosphorus and other pollutants to surface waters.

A reduction in the phosphorus originating from "critical acres" winterspread with manure is essential to achieve water quality goals and objectives in the watershed. A 65% reduction in "critical acres" is deemed essential to meet these goals.

Cost-share eligibility will be confirmed at the time county staff visit a site and will be based on a least cost system which meets (std. 590). Manure Storage Systems may include manure stacks (in accordance with std. 312), short-term storage (std. 313), and long-term storage (std. 313 & 425).

Landowners receiving cost-share funds for storage practices are required to adopt and adhere to a nutrient management plan (std. 590). Additionally, manure removed from a storage system cost-shared through this project shall not be spread on frozen, snow covered or saturated ground.

Table 4-4. Barnyards Targeted for Runoff Control: Upper Yellow River Watershed

Subwatershed	Total Phos. (lbs.)	Management Category I			Management Category II			Management Category IIA			Estimated Control** %
		Yards (#)	Control (lbs.)	Control (%)	Yards (#)	Control (lbs.)	Control (%)	Yards (#)	Control (lbs.)	Control (%)	
Beaver Creek	1,417	14	1,069	77	7	167	12	3	34	2	84
Cat Creek	462	4	248	49	4	98	19	3	34	7	62
East Yellow	1,957	14	1,343	69	10	386	20	4	59	1	60
Lower Yellow	0	0	0	0	0	0	0	—	—	—	—
Middle Yellow	625	3	172	38	5	154	34	7	107	6	58
North Yellow	1,891	17	1,413	75	8	248	13	—	—	—	82
Owl Creek	275	2	139	62	1	45	20	—	—	—	72
Otter Creek	441	3	230	50	3	66	14	3	35	8	61
Puff Creek	482	3	183	40	6	157	35	2	15	3	59
Rocky Creek	781	7	501	64	6	182	23	2	18	2	77
South Yellow	2,444	19	1,666	69	12	382	16	11	204	8	81
Totals	10,776	86	6,964	66	62	1,885	18	35	506	5%	78

** The estimated control is assumed to be one-half of the Category II and IIA fields and all of the Category I fields.

Table 4-5. Manure Storage System Eligibility Criteria for the Upper Yellow River Watershed

Management Category	Number of Critical Acres Winterspread*	Eligible Acres/Landowner	percent Reduction
I	30 or more	1,186/32	39
II	between 15 and 30	1,103/55	36

* These acreages apply to individual landowners.

Sources: Wood, Clark and Marathon County Land Conservation Departments, Wisconsin Department of Natural Resources and the Department of Trade and Consumer Protection

Table 4-5a. Manure Storage System Eligibility Criteria for the Upper Yellow River Watershed

Management Category	Number of Critical Acres Winterspread*	Eligible *P205/Landowner	% Reduction
I	30 or more	195,795/32	28
II	between 15 and 30	237,233/55	34

* These acreages apply to individual landowners.

Sources: Wood, Clark and Marathon County Land Conservation Departments, the Wisconsin Department of Natural Resources and the Department of Agriculture, Trade and Consumer Protection

* This is an estimate of phosphate winterspread on critical acres, not the amount of phosphate entering surface waters.

Nutrient and Pesticide Management

Improved pesticide and fertilizer management is needed in this watershed as shown by the results of the well tests. 1% of the well tested for triazines were above the enforcement standard of 3 ppb, and 8% of the well tested above the 10 ppm enforcement standard for nitrates. Landowners will be encouraged to participate in nutrient and pest management activities to result in improved ground and surface water quality.

Farms that participate in nutrient management will also be eligible to participate in pest management if the farmer chooses. These landowners are eligible to participate in a one on one Nutrient and Pesticide (NPM) information and education program to change attitudes on managing nutrients and pesticides with financial assistance going toward reducing consultant fees.

Nutrient and pest management will be addressed with the development of both nutrient management (SCS Std. 590) and pest management (SCS Std. 595). The planning of these practices is closely tied together in their implementation, and it is cost effective to develop these plans simultaneously. It is also more cost effective to prevent further ground and surface water degradation now than to try and treat it after damage has occurred.

The plans may be prepared by crop consultants or LCD staff and must meet SCS Standard 590 and 595. These plans will be approved by the Wood, Clark and Marathon County Land Conservation Departments. Records should be kept showing progress towards reducing the use of fertilizer and pesticides.

The development of these plans and their implementation as a single system are eligible for 3 years of reduced consulting rates. Other practices that are singularly eligible for cost-sharing are soil and manure testing, crop scouting, and spill control basins for pesticide handling. A cost-sharing rate of 50% is given for all nutrient and pesticide management practices except for 70% on spill control basins.

In addition, the Wood County Land Conservation Department anticipates working with one cranberry grower to install a pesticide mixing and loading pad. This effort will be a prototype water quality demonstration project.

All farm operations which are determined eligible for storage systems are also eligible to participate in nutrient management (std. 590) and pesticide management (std. 595). See tables 4-5 and 4-5a for the number of eligible landowners.

Abandonment of Leaking and Improperly Sited Manure Storage Systems

The proper abandonment of leaking and improperly sited manure storage systems will be an eligible practice in the Upper Yellow River watershed if the storage facility exhibits a high likelihood for a water quality problem. Conditions where this practice applies and criteria are outline in a separate proposal (available from the County LCD Land Conservation Department or DNR) for this alternative best management practice. In the Upper Yellow River watershed, up to 16 manure storage systems may be eligible for proper abandonment.

Streambanks

Streambank Erosion: Streambanks contribute just 1% of the overall sediment delivered to streams in the watershed. Category I participants are those with identified severe erosion

sites contributing more than 0.5 tons annually. County staff will evaluate site accessibility/feasibility on Category I sites. If all Category I streambanks are controlled, the goal of 25% reduction in streambank erosion will be achieved. As additional sites are identified during the implementation of the project the Category I criteria will be used to determine eligibility.

Category II participants are also eligible for streambank erosion control practices. Eligible streambanks are those with identified moderate erosion rates of between 0.3 and 0.5 tons per year.

Category III streambanks are those with slight erosion rates yielding less than 0.3 tons per year.

Livestock Access: Category I (essential) streambanks include trampled sites totaling over 250 feet per landowner.

Category II (eligible) streambanks are all other sites.

Access restrictions will be outlined in a grazing management plan, which county staff will develop, and may include fencing, or allowing the cattle access to the stream only during limited times of the year. The timing and period of access allowed is determined by the County Land Conservation Department (LCD) in consultation with the landowner, with agreement from the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (DATCP). Participating landowners with Category I sites will develop these grazing management plans as part of the cost-share agreement, except in cases where livestock are excluded entirely. Landowners with Category II streambanks should do a grazing management plan, however they are not required to do so.

The purpose of the grazing management plan is to protect and stabilize areas immediately adjacent to streams. County staff will use their discretion concerning cost effectiveness and feasibility when applying best management practices (BMPs) to protect and stabilize agriculturally affected streambanks. See Table 4-6.

Table 4-6. Streambank Eligibility Criteria for the Upper Yellow River Watershed

Management Category	Criteria
Streambank Erosion	
I	Streambanks with an erosion rate of greater than 0.5 tons/year
II	Streambanks with an erosion rate of between 0.3 and 0.5 tons/year
III	Streambanks with an erosion rate of less than 0.3 tons/year
Streambank Habitat	
I	Trampled sites over 250 feet/landowner
II	All livestock access sites

Sources: Wood, Clark and Marathon County Conservation Departments, the Department of Natural Resources and the Department of Agriculture, Trade and Consumer Protection

Gully Erosion: Gully erosion contributes less than 1% of the overall sediment delivered to streams in the watershed. There will be no Category I for gully erosion. Category II will include all active gullies identified for 2 years or more consecutively.

Sediment Management Strategy: See Table 4-7, Management Strategy for Sediment: All Sources.

Phosphorus Management Strategy: See Table 4-8, Management Strategy for Phosphorus: All Sources.

Wetland Restoration

The aim of wetland restoration in the Upper Yellow River watershed is to re-establish some of the inherent functions of wetlands prior to their alteration. Those functions include sediment/nutrient filtering ability, flood water storage, wildlife habitat and recreation.

Table 4-7. Management Strategy for Sediment: All Sources

Subwatershed	Annual Cropland Sediment		Annual Gully Sediment		Annual Streambank Sediment		Annual Other Sediment ¹		Total Annual Subwatershed Sediment	
	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%
Beaver Creek	5,202	9	0	0	1	<1	595	1	5,798	11
Cat Creek	1,892	3	14	<1	1	<1	730	1	2,637	5
East Yellow	9,558	17	7	<1	22	<1	2,172	4	11,759	21
Lower Yellow	0.3	0	0	0	408	1	284	<1	692	1
Middle Yellow	1,864	3	0	0	0	0	582	1	2,446	4
North Yellow	7,207	13	0	0	2	<1	1,333	2	8,542	16
Owl Creek	1,394	3	0	0	0	0	610	1	2,004	4
Otter Creek	1,319	2	3	<1	37	<1	718	1	2,077	4
Puff Creek	821	1	0	0	0	0	807	1	1,628	3
Rocky Creek	4,465	8	0	0	5	<1	1,202	2	5,672	10
South Yellow	10,452	19	3	<1	5	<1	1,074	2	11,534	21
Totals	44,174	81	27	<1	481	1	10,107	18	54,789	100
Subwatershed	Sediment Control Planned						Total Sediment Control Planned ²			
	Cropland ²		Streambanks ²		Gullies ²					
	Tons	%	Tons	%	Tons	%	Tons	%		
Beaver Creek	2,299	40	0.25	<1	0	0	2,299	40		
Cat Creek	442	17	0.25	<1	3.5	<1	446	17		
East Yellow	3,902	33	6.0	<1	2	<1	3,910	33		
Lower Yellow	0	0	102	15	0	0	102	15		
Middle Yellow	559	23	0	0	0	0	559	23		
North Yellow	2,685	31	0.5	<1	0	0	2,686	31		
Owl Creek	347	17	0	0	0	0	347	17		
Otter Creek	526	25	9	<1	1	<1	536	26		
Puff Creek	198	12	0	0	0	0	198	12		
Rocky Creek	2,635	46	1.25	<1	0	0	2,636	46		
South Yellow	5,362	46	1.25	<1	1	<1	5,364	47		
Totals	18,955	35	121	<1	7.5	<1	19,083	35		

¹ Includes: developed areas, grassland, pasture, woodlots, wetlands.

² Control planned is estimated to be half of Category II tons and all of Category I tons.

Table 4-8. Management Strategy for Phosphorus: All Sources

Subwatershed	Annual Phosphorus Loading										Total Phosphorus Loading ²	
	Barnyards		Cropland ¹		Streambanks ¹		Gullies ¹		Other ^{1,3}		(lbs.)	%
	(lbs.)	%	(lbs.)	%	(lbs.)	%	(lbs.)	%	(lbs.)	%		
Beaver Creek	1,417	2	5,358	8	1.03	<1	0	0	613	1	7,389	11
Cat Creek	462	1	1,949	3	1.03	<1	14	<1	752	1	3,178	5
East Yellow	1,957	3	9,845	15	23	<1	7	<1	2,237	3	14,069	21
Lower Yellow	0	0	0.4	<1	420	1	0	0	293	0	713	1
Middle Yellow	625	1	1,920	3	0	0	0	0	599	1	3,144	4
North Yellow	1,892	3	7,423	11	2	<1	0	0	1,373	2	10,690	16
Owl Creek	275	<1	1,436	2	0	0	0	0	628	1	2,339	3
Otter Creek	441	1	1,359	2	38	<1	3	<1	740	1	2,581	4
Puff Creek	482	1	846	1	0	0	0	0	831	1	2,159	3
Rocky Creek	781	1	4,599	7	5	<1	0	0	1,238	2	6,623	11
South Yellow	2,444	4	10,766	16	5	<1	3	<1	1,106	2	14,324	21
Totals	10,755	16	45,501	68	495	<1	27	<1	10,410	16	67,209	100

Subwatershed	Phosphorus Control Planned								Total Planned Phosphorus Control	
	Barnyards		Croplands		Streambanks		Gullies		lbs.	%
	lbs.	%	lbs.	%	lbs.	%	lbs.	%		
Beaver Creek	1,153	16	2,368	32	0.26	<1	0	0	3,521	48
Cat Creek	297	9	455	14	0.26	<1	3.6	<1	756	23
East Yellow	1,536	11	4,019	29	6.2	<1	2.1	<1	5,563	40
Lower Yellow	0	0	0	0	105	15	0	0	105	15
Middle Yellow	249	8	576	19	0	0	0	0	825	27
North Yellow	1,537	14	2,766	26	0.52	<1	0	0	4,304	40
Owl Creek	162	7	357	16	0	0	0	0	519	23
Otter Creek	263	10	542	21	9.3	<1	1.3	<1	816	31
Puff Creek	262	12	204	10	0	0	0	0	466	22
Rocky Creek	592	9	2,714	41	1.29	<1	0	0	3,307	50
South Yellow	1,857	13	5,523	39	1.29	<1	1.3	<1	7,383	52
Totals	7,908	12	19,524	29	124	<1	8.3	<1	27,565	41

¹ Assumes 1.03 lbs. P/l ton sediment (calculated).

² Assumes 0.46 lbs P/acre loading from all sources (Green Bay Remedial Action Plan, 1987).

³ Includes developed areas, woodlots, wetlands, grasslands, pastures.

⁴ Control planned is estimated to be half of the Category II pounds and all of the Category I pounds.

⁵ Control planned for winterspread manure was not estimated.

Half of the annual phosphorus loading from "other sources" was estimated to be from winterspread manure (5,205 lbs.). The plan calls for a 65% reduction in phosphorus from winterspread manure, or a reduction of 3,383 lbs. This reduction yields an additional overall reduction in phosphorus of 5%, resulting in an overall planned phosphorus control of 46%.

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.

There will be no Category I for wetland restoration. All inventoried restorable wetlands (3007 acres) will be Category II (eligible) for restoration if the sites meet the criteria following. The goal is to restore 15% (451 acres) of the wetlands sites inventoried. See Chapter Two, Table 2-3 for wetland inventory details.

Wetland restoration includes: the plugging or breaking up of existing tile drainage systems, the plugging of open channel drainage systems, other methods of restoring the pre-development water levels of an altered wetland and the fencing of wetlands to exclude livestock.

Wetland restoration is an eligible practice when applied to any of the following:

- 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.

- 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.

- Prior converted wetlands downslope or upslope from fields identified as Management Category I upland sediment sources through the WIN 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) reduce 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.

Other wetland sites identified during the inventory as having potential for restoration or protection projects will be evaluated for eligibility based on several factors. These sites include nonriparian pastured wetlands and wetland areas that were altered and cropped but have since been abandoned. These potential sites will be reviewed by the DNR District Coordinator, county watershed staff and DNR Wildlife Management staff. Factors to be considered in the reviews include:

- Water resource conditions and objectives for the subwatershed
- Cost effectiveness of the project
- Presence of natural and cultural limitations which may make restoration difficult such as excessive slope or location of roads.
- Land ownership and property boundaries

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.

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.

Situations encountered when determining the use of easements are:

- **Critical lands throughout the watershed** where permanent vegetative cover provides a cost-effective means of controlling a nonpoint source. There may be situations where taking cropland out of production and providing an easement with permanent vegetative cover is less costly than constructing a terrace, an agricultural sediment basin, or other high cost control measures.
- **Shoreline buffers throughout the watershed** where permanent vegetative cover provides cost-effective pollution control when compared to other control measures. For example, if shoreline easement costs are similar or lower than practices such as reduced tillage, crop rotation changes, contour strips, etc.
- **Wetland restorations** to control either livestock grazing within wetlands riparian to lakes, streams, or tributaries, and restorations of prior converted wetlands down slope or up slope from fields identified as critical upland sediment sources through the WIN model. Secondary benefits may include enhancement of fish and/or wildlife habitat.

Ordinances

Animal Waste Storage Ordinance

Improperly stored manure can be a significant source of surface or groundwater contamination. Poorly sited and/or designed earthen storage facilities often contaminate groundwater near these facilities. Elevated nitrate-nitrogen concentrations are particularly common in groundwater near leaking earthen storage facilities. In Wood County, few regulations exist to protect water resources from the threat of contamination due to animal waste storage and handling.

Properly storing manure entails utilizing certain minimum standards, such as those determined by the USDA Soil Conservation Service, when siting and constructing a manure storage structure. These technical standards provide effective, practical and environmentally safe methods for storing animal waste.

Surface water resources are also at risk with manure storage facilities, when improperly located and/or designed. Manure overflows or a blowout from earthen 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 water quality unless properly treated. Uncontrolled drainage may also affect groundwater quality, particularly when it occurs in an area with shallow depth to groundwater.

The need for animal waste regulation in Wood County is evident. More than thirty Wisconsin counties have already adopted ordinances for managing animal waste. Clark and Marathon Counties have enacted animal waste storage ordinances for the protection of

surface and groundwater resources. The Marathon County ordinance is in the process of being revised to include concrete systems in addition to earthen systems. To help assure the attainment of surface water quality objectives and to protect the groundwater resource, the adoption of an animal waste storage ordinance in Wood County is necessary during the span of the Upper Yellow River Watershed project. Certain costs for the development and administration of the ordinance are eligible for reimbursement under the Priority Watershed Project. At the time of publication of this plan, the Wood County LCD had initiated discussion on the development of a manure storage ordinance, with the intention of adopting an ordinance during 1994. As required by State Statute, should Wood County fail to adopt an animal waste storage ordinance, the County must repay to the State all Upper Yellow River Nonpoint Source Grant Agreement funding. This will be a condition of the Wood County Nonpoint Source Grant Agreement.

Construction Site Erosion Ordinance

The significance of nonpoint source pollution from construction site erosion in the Upper Yellow River watershed has been researched. Data were collected on the number of building permits issued per year. The number of permits issued in the watershed area is low, with the exception of the western edge of Marshfield which is in the watershed.

Building Permits

Under the Department of Industry, Human, Labor Relations' (DILHR) unique multi-family dwelling code, any city, town, or village with a population of 2,500 or above, will have the city or municipal government administering and enforcing construction site erosion controls on one and two family dwellings. The portion of the City of Marshfield in the Upper Yellow River watershed is the primary area of concern for construction site erosion. DILHR's code deems that jurisdiction for construction site erosion control lies with the city. However, the DILHR code applies just to one and two family dwellings. Since 1982, in the Upper Yellow River watershed, near Marshfield, non-residential building permits were issued for the following:

- One mobile home court*
- 13 new non-residential buildings*
- 11 new non-residential buildings*

Residential building permits since 1982 included the following:

- 237 one- and two-family residential buildings/dwellings (covered by DILHR code)
- Two 8-unit apartment buildings*
- One 4-unit condominium building*
- One 2-unit condominium building*

* Indicates that construction is not covered by the DILHR code.

Population Trends

Population trends over the past decade were reviewed. The Wood, Clark and Marathon Counties portion of the Upper Yellow River watershed showed no significant population increases over the past two decades, with the exception of the city of Marshfield. The population in the major towns of these areas has increased just slightly (3-8%) over the past decade.

In light of this information, the Department of Natural Resources, strongly suggests that Wood, Clark and Marathon Counties adopt a construction site erosion control ordinance for preventative reasons. However, review of existing data reveals that construction sites do not represent a significant pollutant source in the project area at this time to warrant requiring an ordinance for grant eligibility. Currently, there is a potential problem with construction site erosion in the developing area west of the city of Marshfield; however, enforcement of the DILHR Rules should substantially abate this erosion source.

The DNR will require Wood County to submit an annual review of building permits for other than one- and two-family dwellings and of population trends in the watershed project area. If these data indicate construction site erosion may have the potential to interfere with the goals of this plan, a construction site erosion control ordinance will be required at that time.

The DNR suggests that the Wisconsin Construction Site Erosion Best Management Handbook (DNR Publication WR-222-89) be used as a reference for any development that does occur in the Upper Yellow River Watershed.

CHAPTER FIVE

Detailed Program for Implementation

Introduction

This chapter identifies the means for implementing the management actions for nonpoint source control described in Chapter Four and describes the county's nonpoint source implementation strategy for rural areas. Included in the implementation program for rural areas is an information and education strategy. The success of this priority watershed project depends on the aggressive implementation of these nonpoint source control strategies.

More specifically this chapter identifies:

- The agencies and units of government responsible for carrying out the identified tasks;
- The best management practices (BMPs) necessary to control pollutants on the critical sites identified in Chapter Four;
- The cost-share budget;
- The cost containment policies;
- The cost-share agreement reimbursement procedures including administrative procedures for carrying out the project;
- Staffing needs including total hours per year and number of staff to be hired;
- Schedules for implementing the project;
- The involvement of other programs;
- The information and education activities that will be carried out in the project area; and
- 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

Land Conservation Committees: Land Conservation Committees in Wood, Clark and Marathon Counties are the primary units of government responsible for implementing this plan in rural areas.

The Wood, Clark and Marathon County Land Conservation Committees (LCC) acting for their respective County Boards, will provide contractual and financial support in representing the State of Wisconsin for management of the project in areas with rural land uses. The County LCCs will coordinate the activities of all other agencies involved with the rural portion of the project.

The specific responsibilities for the Land Conservation Committees in each county during project implementation are defined in the Wisconsin Administrative Rules, s. NR 120.04, and are summarized below:

- Identify in writing a person to represent the county LCC during implementation of the project.
- Contact all owners or operators of lands identified as significant nonpoint sources (Category 1) within 1 year of signing the nonpoint source grant agreement. The counties' strategies for contacting landowners are included in this chapter.
- Develop farm conservation plans consistent with the needs of the project.
- 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, Wis. Adm. Code.
- Provide best management practice technical design and installation assistance for all best management practices in cost-share agreements within jurisdiction.
- Provide the DNR with verification of proper installation, operation and maintenance of best management practices.
- Reimburse cost-share recipients for the eligible costs of installing BMPs at the rates consistent with administrative rules and established in this plan.
- Prepare and submit annual work plans for activities necessary to implement the project. The Wood, Clark and Marathon County Land Conservation Departments (LCDs) shall submit a workload analysis and grant application to the Department of Agriculture, Trade and Consumer Protection (DATCP) as required in s. Ag. 166.50.

- Prepare and submit to the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (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.
- Participate in the annual watershed project review meeting.
- Conduct the information and education activities identified in this plan for which they are responsible.

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 Upper Yellow River Watershed eligible for cost-share assistance through the priority watershed program include: 1) individuals; 2) Wood County, Clark County and Marathon County; 3) other governmental units described in NR 120.02(19); 4) corporations; and 5) the State of Wisconsin.

Department of Natural Resources

The role of the Department of Natural Resources (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 county LCCs 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 Land Conservation Departments.

The Department reviews cost-share agreements signed by the county LCC representative 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 Upper Yellow River Watershed are included in Chapter Eight. 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:

- The appropriate District Nonpoint Source Coordinator to arrange for DNR staff to assist county Land Conservation Department staff with site reviews to determine the impacts of nonpoint sources on wetlands and/or groundwater quality.
- Assisting county LCD staff to integrate wildlife and fish management concerns into selection and design of BMPs.

Department of Agriculture, Trade and Consumer Protection

The role of the Department of Agriculture, Trade and Consumer Protection (DATCP) is identified in s. 144.25, Stats., ch. 92 Stats., and NR 120. In summary, the DATCP will:

- Manage a training program for the staff involved with project implementation.
- 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.
- Assist the county LCDs to carry out the information and education activities or tasks described in this plan.
- Assist county LCD staff to identify watershed participants subject to federal or state conservation compliance programs.
- Assist county LCCs, if requested, to develop a manure storage ordinance.

- Assist county LCD staff to complete annual workload analyses and grant applications for work conducted under the priority watershed project.
- Participate in the annual project review meetings.
- If the need arises, assist in developing technical standards for agricultural BMPs and provide technical assistance to county LCD staff concerning application of these practices.
- Assist county LCD staff to evaluate the site specific practicality of implementing rural best management practices.

Other Agencies

The Upper Yellow River Watershed Project will seek 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 LCD 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 Upper Yellow River 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 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 Upper Yellow River 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 under the Upper Yellow Watershed Project and the cost-share rates for each BMP are listed in Table 5-1 and 5-2 on the following pages.

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 alternative design criteria based on the provisions of NR 120.15 where necessary to meet the water resource objectives.

Table 5-1. State Cost-Share% Rates for Best Management Practices*

Best Management Practice	State Cost-Share Rate
Field Diversions and Terraces	70%
Grassed Waterways	70%
Critical Area Stabilization Structures	70% ¹
Grade Stabilization Structures	70%
Agricultural Sediment Basins	70%
Shoreline and Streambank Stabilization Includes Livestock Exclusion	70% ^{2,*}
Shoreline Buffers	70% ^{1,3}
Livestock Exclusion From Woodlots	50% [*]
Barnyard Runoff Management	70%
Animal Lot Relocation	70% ^{3,*}
Manure Storage Facilities	70% ⁴
Roofs for Barnyard Runoff Management and Manure Storage Facilities	70%
Wetland Restoration	70% ¹
Nutrient Management	50%
Pesticide Management	50% ⁵
Structural Urban Practices	70% ⁶

¹ Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See Chapter Four for an explanation of where easements may apply.

² Pasture pumps are an eligible component to this BMP at a state cost-share rate of 70%.

³ The maximum cost-share amount of relocation of buildings, structures and lots shall be 70% of the replacement cost up to their appraised value. Salvage or resale value realized during the maintenance period of the cost-share agreement shall be deducted from the appraised value.

⁴ Maximum cost-share amount is \$20,000 for manure storage facilities.

⁵ Spill control basins have a state cost-share rate of 70%.

⁶ Applies to practices for existing urban areas. Construction erosion control and stormwater management practices for new development are not eligible.

^{*} See Table 5-2 for BMPs cost-shared at a flat rate. Table 5-2 lists maximum state cost-share flat rates. The watershed should use either a percentage or a flat rate cost for each practice.

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

Best Management Practice	Flat Rate
Reduced Tillage	\$15.00/ac ⁽²⁾
Contour Farming	\$6.00/ac ⁽¹⁾
Field Strip Cropping	\$10.00/ac ⁽¹⁾
Contour Strip Cropping	\$12.00/ac ⁽¹⁾
Streambank Fencing/Woodland Fencing	
Temporary	\$ 8.00/rod
Permanent	\$16.00/rod

⁽¹⁾ Wildlife habitat restoration components of this practice are cost-shared at 70%

⁽²⁾ \$15 per acre for one year only for reduced tillage on crop rotations including hay
 \$45 per acre over 3 years for reduced tillage on continuous row croplands

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 and Field Stripcropping:** Growing crops in a systematic arrangement, usually on the contour, in alternate strips of close grown crops, such as grasses or legumes, and tilled row crops.
- **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 at least 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 that 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.

- **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 rip-rap, streambank sloping and seeding, stream crossings, livestock watering, streambank fencing and fish habitat structures. This practice may include plans and practices to control 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 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 winterspread 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 enhancement of wetland functions and values or the destruction 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 testing.

- **Pesticide Management:** The management of the handling, disposal and application of pesticides including the rate, method and timing of application to minimize the amount of pesticides entering surface and groundwater.
- **Easements:** Although not considered to be Best Management Practices, easements are useful legal tools and their applicability is defined in Chapter Four, Management Actions. Details for such arrangements will be worked out between DNR and the county LCDs during the 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 of the area.
- **Rotational Grazing -** A grazing management scheme that divides the pasture into multiple cells (usually 5 to 30) that receive a short but intensive grazing period followed by a recovery period of approximately 28 days. Rotational grazing increases pasture production while enhancing a dense, stable vegetative cover. Practice will be limited to one trial and will then be evaluated before potentially expanding use.
- **No-Till -** In the event that an alternative best management practice is developed which expands cost-sharing conditions for no-till, the Upper Yellow River project will be able to use this practice as per conditions and criteria developed.

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, i.e. Wisconsin Fund.
- 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.

- Manure spreading management.
- Other activities the DNR, DATCP and the County LCCs determine are not 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 practices which were rendered ineffective do to circumstances beyond the landowners control,
- Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program or covered in other ways by Chapter 147 of Wisconsin Statutes (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 this projects water quality objectives are listed in Tables 5-3, 5-3a, 5-3b, and 5-3c. The capital cost of installing the BMPs are listed in this table assuming landowner participation rates of 100% and 75%. Also included are the units of measurement and cost-share amount per unit for the various BMPs.

The capital cost of installing the Best Management Practices in Wood, Clark and Marathon Counties is approximately \$6.5 million, \$1.5 million and \$0.8 million, respectively, assuming 100% participation.

- State funds necessary to cost-share this level of control would be about \$5.0 million, \$1.1 million and \$0.6 million for Wood, Clark and Marathon Counties, respectively.
- The local share provided by landowners and other cost-share recipients would be about \$1.5 million, \$0.4 million and \$0.2 million, respectively.

At a 75% level of participation, the state funds needed to cover capital installation would be about \$3.7 million, \$0.8 million and \$0.5 million for Wood, Clark and Marathon Counties, respectively.

Easement Costs

Chapter Four identifies where nonpoint source program funds can be used to purchase easements. The estimated cost of purchasing easements on eligible lands in Wood, Clark and Marathon Counties is shown in Table 5-3 through 5-3c. At 100% participation, the estimated purchase price of easements on eligible lands would be \$715,000, \$204,000 and \$180,000 in Wood, Clark and Marathon Counties, respectively. At 75% participation, the cost would be \$536,250, \$153,000 and \$135,000; respectively. 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.

Table 5-3. Cost-Share Budget for Rural Management Practices in Wood County

Management Needs 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	380 ac	NA ²	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Contour Cropping	420 ac	\$ 6.00	2,520	2,520	(3)	1,890	(3)
Contour Strip Cropping	280 ac	12.00	3,360	3,360	(3)	2,520	(3)
Reduced Tillage ⁴	2,700 ac	15.00	40,500	40,500	(3)	30,375	(3)
Reduced Tillage ⁵	1,200 ac	15.00	18,000	18,000	(3)	13,500	(3)
Critical Area Stabilization	92 ac	700.00	64,400	45,080	19,320	33,810	14,490
Tree Planting	52 ac	125.00	6,500	6,500	(3)	4,875	(3)
Grass Waterways	46 ac	2,200.00	101,200	70,840	30,360	53,130	22,770
Field Diversions & Terraces	2,300 ft	3.00	6,900	4,830	2,070	3,623	1,553
Grade Stabilization	12 ea	7,000.00	84,000	58,800	25,200	44,100	18,900
Agricultural Sediment Basin	13 ea	15,000.00	195,000	136,500	58,500	102,375	43,875
Nutrient and Pest Mgmt.	4,700 ac	25.00	117,500	58,750	58,750	44,063	44,063
Shoreline Buffers	318 ac	150.00	47,700	33,390	14,310	25,043	10,733
Wetland Restoration	94 ea	2,000.00	188,000	131,600	56,400	98,700	42,300
Livestock Exclusion ⁷	44,665 ft	0.80	35,732	35,732	(3)	26,799	(3)
Spill Control Basins	3 ea	15,000.00	45,000	31,500	13,500	23,625	10,125
Animal Waste Management							
Barnyard Runoff Control							
Complete System	94 ea	22,500.00	2,115,000	1,480,500	634,500	1,110,375	475,875
Roof Gutters	56 ea	400.00	22,400	15,680	6,720	11,760	5,040
Clean Water Diversion	62 ea	800.00	49,600	34,720	14,880	26,040	11,160
Manure Storage Facility ⁶	68 ea	25,000.00	1,700,000	1,360,000	340,000	1,020,000	255,000
Leaking/Improperly Sited Manure Storage	10 ea	25,000 ²	250,000	125,000	125,000	93,750	93,750
Streambank Erosion Control Facilities							
Shape and Seeding ⁷	14,097 ft	4.00	56,388	39,472	16,916	29,604	12,687
Fencing ⁷	329,818 ft	0.80	263,854	263,854	(3)	197,891	(3)
Rip-Rap ⁷	8,992 ft	25.00	224,800	157,360	67,440	118,020	50,580
Livestock/Machinery Crossing/Watering Ramp	116 ea	1,500.00	174,000	121,800	52,200	91,350	39,150
Remote Watering Systems	47 ea	500.00	23,500	16,450	7,050	12,338	5,288
Subtotals			\$5,835,854	\$4,292,738	\$1,543,116	\$3,219,556	\$1,157,339
Easements	715 ac	\$1,000.00	715,000	715,000	0	536,250	0
Totals			\$6,550,854	\$5,007,738	\$1,543,116	\$3,755,806	\$1,157,339

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, over 3 years
⁴ Reduced tillage on continuous row crops, greater than 3 years
⁵ Reduced tillage, including no-till, on rotations including hay
⁶ Maximum cost-share is \$20,000 for waste storage facilities and waste transfer
⁷ Wisconsin Conservation Corps could provide labor to reduce landowner costs

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection; and the Wood and Clark County Land Conservation Departments

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

Management Needs 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	100 ac	NA ²	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Contour Cropping	200 ac	\$ 6.00	1,200	1,200	(3)	900	(3)
Contour Strip Cropping	50 ac	12.00	600	600	(3)	450	(3)
Reduced Tillage ⁴	1,200 ac	15.00	18,000	18,000	(3)	13,500	(3)
Reduced Tillage ⁵	300 ac	15.00	4,500	4,500	(3)	3,375	(3)
Critical Area Stabilization	40 ac	700.00	28,000	19,600	8,400	14,700	6,300
Tree Planting	20 ac	125.00	2,500	2,500	(3)	1,875	(3)
Grass Waterways	12 ac	2,200.00	26,400	18,480	7,920	13,860	5,940
Field Diversions & Terraces	500 ft	3.00	1,500	1,050	450	788	338
Grade Stabilization	2 ea	7,000.00	14,000	9,800	4,200	7,350	3,150
Agricultural Sediment Basin	5 ea	15,000.00	75,000	52,500	22,500	39,375	16,875
Nutrient and Pest Mgmt.	625 ac	25.00	15,625	7,813	7,813	5,859	5,859
Shoreline Buffers	40 ac	150.00	6,000	4,200	1,800	3,150	1,350
Wetland Restoration	16 ea	2,000.00	32,000	22,400	9,600	16,800	7,200
Livestock Exclusion ⁷	8,250 ft	0.80	6,600	6,600	(3)	4,950	(3)
Spill Control Basins	1 ea	15,000.00	15,000	10,500	4,500	7,875	3,375
Animal Waste Management							
Barnyard Runoff Control							
Complete System	25 ea	22,500.00	562,500	393,750	168,750	295,313	126,563
Roof Gutters	8 ea	400.00	3,200	2,240	960	1,680	720
Clean Water Diversion	14 ea	800.00	11,200	7,840	3,360	5,880	2,520
Manure Storage Facility ⁶	13 ea	25,000.00	325,000	260,000	65,000	195,000	48,750
Leaking/Improperly Sited Manure Storage	6 ea	25,000 ²	150,000	75,000	75,000	56,250	56,250
Streambank Erosion Control							
Shape and Seeding ⁷	2,000 ft	4.00	8,000	5,600	2,400	4,200	1,800
Fencing ⁷	5,115 ft	0.80	4,092	4,092	(3)	3,069	(3)
Rip-Rap ⁷	62 ft	25.00	1,550	1,085	465	814	349
Livestock/Machinery Crossing/Watering Ramp	8 ea	1,500.00	12,000	8,400	3,600	6,300	2,700
Remote Watering Systems	6 ea	500.00	3,000	2,100	900	1,575	675
Subtotals			\$1,327,467	\$939,850	\$387,618	\$704,888	\$290,714
Easements	204 ac	\$1,000.00	204,000	204,000	0	153,000	0
Totals			\$1,531,467	\$1,143,850	\$387,618	\$857,888	\$290,714

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 continuous row crops, greater than 3 years
⁵ Reduced tillage, including no-till, on rotations including hay
⁶ Maximum cost-share is \$20,000 for waste storage facilities and waste transfer
⁷ Wisconsin Conservation Corps could provide labor to reduce landowner costs

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection; and the Wood and Clark County Land Conservation Departments

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

Management Needs 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	70 ac	NA ²	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Contour Cropping	80 ac	\$ 6.00	480	480	(3)	360	(3)
Contour Strip Cropping	50 ac	12.00	600	600	(3)	450	(3)
Reduced Tillage ⁴	900 ac	15.00	13,500	13,500	(3)	10,125	(3)
Reduced Tillage ⁵	200 ac	15.00	3,000	3,000	(3)	2,250	(3)
Critical Area Stabilization	28 ac	700.00	19,600	13,720	5,880	10,290	4,410
Tree Planting	20 ac	125.00	2,500	2,500	(3)	1,875	(3)
Grass Waterways	10 ac	2,200.00	22,000	15,400	6,600	11,550	4,950
Field Diversions & Terraces	340 ft	3.00	1,020	714	306	536	230
Grade Stabilization	2 ea	7,000.00	14,000	9,800	4,200	7,350	3,150
Agricultural Sediment Basin	3 ea	15,000.00	45,000	31,500	13,500	23,625	10,125
Nutrient and Pest Mgmt.	500 ac	25.00	12,500	6,250	6,250	4,688	4,688
Shoreline Buffers	20 ac	150.00	3,000	2,100	900	1,575	675
Wetland Restoration	10 ea	2,000.00	20,000	14,000	6,000	10,500	4,500
Livestock Exclusion ⁷	5,280 ft	0.80	4,224	4,224	(3)	3,168	(3)
Spill Control Basins	1 ea	15,000.00	15,000	10,500	4,500	7,875	3,375
Animal Waste Management							
Barnyard Runoff Control							
Complete System	10 ea	22,500.00	225,000	157,500	67,500	118,125	50,625
Roof Gutters	7 ea	400.00	2,800	1,960	840	1,470	630
Clean Water Diversion	7 ea	800.00	5,600	3,920	1,680	2,940	1,260
Manure Storage Facility ⁶	6 ea	25,000.00	150,000	120,000	30,000	90,000	22,500
Streambank Erosion Control							
Shape and Seeding ⁷	1,240 ft	4.00	4,960	3,472	1,488	2,604	1,116
Fencing ⁷	25,625 ft	0.80	20,500	20,500	(3)	15,375	(3)
Rip-Rap ⁷	84 ft	25.00	2,100	1,470	630	1,103	473
Livestock/Machinery Crossing/Watering Ramp	9 ea	1,500.00	13,500	9,450	4,050	7,088	3,038
Remote Watering Systems	2 ea	500.00	1,000	700	300	525	225
Subtotals			\$601,884	\$447,260	\$154,624	\$335,447	\$115,970
Easements	180 ac	\$1,000.00	180,000	180,000	0	135,000	0
Totals			\$781,884	\$627,260	\$154,624	\$470,447	\$115,970

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 continuous row crops, greater than 3 years
⁵ Reduced tillage, including no-till, on rotations including hay
⁶ Maximum cost-share is \$20,000 for waste storage facilities and waste transfer
⁷ Wisconsin Conservation Corps could provide labor to reduce landowner costs

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection; and the Wood and Clark County Land Conservation Departments

Table 5-3c. Cost-Share Budget for Rural Management Practices in Wood, Clark and Marathon Counties

Management Needs 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	550 ac	NA ²	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Contour Cropping	700 ac	\$18.00	4,200	4,200	(3)	3,150	(3)
Contour Strip Cropping	380 ac	36.00	4,560	4,560	(3)	3,420	(3)
Reduced Tillage ⁴	4,800 ac	45.00	72,000	72,000	(3)	54,000	(3)
Reduced Tillage ⁵	1,700 ac	45.00	25,500	25,500	(3)	19,125	(3)
Critical Area Stabilization	160 ac	2,100.00	112,000	78,400	33,600	58,800	25,200
Tree Planting	92 ac	375.00	11,500	11,500	(3)	8,625	(3)
Grass Waterways	68 ac	6,600.00	149,600	104,720	44,880	78,540	33,660
Field Diversions & Terraces	3,140 ft	9.00	9,420	6,594	2,826	4,947	2,121
Grade Stabilization	16 ea	21,000.00	112,000	78,400	33,600	58,800	25,200
Agricultural Sediment Basin	21 ea	45,000.00	315,000	220,500	94,500	165,375	70,875
Nutrient and Pest Mgmt.	5,825 ac	75.00	145,625	72,813	72,813	54,610	54,610
Shoreline Buffers	378 ac	450.00	56,700	39,690	17,010	29,768	12,758
Wetland Restoration	120 ea	6,000.00	240,000	168,000	72,000	126,000	54,000
Livestock Exclusion ⁷	58,195 ft	2.40	46,556	46,556	(3)	34,917	(3)
Spill Control Basins	5 ea	45,000.00	75,000	52,500	22,500	39,375	16,875
Animal Waste Management							
Barnyard Runoff Control							
Complete System	129 ea	67,500.00	2,902,500	2,031,750	870,750	1,523,813	653,063
Roof Gutters	71 ea	1,200.00	28,400	19,880	8,520	14,910	6,390
Clean Water Diversion	83 ea	2,400.00	66,400	46,480	19,920	34,860	14,940
Manure Storage Facility ⁶	87 ea	75,000.00	2,175,000	1,740,000	435,000	1,305,000	326,250
Leaking/Improperly Sited Manure Storage	16 ea	50,000 ²	400,000	200,000	200,000	150,000	150,000
Streambank Erosion Control							
Shape and Seeding ⁷	17,337 ft	12.00	69,348	48,544	20,804	36,408	15,603
Fencing ⁷	360,558 ft	2.40	288,446	288,446	(3)	216,335	(3)
Rip-Rap ⁷	9,138 ft	75.00	228,450	159,915	68,535	119,937	51,402
Livestock/Machinery Crossing/Watering Ramp	133 ea	4,500.00	199,500	139,650	59,850	104,738	44,888
Remote Watering Systems	55 ea	1,500.00	27,500	19,250	8,250	14,438	6,188
Subtotals			7,765,205	5,679,848	2,085,337	4,259,891	1,564,023
Easements	1,099 ac	3,000.00	1,099,000	1,099,000	0	824,250	0
Totals			8,864,205	6,778,848	2,085,337	5,084,141	1,564,023

Total cost to control identified critical pollution sources
¹ NA means that cost-share funds are not available for this practice
² Local share consists of labor and any additional equipment costs
³ Reduced tillage on continuous row crops, greater than 3 years
⁴ Reduced tillage, including no-till, on rotations including hay
⁵ Maximum cost-share is \$20,000 for waste storage facilities and waste transfer
⁶ Wisconsin Conservation Corps could provide labor to reduce landowner costs

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection; and the Wood and Clark County Land Conservation Departments

Cost Containment

Cost Containment Provisions

Chapter NR 120 requires that cost containment provisions be outlined to control the costs of installing best management practices (BMPs) in the Upper Yellow River Priority Watershed project.

Cost-share payments will be based on actual installation costs. If actual installation costs exceed the amount of cost-sharing determined from cost estimates from qualified contractors, then the amount paid the grantee may be increased with the approval of the appropriate Land Conservation Committee. Appropriate documentation regarding the need for changes will be submitted to DNR if required. The cost containment procedures to be used by Wood, Clark and Marathon Counties are described in each county's cost containment procedure. Copies of the cost containment procedure can be obtained from each respective county LCD. If these procedures change, they are subject to approval by DATCP and DNR.

Where special circumstances warrant, practice costs may exceed the cost-share maximum identified by these provisions. In no case, however, may the amount paid the grantee exceed actual installation cost times the specified cost-share rate.

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.

Quotes and Average Costs

BMPs estimated under \$5,000 will need a quote only at the discretion of the project manager in each respective county. Quotations or bid proposals from Contractors will be required for all practices estimated at or over \$5,000. The Land Conservation Committee approves and selects a quote or Bid Proposal from which the cost-share dollar amount of the practice or project is based. It is the landowners responsibility to contact contractors, receive quotes or bid proposals and select a contractor to install the BMP practice. Costs will be based on the estimated bid proposal selected by the Land Conservation Committee. If no quotes are received or if the selected quote is not complete or deemed not appropriate, the cost-share payment will be based on the practice cost estimate outlined on the cost-share agreement.

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. The counties have established flat rates for determining labor rates for the farmer and his machinery. See the county's policy for these rates.

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 Wood, Clark and Marathon County LCCs for use in funding the state's share of cost-share agreements. Cost-share agreements are the means to transmit funds from the counties to the landowners.

A portion of the Nonpoint Source Grant is forwarded to Wood, Clark and Marathon County LCCs to allow the county LCDs to set up an "up front" account. Funds from this account are used by the county LCD to pay landowners after practices are installed under the project. As this account is drawn down, the county LCD will request reimbursements from DNR to replenish the account. The county LCDs 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 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

County LCCs are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Upper Yellow River 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 percentage of the costs of installing BMPs to meet the project objectives. Landowners have 3 years after formal approval of the watershed plan to enter

into cost-share agreements. Practices included in cost-share agreements must be installed within the schedule agreed to in the cost-share agreement. Unless otherwise approved, the schedule of installing BMPs will be within 5 years of signing of the cost-share agreement. Practices must be maintained for a minimum of 10 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 LCC. The agreement includes the name and other information about the landowner and grant recipient, conditions of the agreement, the practices involved and their location.

Also included are 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 Cost-Share Agreement 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 LCD 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.

Wood, Clark and Marathon County LCCs 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. Wood, Clark and Marathon county LCCs will check for compliance with practice maintenance provisions once every 3 years after the last practice has been installed. The county LCC must check maintenance at its own expense after the Nonpoint Source Agreement has lapsed, unless state funding for this activity becomes available.

Landowner Contact Strategy

The following procedure will be used to make landowner contacts.

1. During the first three months of the implementation period, all landowners or operators with eligible nonpoint sources will receive from the county LCD a mailing explaining the project and how they can become involved.
2. After the initial landowner mailings, county LCD 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 during the cost-share period.
3. The county LCD 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.
4. The county LCD 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 Four.

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 Wood, Clark and Marathon County LCDs for developing and administering agreements. Below are the steps from the initial landowner contact through the completion of BMP maintenance.

1. Landowner and county LCD staff meet to discuss 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 LCD.
4. The landowner agrees with the plan, a Cost-Share Agreement is prepared and both documents are signed by the landowner and the county LCC or representative. Two copies of the Cost-Share Agreement (CSA) are sent to the DNR North Central District

Nonpoint Source Coordinator along with a CAMPS report for eligibility and pollutant load tracking and a copy given to the landowner. The CSA will be recorded by the county LCD with the County Register of Deeds.

5. Practices are designed by the county LCD, 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 LCD staff oversee practice installation.
9. The county LCD verifies the installation.
10. The landowner submits paid bills and proof of payment (canceled checks or receipts marked paid) to the county LCD.
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 LCC to the respective landowners and project ledgers are updated.
13. The county LCD records the check amount, number and date.
14. DNR reimburses the county LCD for expended cost-share funds.

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 LCD.
- 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 NR 120.14. 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 Wood, Clark and Marathon County LCCs for supporting their staffing and support costs of carrying out this watershed plan. Each county LCC will have its own agreement.

Consistent with NR 120, the county LCCs will use funds from the LAGA for additional 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 LCD. 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

Wood, Clark and Marathon County LCCs are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Upper Yellow River 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 each county in accordance with s. Ag. 166.40(4) accounting for staff time, expenditures and accomplishments regarding activities funded through the watershed project. Reimbursement requests may be included with the submittal of the quarterly project reports.

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

Activity	Project Years When Work Will Be Done	WOOD COUNTY	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project and Financial Management	1-8	7,408	7,408
Information and Education Program	1-8	2,735	2,735
Pre-Contact Office Inventory; Landowner Contracts and Progress Tracking	1-3	1,272	848
Conservation Planning and Cost-Share Agreement Development	1-3	2,850	1,900
Plan Revisions and Monitoring	1-8	264	176
Practice Design and Installation	1-8		
Upland Sediment Control		4,880	3,253
Animal Waste Management		16,194	10,796
Streambank Erosion Control		10,091	6,727
Easements		215	143
Training	1-8	624	624
Total LCD Workload:		46,532	34,610
Estimated Staff Required for Years 1-3:		3.3 per year	2.4 per year
Hours		6,810 per year	5,027 per year
Estimated Staff Required for Years 4-8:		2.5 per year	1.9 per year
Hours		5,220 per year	3,906 per year

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Clark County Land Conservation Department

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

Activity	Project Years When Work Will Be Done	CLARK COUNTY	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project and Financial Management	1-8	3,120	3,120
Information and Education Program	1-8	956	956
Pre-Contact Office Inventory; Landowner Contracts and Progress Tracking	1-3	548	365
Conservation Planning and Cost-Share Agreement Development	1-3	702	468
Plan Revisions and Monitoring	1-8	203	135
Practice Design and Installation	1-8		
Upland Sediment Control		1,426	951
Animal Waste Management		4,173	2,782
Streambank Erosion Control		596	397
Easements		61	41
Training	1-8	624	624
Total LCD Workload:		12,408	9,839
Estimated Staff Required for Years 1-3:		0.9 per year	0.7 per year
Hours		1,804 per year	1,412 per year
Estimated Staff Required for Years 4-8:		0.7 per year	0.5 per year
Hours		1,399 per year	1,121 per year

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Clark County Land Conservation Department

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

Activity	Project Years When Work Will Be Done	MARATHON COUNTY	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project and Financial Management	1-8	3,120	3,120
Information and Education Program	1-8	0	0
Pre-Contact Office Inventory; Landowner Contracts and Progress Tracking	1-3	174	116
Conservation Planning and Cost-Share Agreement Development	1-3	300	200
Plan Revisions and Monitoring	1-8	32	21
Practice Design and Installation	1-8		
Upland Sediment Control		939	626
Animal Waste Management		1,617	1,078
Streambank Erosion Control		685	457
Easements		54	36
Training	1-8	624	624
Total LCD Workload:		7,545 per year	6,278 per year
Estimated Staff Required for Years 1-3:		0.5 per year	0.4 per year
Hours		1,033 per year	845 per year
Estimated Staff Required for Years 4-8:		0.4 per year	0.4 per year
Hours		889 per year	749 per year

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Marathon County Land Conservation Department

Staffing Needs

Budget and Staffing Needs

This section estimates the funding and staffing required to provide technical assistance for the rural portion of this project. These estimates are based on needs identified for Wood, Clark and Marathon County LCDs.

Staff Needs

Table 5-4 to 5-4b lists the total estimated staff needed to implement the project in Wood, Clark and Marathon Counties, respectively. Figures are provided for both the 50% and 75% levels of participation. A total of about 46,532 staff hours is required in Wood County and 12,408 staff hours in Clark County and 7,545 staff hours in Marathon County to implement this plan at a 75% landowner participation rate. This includes 2,735 staff hours in Wood County and 956 staff hours in Clark County to carry out the information and education program.

Currently there are 3 employees in the Wood County LCD, 1 employee in Clark County LCD and 1 employee in Marathon County LCD to implement the Upper Yellow River Watershed Project. The county LCDs and other agencies will determine the need for additional staff based on further analysis of the project requirements. The county LCD will assess the number and type of staff required for the final 5 years of the project based on the actual landowner participation following the 3-year cost-share sign-up period.

Staffing Costs

The estimated cost for staff at this landowner participation rate (see Table 5-5 through 5-5c) is approximately \$4.7 million and \$1.1 million and \$0.7 million; respectively, in Wood, Clark and Marathon Counties. All of these costs, with the exception of some direct cost items, would be paid for by the state.

Schedules

Grant Disbursement and Project Management Schedule

Implementation may begin upon approval of this watershed plan and Nonpoint Source Grant by the Wood County Board; Clark County Board; Marathon County Board; Wisconsin Department of Agriculture, Trade and Consumer Protection; and the Wisconsin Department of Natural Resources. The priority watershed project implementation period lasts 8 years. It

includes an initial 3-year period for contacting eligible landowners and signing cost-share agreements. Practices on any cost-share agreement must be installed within a 5-year period.

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 Wood, Clark and Marathon County LCCs will be based on an annual workload analysis and grant application process. The estimated grant disbursement schedule based on 75% participation by eligible landowners can be found in Tables 5-6, 5-6a and 5-6b; Wood County, Clark County and Marathon County, respectively.

Total Project Cost

The total state funding required to meet the rural nonpoint source pollution control needs at a 75% level of landowner participation is presented Table 5-5c. This figure includes the capital cost of practices, staff support and easement costs presented on the previous pages. The estimated cost to the state would be \$6.5 million and the estimated cost to the county would be \$1.0 million; \$0.2 million and \$0.1 million in Wood, Clark and Marathon Counties, respectively.

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.

Table 5-5. Wood County Project Costs at 75 percent Landowner Participation Rate

Item	Costs (State Share)
Cost-Share Funds: Practices	\$3,219,554
Cost-Share Funds: Easements	\$536,250
Local Assistance Staff Support*	\$715,662
Information/Education Direct	\$37,710
Other Direct (travel, supplies, etc.)	\$198,880
Engineering Assistance	\$0
Total	\$4,708,056

* Salary + Indirect = \$32,000/year

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Wood County Land Conservation Department

Table 5-5a. Clark County Project Costs at 75 percent Landowner Participation Rate

Item	Costs (State Share)
Cost-Share Funds: Practices	\$704,887
Cost-Share Funds: Easements	\$153,000
Local Assistance Staff Support*	\$190,835
Information/Education Direct	\$4,190
Other Direct (travel, supplies, etc.)	\$120,000
Engineering Assistance	\$0
Total	\$1,172,912

* Salary + Indirect = \$32,000/year

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Clark County Land Conservation Department

Table 5-5b. Marathon County Project Costs at 75 percent Landowner Participation Rate

Item	Costs (State Share)
Cost-Share Funds: Practices	\$335,445
Cost-Share Funds: Easements	\$135,000
Local Assistance Staff Support*	\$116,042
Information/Education Direct	\$0
Other Direct (travel, supplies, etc.)	\$120,000
Engineering Assistance	\$0
Total	\$706,487

* Salary + Indirect = \$32,000/year

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Marathon County Land Conservation Department

Table 5-5c. Total Project Costs at 75 percent Landowner Participation Rate

Item	Costs (State Share)
Cost-Share Funds: Practices	\$4,259,886
Cost-Share Funds: Easements	\$824,250
Local Assistance Staff Support*	\$1,022,539
Information/Education Direct	\$41,900
Other Direct (travel, supplies, etc.)	\$438,880
Engineering Assistance	\$0
Total	\$6,587,455

* Salary + Indirect = \$32,000/year

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Wood, Clark and Marathon County Land Conservation Department

Table 5-6. Wood County Grant Disbursement Schedule at 75 percent Landowner Participation

Item	Project Year			
	1	2	3	3 - 8
Cost-Share Funds: Practices	\$965,866	\$965,866	\$1,287,822	\$ 0
Cost-Share Funds: Easements	107,250	214,500	214,500	0
Local Assistance Staff Support	104,738	104,738	104,738	401,448
Information/Education: Direct	14,501	14,501	14,501	43,504
Other Direct: (travel, supplies, etc.)	39,776	39,776	39,776	79,552
Engineering Assistance	0	0	0	0
Totals	\$1,232,131	\$1,339,381	\$1,661,337	\$524,504

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Wood County Land Conservation Department

Table 5-6a. Clark County Grant Disbursement Schedule at 75 percent Landowner Participation

Item	Project Year			
	1	2	3	3 - 8
Cost-Share Funds: Practices	\$211,466	\$211,466	\$281,954	\$ 0
Cost-Share Funds: Easements	30,600	61,200	61,200	0
Local Assistance Staff Support	27,746	27,746	27,746	107,597
Information/Education: Direct	924	924	924	2,768
Other Direct: (travel, supplies, etc.)	24,000	24,000	24,000	48,000
Engineering Assistance	0	0	0	0
Totals	\$294,736	\$325,336	\$395,824	\$158,365

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Clark County Land Conservation Department

Table 5-6b. Marathon County Grant Disbursement Schedule at 75 percent Landowner Participation

Item	Project Year			
	1	2	3	3 - 8
Cost-Share Funds: Practices	\$100,633	\$100,633	\$134,178	\$ 0
Cost-Share Funds: Easements	27,000	54,000	54,000	0
Local Assistance Staff Support	15,888	15,888	15,888	68,378
Information/Education: Direct	0	0	0	0
Other Direct: (travel, supplies, etc.)	24,000	24,000	24,000	48,000
Engineering Assistance	0	0	0	0
Totals	\$167,521	\$194,521	\$228,066	\$116,378

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Marathon County Land Conservation Department

Table 5-6c. Total Project Grant Disbursement at 75 percent Landowner Participation

Item	Project Year			
	1	2	3	3 - 8
Cost-Share Funds: Practices	\$1,277,965	\$1,277,965	\$1,703,954	\$ 0
Cost-Share Funds: Easements	164,850	329,700	329,700	0
Local Assistance Staff Support	148,372	148,372	148,372	577,423
Information/Education: Direct	15,425	15,425	15,425	46,272
Other Direct: (travel, supplies, etc.)	87,776	87,776	87,776	175,552
Engineering Assistance	0	0	0	0
Totals	\$1,694,388	\$1,859,238	\$2,285,227	\$799,247

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Wood, Clark, and Marathon County Land Conservation Department

Involvement of Other Programs

Coordination With State and Federal Conservation Compliance Programs

The Upper Yellow River Watershed Project will be coordinated with the conservation compliance features of the Wisconsin Farmland Preservation Program (FPP) administered by DATCP and the Federal Food Security Act (FSA) administered by the Soil Conservation Service. DATCP will assist Wood, Clark and Marathon County LCCs 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.

There will be a need to implement the conservation plans and in the future amend these plans during the implementation phase of the watershed project. Watershed project supported staff will revise the conservation plans developed for FPP and inform SCS of changes in FSA 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 which the landowner participates.

Some eroding uplands in Management Categories I and II 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

Upper Yellow River Priority Watershed Project Information and Education Program

Objectives and Goals

The Information and Education (I&E) Program objectives are to gather support for the Upper Yellow River Priority Watershed Project and to maximize landowner participation in the project.

To achieve its objectives, the I&E program has been structured around the following goals:

- Increased awareness, understanding and appreciation for the water resources in the Upper Yellow River Priority Watershed Project.
- Increased understanding of the principles and recognition of the problem of non-point source pollution as experienced in the Upper Yellow River Priority Watershed Project.
- Increased awareness, understanding and acceptance of Best Management Practices promoted through the Upper Yellow River Priority Watershed Project, including how these practices can lead to cleaner water and improved farm management.
- Increased awareness and understanding of the purpose, operation and benefits of the Upper Yellow River Priority Watershed Project.

Audience

The primary audience of the Information and Education Program are priority watershed landowners who are eligible for project participation. Secondary audiences are priority watershed landowners and residents, suppliers of services to the priority watershed (agribusiness), interest groups and the general public.

Delivery Team

The Wood County Land Conservation Department and the Wood County University Extension Office will take the lead responsibility for I&E program delivery.

The Clark and Marathon County Land Conservation Departments, the Department of Natural Resources and the Department of Agriculture, Trade and Consumer Protection will provide supporting assistance.

Activities

Displays

Description

Displays include "manned" displays for use at fairs, farm shows and demonstration projects; and "stand alone" displays for use at banks, courthouses, parks, etc. Displays were varied so different audiences will learn about a variety of topics. Primary objectives include problem awareness and problem recognition.

Schedule

Throughout project life.

Signs

Description

A total of fourteen project boundary signs was placed in Wood and Clark Counties. Ten signs will be in Wood County and four signs in Clark County. The signs will mark the location along prominent highways where people enter and exit the watershed. Two demonstration signs will be assembled in Wood County and one in Clark County which will be placed on the farms where demonstration Best Management Practices (BMPs) have been installed. Three ongoing construction signs will also be assembled in Wood County and one in Clark County which will be used to highlight projects which are under construction. In general, the signs will be targeted at the general public, local landowners, operators and farmers to raise awareness of the priority watershed project, increase recognition of Nonpoint Sources of Pollution in the watershed, and also to begin accepting solutions demonstrated in the Upper Yellow River Watershed.

Schedule

Signs were installed in 1991 and 1992, and will be used throughout the life of the project.

Newsletters

Description

Priority watershed staff will develop a newsletter to be mailed out to all landowners within the watershed project. There will be eight mailings within the first 2 years of the project, three mailings annually for the 3-year sign-up period, and then two mailings annually throughout the life of the project. The newsletters will increase problem awareness of the general public, problem recognition and solution acceptance by landowners and operators, and help support the impacts which are resulting from the efforts of the priority watershed project.

Schedule

Entire life of the project, eight mailings in 1991 and 1992. Three mailings annually in 1993, 1994 and 1995 and two mailings annually thereafter.

Citizens Advisory Committee

Description

Citizens Advisory Committee will include local technical personnel, local government officials and interested citizens to provide input into the planning process, and to help create awareness of the priority watershed to affected landowners. The objective of the Citizens Advisory Committee is to create project awareness for the planning staff, the Citizens Advisory Committee itself and local landowners.

Schedule

The Citizens Advisory Committee will meet on as-needed basis, at least semi-annually during the first 3 years of the project, and on an as-needed basis during later years of the project.

Informational Meetings

Description

Informational meetings will be held for the general public and local officials. Meetings will be held throughout the project time period, and at least two more formal informational meetings will be held in 1991 and 1992, to inform the general public and local government officials about progress of the priority watershed project plan.

Schedule

Two formal informational meetings during the initial phase of the project and informational meetings on an on-going basis or as needed.

Kickoff Picnic

Description

An informational kickoff picnic was held to encourage the general public, farmers and natural resource groups to come and learn about the priority watershed project in an informal setting. This event was included speakers, displays, handouts and a meal. The picnic was held at a park location within the priority watershed.

Schedule

A kick-off picnic was held in 1991. In addition, an informational picnic for the beginning of sign-up will be held in 1993.

Town Board Meeting

Description

Project staff met with town officials affected by the project to discuss the priority watershed project plan and how it can affect landowners. Meeting with town officials is important because they are a recognized information source for local landowners.

Schedule

Meeting with town officials occurred in 1992.

Public Hearing

Description

A formal public hearing was held to present the project plan to the public and to create project awareness and accept public input towards the plan. This was a formal public hearing, with formal public notice, landowners, and the general public attending.

Schedule: Fall of 1992

Canoe Orientation

Description

An orientation of the watershed area through a canoe trip down a portion of the Yellow River was conducted early in the project in 1991. The canoe orientation was geared towards agency people interested in the natural resources in the watershed and those involved in planning the priority watershed plan.

Schedule: Summer 1991

Surface Water Runoff/Construction Site Erosion Runoff Demonstration

Description

A workshop/demonstration will be held for local officials, contractors and builders to teach them about the problems of construction site runoff, and how to prevent this form of non-point source pollution. The workshop/demonstration will create awareness of this problem and recognition of solutions that are available.

Schedule: Spring 1993

Chemical Mixing/Loading/Storage Site

Description

A model chemical mixing/loading/storage site will be constructed on a cranberry operation in the priority watershed. A mixing/loading/storage site will be used for an on-going demonstration on how to properly construct and maintain a total containment site so as to decrease the chances of surface or groundwater contamination from pesticides or fertilizer spills. This demonstration will increase awareness of the problem of spilled chemicals, and increase the recognition and acceptance of a primary solution.

Schedule: 1993

Streambank Restoration/Exclusion and Manure Storage Facility Demonstration

Description

A demonstration project was constructed at a highly visible farm near the intersection of two primary roads, within the watershed. The project will demonstrate streambank habitat improvements, livestock exclusion and a concrete lined waste storage facility to store animal wastes. The objective of this demonstration is to have local landowners, operators and farmers recognize the problem of winterspread manure on snow covered soils and accept solutions to this nonpoint source. Winterspreading of animal wastes creates a high potential for spring runoff to carry high levels of phosphorus to surface waters.

Schedule: Fall 1992

Barnyard Runoff/Roof Runoff/Streambank Restoration Demonstration

Description

A demonstration involving barnyard runoff, roof runoff, streambank habitat restoration with limited livestock access, alternative watering systems and a streambank crossing was conducted early in the priority watershed project. This demonstration will reduce phosphorus loading on one of our streams in the watershed and improve streambank habitat which improves water quality and prevents streambank erosion by stabilizing the streambanks. This farm is located within the watershed project and field days will be held to help local landowners, operators and farmers recognize the problem of barnyard runoff, observe the benefits and solutions of runoff control, and accept the solutions that barnyard runoff systems offer. This farm also demonstrates new and unique alternative pasture watering systems along with streambank improvements and the benefits of a stream crossing for cattle.

Schedule: Summer 1992

Promotional Items

Description

A variety of promotional items about the Upper Yellow River Priority Watershed were developed including: folders, caps, mugs, posters, pens, jackets and t-shirts. The educational objective of these promotional areas are primarily for project awareness, so that people become aware of the Upper Yellow River Priority Watershed. These items

offer more point of contact with local landowners, operators and farmers to accept the priority watershed and consider solutions offered to them.

Schedule: 1991 and throughout the life of the project.

Photography

Description

Film, transparencies, processing slides, etc., will be purchased to keep track of progress within the priority watershed, and also to demonstrate problems within the watershed. This information will be used during presentations to the general public and local residents to demonstrate how problems can be corrected within the watershed.

Schedule: 1991 to 1993 primarily, and throughout the life of the project.

Slide Tape Set Fact Sheet

Description

A slide tape set of an overview of the Yellow River Priority Watershed along with fact sheets about the priority watershed and slides on specific demonstration projects will be developed. This information will be used at public events and also during field days to create awareness of problems, problem recognition and acceptance of solutions.

Schedule: 1991 to 1993 primarily, and throughout the life of the project.

News Releases

Description

News releases will be used for all priority watershed project events and will be released through local papers, farm papers and for general distribution. The news releases are a low, no-cost method to increase awareness of the objectives of the priority watershed and to assist the general public in coming to meetings to learn about the priority watershed.

Schedule: Primarily 1991 to 1993, and throughout life of project.

Radio Announcements, Call-In Shows

Description

Project staff will participate in public service announcements and local call in radio shows in Wisconsin Rapids, Marshfield and Neillsville. These call in shows will be a method to reach the general public and also to publicize events about the priority watershed.

Schedule: Primarily 1991 to 1993, and throughout life of project.

School Science Project Water Testing

Description

A school science project to test the quality of the Yellow River to determine its health for aquatic life will be funded for youth with the Pittsville School, which is located adjacent to the Yellow River. This project will create awareness of the watershed and impacts of non-point source pollution on the health of the Yellow River. This in turn will increase awareness throughout the watershed of the importance of the priority watershed project.

Schedule: 1992 to 1993

Stormwater Stenciling

Description

This project will encourage youth groups or citizen groups to stencil near stormwater drains warning that stormwater sewers enter directly into nearby lakes and streams, and residents should not place contaminants in the stormwater drain system. This project will increase awareness of this non-point source pollution problem, and also awareness through publicity of the priority watershed project.

Schedule: 1992 to 1993

Well Abandonment Workshops

Description

Project staff will conduct six well abandonment workshops in Wood and Clark Counties. Workshops will include demonstration of proper well abandonment, fact sheets and groundwater education.

Schedule: Workshops will be held during the first three years of project implementation.

Reduced Tillage Workshops

Description

Project staff will conduct three reduced tillage workshops in Wood and Clark Counties. Workshops will be in the form of public meetings with counties. Workshops will be in the form of public meetings with speakers, fact sheets and lunch provided.

Schedule: Workshops will be held during the first three years of project implementation.

Land Conservation Committee Watershed Meetings

Description

Project staff will meet with the Land Conservation Committee to discuss special topics concerning the priority watershed project.

Schedule: The Land Conservation Committee will meet on an as-needed basis, at least semi-annually during the three year sign-up period, and on an as-needed basis for the remainder of the project.

INFORMATION AND EDUCATION BUDGET AND STAFF NEEDS

Activities	Total Number	Total Direct Cost	Required Staff Hours	
			Years 1 - 3	Years 4 - 8
Displays (C)	4	\$2,000	40	10
Signs (C)	14	\$8,100	80	20
Newsletters (O)	27	\$10,800	180	180
Citizens Advisory Committee (O)	7	\$700	80	80
Informational Meetings (C)	4	\$100	80	80
Kickoff Picnics (C)	2	\$800	80	0
Town Board Meetings (C)	1-5	\$100	20	10
Public Hearing (C)	2	\$100	80	40
Canoe Orientation (C)	1	\$100	40	0
Urban Runoff/Construction Site Runoff Demonstration (C)	1	\$1,000	80	40
Chemical Mixing/Loading/Storage Site Demonstration (P)	1	\$15,000	210	40
Streambank Exclusion/Manure Storage Facility Demonstration (C)	1	\$22,925	180	40
Barnyard Runoff/Roof Runoff/Streambank Crossing/Alternative Watering System Demonstration (C)	1	\$21,565	220	60
Promotional Items (C)	4,266	\$5,357	80	40
Photography (O)	1	\$650	160	160
Slide-Tape Set, Fact Sheets (O)	10	\$200	160	80
Project Brochures (O)	5,000	\$0	40	40
News Releases (O)	20	\$0	100	40
Radio Announcements/Call-in Shows (O)	10	\$0	80	40
School Science/Project-Water Testing (P)	1	\$1,000	100	50
Stormwater Stenciling (P)	1	\$50	100	40
Wetland Restoration Demonstration (C)	1	\$350	171	20
Nutrient and Pesticide Management Demonstration Plot (C)	1	\$1,200	200	20
Well abandonment workshops (P)	6	\$12,000	200	—
Reduced Tillage Workshops (P)	3	\$1,500	100	—
Totals		\$41,900	2,861	1,130

C = Completed

P = Planned

O = Ongoing

* Total for direct cost = estimated planned (P) and ongoing (O) activities.

CHAPTER SEVEN

Integrated Resource Management Program

Introduction

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

Fisheries

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

Wetland Restoration

Significant amounts of restorable wetland areas exist in this watershed. This is especially so for the floodplain areas along the main stem of the Upper Yellow River. 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 Department of Natural Resources (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 Wood, Clark and Marathon County Land Conservation Departments (LCD). In addition to the normal priority watershed funding, additional cost-sharing may be available to

provide for a 100% 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 grazing and trampling. These may be acquired through easements so that they receive lasting protection. These areas are important wildlife habitats, for wood ducks and other species.

Stewardship

The streambank protection program under stewardship is an important additional means of protecting water quality. Streams in the watershed may be eligible for easement acquisition and protection under Stewardship. Policies and procedures regarding easement purchases and stream protection under the Nonpoint Source Program will be coordinated with similar provisions under Stewardship. Counties, along with the DNR Fish Manager and the DNR District NPS Coordinator can propose easement area plans for streams or segments of streams that they agree should be under Stewardship.

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 support financially the fencing of the stream to protect it from livestock access.

Streams eligible in the watershed: Cat Creek, Rocky Creek, East and South Branches of the Yellow River.

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

Endangered Resources

Endangered, threatened, and special concern species and thirteen natural area sites were identified and are listed in Chapter Two. To the best extent possible, every effort should be made to protect these species and sites in the Upper Yellow River Watershed. If specific locational or other information is needed, contact the DNR Bureau of Endangered Resources.

Cultural Resources

Procedures for coordination with state and federal historic preservation laws are outlined in Chapter Two. The known archeological sites within the Upper Yellow River 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

State Farmland Preservation Program

The Upper Yellow River Watershed Project will be coordinated with the conservation compliance features of the Wisconsin Farmland Preservation Program (FPP) administered by DATCP. This program provides tax credits to farmers who agree to restrict development of their lands. A cross compliance provision in this program requires participating landowners to have their lands adequately protected against soil loss. Since this program results in extensive conservation planning on rural lands, coordination with the Nonpoint Source Program is essential.

Federal Farm Bill Programs

Cross-compliance provisions in 1985 and 1990 Farm Bill legislation require natural resource management requirements be met on each farm benefitting from federal support programs. As this program also results in extensive conservation planning on rural lands, coordination with the Nonpoint Source Program is essential.

Petenwell/Castle Rock Comprehensive Management Plan

The Lower Yellow River drains to Castle Rock Lake, a 16,000-acre (at full pool) eutrophic impoundment. Castle Rock Lake is the fifth largest inland water body in the state. Castle Rock Lake is to be managed as part of the Petenwell/Castle Rock Comprehensive Management Plan. Planning began in October 1991. The management plan will address the following environmental/resource issues:

- water quality
- toxic contamination and bioaccumulation
- water level fluctuation/dam operation

- unbalanced fish communities
- fish and wildlife habitat
- recreational uses/aesthetic values
- wind fetch

The goal of the comprehensive management plan is to restore the beneficial uses that are currently impaired in both flowages.

The anticipated reductions in phosphorus and sediment resulting from the implementation of the Upper Yellow River Priority Watershed project will contribute towards the restoration of beneficial uses in the Castle Rock Flowage.

Port Edwards Priority Watershed: Groundwater Pilot Project

This pilot project in Port Edwards is aimed at assessing groundwater quality in the sandy soils of Central Wisconsin, where vegetable production which relies on intensive irrigation predominates. The Port Edwards project is locally implemented by the Wood County Land Conservation Department; is funded by the DNR; and assisted in planning by the DATCP. The Port Edwards Project is demonstrating and evaluating agricultural practices that reduce fertilizer and chemical inputs, thereby protecting water quality and enhancing profitability. The project involves large scale on-farm demonstrations of improved agricultural practices which include a range of irrigation and nutrient and pest management approaches. The project also has an intensive groundwater monitoring component in place to evaluate the impact of management practices on water quality.

Upper Yellow River project staff should continue to share information and track the progress of this pilot project. See the Port Edwards Groundwater Project Interim Report, August 1992, for more information.

CHAPTER EIGHT

Project Evaluation

Introduction

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

- Administrative review.
- Pollution reduction evaluation.

Information on these components will be collected by the Wood, Clark and Marathon County Land Conservation Departments and reported on a regular basis to the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (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 Wood, Clark, and Marathon County in implementing the project. The project will be evaluated with respect to accomplishments, financial expenditures and staff time spent on project activities.

Accomplishment Reporting

The 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 County LCDs will use CAMPS or an equivalent system to collect data for administrative accomplishments and will provide the information to the DNR and the DATCP for program evaluation.

The County LCDs 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, County representatives will meet with the DNR and the DATCP staff annually to review progress and plan for the subsequent year.

Financial Expenditures

The 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

The 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

Time Spent On Project Activities

The 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

Wood County is required to submit annually the number of new building permits and information on population trends as it becomes available.

Pollutant Load Reduction

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. Three key sources were identified for estimating changes in pollutant loads that reach creeks in the Upper Yellow River Watershed; upland erosion and runoff from barnyards and fields spread with manure.

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

Sediment Goal

Reduce overall sediment delivered by 35%. To meet this goal, the following is needed:

- Thirty-five percent reduction in sediment reaching streams from agricultural uplands in all subwatersheds.
- Twenty-five percent reduction in streambank sediment delivered to all streams and a 50% overall repair of bank habitat in all subwatersheds.

Phosphorus Goal

Reduce overall phosphorus load by 45%.

To meet this goal, the following is needed:

- Sixty-five percent reduction in phosphorus from barnyards in the North Branch, South Branch, Rocky Creek, Cat Creek, Otter Creek, Puff Creek, and Beaver Creek.

- Fifty percent reduction in phosphorus from barnyards in the Lower Yellow, Owl Creek, East Branch, and Middle Yellow subwatersheds.
- Sixty-five percent reduction in phosphorus from winterspread manure on "unsuitable" acres in all subwatersheds.
- Achievement of the sediment goal identified above.
- In addition this plan calls for a restoration of 15% of degraded or prior converted wetlands and control of gullies producing over one ton of sediment/site/year.

Achievement of these pollutant reduction goals for sediment and phosphorus will help achieve water quality objectives for Castle Rock Lake, the 5th largest inland lake in Wisconsin, and an eutrophic impoundment. The Yellow River drains to Castle Rock Lake, which is to be managed as part of the Petenwell/Castle Rock Comprehensive Management Plan.

Streambanks

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

Upland Sediment Sources

County LCD staff will use the WIN (Wisconsin Nonpoint Source) model or an equivalent system to estimate sediment reductions due to changes in cropping practices. The counties will use CAMPS or an equivalent system to provide data for the WIN model on a quarterly basis, as described above.

Barnyard Runoff

County LCD staff 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 or equivalent will be used for all project tracking.

CHAPTER NINE

Water Resource Evaluation Monitoring

Goal and Objectives

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.

Evaluation monitoring objectives are to:

- Evaluate the attainment of water quality "objectives" that result from implementation of best management practices at specific sites.
- Evaluate the attainment of pollutant load reduction goals and the effectiveness of those goals in improving water quality at specific sites.
- Evaluate the implementation of BMPs needed and their effectiveness in reducing the problems that contribute to the non-attainment of water quality objectives at specific sites.
- Evaluate the priority watershed plans applicability to the management of water resources, and the attainment of water quality standards and beneficial uses.

Program Organization

- 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, can be conducted at selected sites as special projects, depending on other monitoring priorities.

- 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.
- 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 land owners;
- 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.
- 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.
- Watersheds should be manageable with areas of 5 to 50 square miles.

Water Quality

- Suspected or known water quality problems should be caused by manageable nonpoint sources should not be present or not significant.
- Point sources should not be present or not significant.
- 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.
- Sites should not be selected that have been ditched within 10 to 15 years.

Site Selection Process

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

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

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.

Upper Yellow River Priority Watershed

Some evaluation monitoring will be conducted during the 8-year project period and will continue for an additional 2 years. Thus the evaluation monitoring activities will not be completed until 2002.

North Central District staff recommends a 5-year basin assessment approach, as discussed in option 2. If time and manpower 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

North Central District Staff will conduct or repeat appraisal type monitoring at the same sites that were monitored in 1990–1991 as part of the Appraisal Monitoring Plan/Report (Herman, 1991 and 1992). Monitoring will follow the 5-year basin assessment schedule and will include the same types of monitoring outlined in the Upper Yellow River Appraisal Report (Herman, 1992). This monitoring approach should detect habitat and surface water quality improvements, especially where they are significant. Sampling will be done only where best management practice installations have been significant.

Lake Dexter

Monitoring of the Reservoir will not continue as proposed in the Appraisal Monitoring Plan. This is due to the fact that the reservoir is shallow, sand covered and has a short retention time. This reservoir is not conducive to monitoring.

Special Projects Approach (optional)

North Central District staff proposes more intensive/frequent monitoring at selected sites as outlined in option 1 (under Basin Assessment Approach). Again this is optional and its implementation is based on available manpower and approval in the districts surface water monitoring plan. Sites where this type of monitoring may take place include:

- Rocky Creek 100 feet downstream of Rocky Run Road (T23NR03E Sect 8) (above demonstration site).
- Rocky Creek 150 feet downstream of Polish Road (T23NR09E Sect 8) (below demonstration site).

- Otter Creek (Creek 10-12) 100 feet upstream of Hwy C (T23NR03E Sect 11) (above demonstration site).
- Otter Creek (Creek 10-12) 100 feet below Hwy A (T23NR03E Sect 15) (downstream of demonstration site).
- Cat Creek 20 to 25 feet above Hwy 13 (T23NR03E Sect 22) (below demonstration site).
- Cat Creek above barnyard and pasture area off of Hwy. A (T23NR03E Sect 22) (above demonstration site).
- Yellow River 250 feet above the swinging bridge at North Wood County Park (T24NR03E Sect 33) (above demonstration site).
- Yellow River 150 feet below Manakiki dam (T24NR03E Sect 33) (below demonstration site).

These stream reaches will be evaluated using the same techniques as used in the Appraisal Monitoring Plan (Herman, 1991).

Its 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.

REFERENCES

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Herman, L. 1991. Upper Yellow River Priority Watershed Water Resource Appraisal Monitoring Plan. WDNR 14 pp.

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APPENDIX A

Assessment Methods

Methods Used to Assess the Water Quality and Nonpoint Source Conditions in the Upper Yellow River Watershed Project

Water Resource Assessment Methods

Introduction

Part of the Upper Yellow River Priority Watershed Project's planning process was to determine the current water quality and water use conditions of the ground and surface water resources in the project area. Then an assessment was made of the potential changes in water quality and use that might be expected as a result of the control of nonpoint source pollutants.

The assessment was made based on many sources of information including: chemical and biological water quality data from the Department of Natural Resources (DNR) files, the Surface Water Resources of Wood, Clark and Marathon Counties publications and input from the county Land Conservation Department (LCD) staff, the DNR fish managers and the DNR water quality specialists. Two of the tools used in this assessment are discussed in more detail below.

Biotic Index

The type of insects found living on rocks and in other habitats in a stream reflects the water conditions of that stream. Certain species of insects will tolerate only unpolluted waters while others are able to survive various degrees of water pollution. The term pollution in this discussion refers to organic material in the water. Two ways organic pollutants affect water quality are that the organic material adds nutrients to the water which may result in nuisance growth of algae or weeds, and the bacterial breakdown of the organic material can deplete water of its dissolved oxygen, which is required for fish survival.

A system—the Hilsenhoff Biotic Index, or HBI--developed in Wisconsin indicates the degree of organic pollution in a stream by the types of insects living in the stream. Organic pollution tolerance values are assigned to various species of insects. The scale of the values

is zero to 10, with zero being the least tolerant (that is, insects least tolerant to organic pollution in the stream). The number and types of insects found at a stream site are used to calculate an HBI value between zero and five for the stream. Qualitative descriptions of water quality for the index values are given in Table A-1.

Table A-1. Qualitative Descriptions for Biotic Index

HBI Range Pollution	Water Quality	Degree of Organic
0.00 – 3.50	Excellent	No organic pollution
3.51 – 4.50	Very Good	Possible slight organic pollution
4.51 – 5.50	Good	Some organic pollution
5.51 – 6.50	Fair	Significant organic
6.51 – 8.50	Poor	Very significant organic pollution
8.51 – 10.00	Very Poor	Severe organic pollution

Source: Hilsenhoff 1987

Stream Fishery Habitat Assessment

In order to determine the present and potential future fishery uses of the streams, a procedure developed by Joe Ball of the DNR was used. This procedure is described in Stream Classification Guidelines for Wisconsin. The system uses an inventory of the stream's physical fish habitat conditions (such as stream flow, bed type, amount of riffles and pools, and streambank conditions) along with other parameters (water quality, water temperature, pH [degree of acidity or alkalinity] and current stream biotic conditions) to classify the present fishery use of the stream.

Then this information is modified to simulate the conditions that may be present as a result of a successful nonpoint source control project in the watershed. This second step results in an indication of the fishery which may be expected after successful nonpoint source control.

Table A-2 indicates the general conditions that need to be present in order for a stream to support various fishery types.

Table A-2. Physical and Chemical Guidelines for Aquatic Life Use

Parameter A	Use Class and Criteria			
	B	C	D	E
Flow (cfs) ¹	>.5	>3	>.2	>.0
Water Quality Dissolved Oxygen (mg/l) ^{2,3}	>4	>3	>3	>1
Temperature (Deg. F) ³	<75	<86	<86	<90
pH ³ 5-9.5	5-10.5	5-10.5	4-11	4-11
Toxics ⁴ acute	<acute	<acute	acute	>acute
Habitat Rating ¹	<144	<144	<144	>200

¹ Wisconsin DNR

² U.S. EPA (1977)

³ Alabaster and Lloyd (1980)

⁴ U.S. EPA (1980)

"<" means "less than"

">" means "greater than"

Use Classes

A: Coldwater Sport Fishery

B: Warmwater Sport Fishery

C: Valuable Tolerant Forage Fishery

D: Rough Fish

E: No Fishery

Source: DNR Technical Bulletin (Unpublished) (Ball, 1982)

Groundwater Sampling

Nitrate is one of the oldest contaminants known to exist in Wisconsin groundwater. Nitrate is water soluble and moves easily through soil. It does not naturally occur in soil minerals or groundwater. Any elevated levels are due to human activities. Sources of nitrate in groundwater include fertilizers, animal waste, septic systems and land disposal of nitrogen-containing waste in amounts that exceed the ability of plants to use it quickly.

Summary

The biotic index and the stream habitat assessment are both important tools for helping to establish water quality and water use objectives in the watershed project. Although no water quality assessment tool can predict with 100% accuracy the changes in water quality and water use, these tools can be useful in appraising the current and potential future conditions of the water resources in the watershed project area.

Pollutant Source Assessment Methods

Introduction

Another part of the watershed planning process was the collection of information on the various nonpoint sources of pollutants in the watershed. The collection of data was conducted under the supervision of the Wood and Clark County Land Conservation Departments (LCDs) with funding support from the DNR. The LCDs hired staff to gather the actual field data. The LCDs reviewed and approved the quality of this data. Then the LCDs sent the data to the DNR for analysis. The inventory methods used for each nonpoint pollutant source are described below.

Before the inventories were conducted, the watershed was divided into 11 subwatersheds. The divisions were based upon individual water resources which could be protected or improved by controlling nonpoint sources of pollutants. All inventory data was organized by subwatershed. With this information, objectives could be set for each water body. In addition, the corresponding reduction in pollutants needed to meet the objectives could be determined.

Upland Sediment Inventory Methods

Upland erosion is of concern because it can be a major contributor of sediment to the water resources of a watershed. Sediment in streams and lakes adversely affects the water resources in many ways. Suspended sediment makes it difficult for fish to feed, and it abrades fish gills, making the fish more susceptible to disease. Suspended sediment also causes the water to be warmer in the summer, and warmwater cannot hold as much oxygen as coldwater. Sediment that settles out to the stream fills up pools in streams and destroys fish habitat. Soil from cropland entering the water also contains nutrients and pesticides, which increases the algae and weed growth in lakes and harms the aquatic life of a water body.

An upland sediment source for this project is defined as the sheet and rill erosion from land areas. This erosion is commonly measured by sediment delivery in tons per acre per year. This sediment results from the overland flow of water on fields. It does not include the gully and streambank types of erosion both of which also contribute sediment to the surface waters.

The evaluation for this project quantified upland erosion and estimated the amount of eroded sediment that reaches surface waters. Cropland, pastures, grasslands, woodlands and other open non-urban land uses were investigated. Individual parcels were identified on aerial photographs. Parcel boundaries were based on the slope, cropping pattern or predominant vegetation type, property boundaries and drainage characteristics.

The inventory was conducted on a representative subsample of the 224 square miles, using existing data and field investigations. Existing data sources included site specific farm

conservation plans, aerial photographs, U.S. Geological Survey 1"=2,000' scale quadrangle maps and the county's soil survey. The information obtained for each parcel included size, soil type and its ability to erode, 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 Model, also called WIN (Baun, 1988). This analytical tool was developed by the Wisconsin Nonpoint Source Water Pollution Abatement Program to assess the pollution potential from eroding uplands. The WIN model calculates the average annual quantity of eroded soil that reaches surface waters by determining the soil loss and routing the runoff originating on each parcel under a "typical" year of precipitation. The parcels are ranked according to their potential to contribute sediment to surface waters.

Streambank Erosion Inventory

Streambank erosion is the bank failure along channels caused by the cutting action of water on the banks. This erosion is important because of its direct impact on fish habitat in terms of bank shade and cover, in addition to the impact of the sediment filling up the stream's pools. Streambank erosion is a natural process but is often accelerated by cultural activities such as grazing cattle.

The inventory method used to evaluate streambank erosion was a modification of the Phase II of the Land Inventory Monitoring process (SCS). For each erosion site, the method estimates the volume and the tons of sediment lost on a yearly average. This was done through measuring the length, height and recessional rate of each erosion site. Recession rates were determined based upon the physical characteristics of the eroded site. The volume of sediment was then multiplied by the density of the sediment to obtain the tons of soil loss from the site. Along with this data, information on the location, landowner identification and cattle access was collected for each site. Field personnel collected this information by walking the streams. Each erosion site was mapped on ASCS eight-inch-to-the-mile air photos.

Barnyard Runoff

Dairy operations are the major type of agriculture in the Upper Yellow River Watershed. All barnyards were inventoried to determine the impact of barnyard runoff on water quality. Barnyard runoff carries manure to the streams and ponds of the watershed.

Manure contains several components that adversely affect water quality and aquatic life. Manure contains nitrogen in the form of ammonia. In high concentrations ammonia can be toxic to fish and other aquatic life. When manure enters a water system the breakdown of the organic matter depletes oxygen which fish and other organisms require to survive. Also,

the nutrients in manure (including nitrogen and phosphorus) will promote nuisance algae and weed growth in the streams and ponds. Finally, bacteria found in livestock manure is harmful to other livestock drinking the water and humans using the water for recreation.

The United States Department of Agriculture—Agriculture Research Service developed a computer model to estimate the amount of pollutants coming from a barnyard as a result of a rainstorm. This model was modified by the Wisconsin DNR's Nonpoint Source and Land Management Section. The model has been used to indicate which barnyards within a watershed have the greatest potential to affect water quality from rainfall runoff that washes through a barnyard. The model does not assess any needs for manure storage or the impact from manure runoff from spread fields—it only assesses the barnyard runoff pollutant quantities.

The information needed to run this model was collected on all of the barnyards in the Upper Yellow River Watershed. The data that this model requires includes: the types and numbers of livestock; the size of the yard; the physical characteristics of the area which contributes surface runoff waters to the yard; and the physical characteristics of the area through which the runoff waters leaving the barnyard flow before becoming channelized. A rainfall amount is assigned to the model. The 10-year, 24-hour rain event (4.2 inches) was selected.

With this information, the model calculates the pounds of phosphorus and the pounds of Chemical Oxygen Demand (COD) for each barnyard as a result of the selected rainfall event. Chemical Oxygen Demand is a measure of the amount of organic material in the barnyard runoff.

Manure Spreading Runoff

The disposal of livestock wastes on land is a concern for water quality when manure is spread on frozen land with steep slopes or on land in a floodplain. Under these conditions, the spread manure runs off with melting snow or winter rain and enters the streams and lakes of the watershed. The impacts from this runoff are the same as those mentioned in the barnyard runoff discussion.

The information collected for the upland sediment inventory and the barnyard runoff inventory was combined and used to estimate the amount of unsuitable land in this watershed that is used for spreading manure during the winter.

Point Sources of Pollution

Unlike the activities mentioned above, the point sources of pollution in Wisconsin are regulated by law. For each municipal or industrial wastewater discharge or landfill, the DNR issues a permit which controls the activities and the effluent from each site. The point

sources have been the most significant, and the most obvious, sources of water quality impairment in the past. With the large scale effort and funding directed at clean-up of point source pollution in the past 20 years, the water quality impacts from these sources in the watershed were minimized.

As mentioned above, each municipal or industrial discharger or landfill has a permit from the DNR. These permits are reviewed to determine how well the facility is meeting its requirements. If a facility is not in compliance, there are regulatory measures which are employed to insure that these point sources do not compromise the control of the nonpoint sources of pollutants.

Chapter Three of this plan provides details of point sources of pollution in the Upper Yellow River watershed.

APPENDIX B

Glossary

AGRICULTURAL CONSERVATION PROGRAM (ACP):

A federal cost-sharing program to help landowners install measures to conserve soil and water resources. ACP is administered by the USDA ASCS through county ACP committees.

ALGAE:

A group of microscopic, photosynthetic water plants. Algae give off oxygen during the day as a product of photosynthesis and consume oxygen during the night as a result of respiration. Thus algae effect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:

A form of nitrogen (NH₃) found in human and animal wastes. Ammonia can be toxic to aquatic life.

ANAEROBIC:

Without oxygen.

AREAWIDE WATER QUALITY MANAGEMENT PLANS (208 PLANS):

A plan to document water quality conditions in a drainage basin and make recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

AVAILABILITY:

The degree to which toxic substances or other pollutants that are present in sediments or elsewhere in the ecosystem 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. The amount of oxygen, pH, temperature and other conditions in the water can affect availability.

BACTERIA:

Single-cell, microscopic organisms. Some can cause disease, and some are important in the stabilization of organic wastes.

BASIN PLAN:

See "Areawide Water Quality Management Plan."

BENTHIC ORGANISMS (BENTHOS):

The 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.

BIOCHEMICAL OXYGEN DEMAND (BOD):

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. BOD₅ is the biochemical oxygen demand measured in a 5-day test. The greater the degree of pollution, the higher the BOD₅.

BIODEGRADABLE:

Waste which 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.

CLEAN WATER ACT:

See "Public Law 92-500."

CONSERVATION TILLAGE:

Planting row crops while disturbing the soil only slightly. In this way a protective layer of plant residue stays on the surface; erosion is decreased.

CONSUMPTION ADVISORY:

A health warning issues by WDNR and WDHSS that recommends that 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, as a pollutant suggests that 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.

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 are often due to inadequate wastewater treatment. The Department of Natural Resources considers 5 ppm DO necessary for fish and aquatic life.

ECOSYSTEM:

The interacting system of biological community and its nonliving surrounding.

EFFLUENT:

Solid, liquid or gas wastes (byproducts) which are disposed on land, in water or in air. As used in the RAP generally means wastewater discharges.

EFFLUENT LIMITS:

The Department of Natural Resources issues WPDES permits that establish the maximum amount of pollutant that can be discharged to a receiving stream. Limits depend on the pollutant involved and the water quality standards that apply for the receiving waters.

ENFORCEMENT STANDARD (ES):

(Health Advisory Level) The concentration of a contaminant at which the enforcing agency, either the Department of Industry and Human Relations, the DATCP or the DNR must take action.

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.

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 leading to increased production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

FECAL COLIFORM:

A group of bacteria used to indicate the presence of other bacteria that cause disease. The number of coliform is particularly important when water is used for drinking and swimming.

FISHABLE AND SWIMMABLE:

Refers to the water quality goal set for the nation's surface waters by Congress in the Clean Water Act. All waters were to meet this goal by 1984.

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 which flows in response to gravity and pressure. Often used by 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-term 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.

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.

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 or inking water supplies.

LOAD:

The total amount of materials or pollutants reaching a given local.

MACROPHYTE:

A rooted aquatic plant.

MASS BALANCE:

A study that examines all parts of the ecosystem to determine the amount of toxic or other pollutant present, its sources and the processes by which the chemical moves through the ecosystem.

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/l):

A measure of the concentration of substance in water. For most pollution measurement this is the equivalent to "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 in which 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 7-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.")

PESTICIDE:

Any chemical agent used for control of 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.

PHOSPHORUS:

A nutrient that when reaching lakes in excess amounts can lead to overfertilized 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.

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.

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 set 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 discharges 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 plant owned by a city, village or other unit of government.

RAP:

See Remedial Action Plan.

RECYCLING:

The process by which waste materials are transformed into new products.

REMEDIAL ACTION PLAN:

A plan designed to restore beneficial uses to a Great Lakes Area of Concern.

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, snow melt, or irrigation that flows over the ground surface and returns to streams. Runoff can collect pollutants from air or land and carry them to receiving waters.

SECONDARY IMPACTS:

The indirect effects that an action can have on the health of the ecosystem or the economy.

SEDIMENT:

Soil particles suspended in and carried by water as a result of erosion.

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 which provides for cleanup of major hazardous landfills and land disposal areas.

SUSPENDED SOLIDS (SS):

Small particles of solid pollutants suspended in water.

TOXICITY:

The degree of danger posed by a toxic substance to animal or plant life. Also see acute toxicity, chronic toxicity and additivity.

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.

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.

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 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:

Those areas that are inundated 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.

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 %age 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 3% of this fund is available for repair or replacement of private, on-site sewer systems.

Nonpoint Source Water Pollution Abatement Grant Program: Funds to share the cost of reducing water pollution nonspecified sources are available in selected priority watersheds.

Solid Waste Grant Program: Communities planning for solid waste disposal sites are eligible for grant money. \$500,000 will be available each year to help with planning costs.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:

A state cost-share program established by the State Legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES):

A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

**PRIORITY WATERSHED PROJECTS IN WISCONSIN
1992**

<u>Map Number</u>	<u>Large-scale Priority Watershed Project</u>	<u>County(ies)</u>	<u>Year Project Selected</u>
79-1	Galena River*	Grant, Lafayette	1979
79-2	Elk Creek*	Trempealeau	1979
79-3	Hay River*	Barron, Dunn	1979
79-4	Lower Manitowoc River*	Manitowoc, Brown	1979
79-5	Root River*	Racine, Milwaukee, Waukesha	1979
80-1	Onion River*	Sheboygan, Ozaukee	1980
80-2	Sixmile-Pheasant Branch Creek*	Dane	1980
80-3	Big Green Lake*	Green Lake, Fond du Lac	1980
80-4	Upper Willow River*	Polk, St. Crox	1980
81-1	Upper West Branch Pecatonica River*	Iowa, Lafayette	1981
81-2	Lower Black River	La Crosse, Trempealeau	1981
82-1	Kewaunee River*	Kewaunee, Brown	1982
82-2	Turtle Creek	Walworth, Rock	1982
83-1	Oconomowoc River	Waukesha, Washington, Jefferson	1983
83-2	Little River	Oconto, Marinette	1983
83-3	Crossman Creek/Little Baraboo River	Sauk, Juneau, Richland	1983
83-4	Lower Eau Claire River	Eau Claire	1983
84-1	Beaver Creek	Trempealeau, Jackson	1984
84-2	Upper Big Eau Pleine River	Marathon, Taylor, Clark	1984
84-3	Sevenmile-Silver Creeks	Manitowoc, Sheboygan	1984
84-4	Upper Door Peninsula	Door	1984
84-5	East & West Branch Milwaukee River	Fond du Lac, Washington, Sheboygan, Dodge, Ozaukee	1984
84-6	North Branch Milwaukee River	Sheboygan, Washington, Ozaukee, Fond du Lac	1984
84-7	Milwaukee River South	Ozaukee, Milwaukee	1984
84-8	Cedar Creek	Washington, Ozaukee	1984
84-9	Menomonee River	Milwaukee, Waukesha, Ozaukee, Washington	1984
85-1	Black Earth Creek	Dane	1985
85-2	Sheboygan River	Sheboygan, Fond du Lac, Manitowoc, Calumet	1985
85-3	Waumandee Creek	Buffalo	1985
86-1	East River	Brown, Calumet	1986
86-2	Yahara River - Lake Monona	Dane	1986
86-3	Lower Grant River	Grant	1986
89-1	Yellow River	Barron	1989
89-2	Lake Winnebago East	Calumet, Fond du Lac	1989
89-3	Upper Fox River (Ill.)	Waukesha	1989
89-4	Narrows Creek - Baraboo River	Sauk	1989
89-5	Middle Trempealeau River	Trempealeau, Buffalo	1989
89-6	Middle Kickapoo River	Vernon, Monroe, Richland	1989
89-7	Lower East Branch Pecatonica River	Green, Lafayette	1989
90-1	Arrowhead River & Daggets Creek	Winnebago, Outagamie, Waupaca	1990
90-2	Kinnickinnic River	Milwaukee	1990
90-3	Beaverdam River	Dodge, Columbia, Green Lake	1990
90-4	Lower Big Eau Pleine River	Marathon	1990
90-5	Upper Yellow River	Wood, Marathon, Clark	1990
90-6	Duncan Creek	Chippewa, Eau Claire	1990
91-1	Upper Trempealeau River	Jackson, Trempealeau	1991
91-2	Neenah Creek	Adams, Marquette, Columbia	1991
92-1	Balsam Branch	Polk	1992
92-2	Red River - Little Sturgeon Bay	Door, Brown, Kewaunee	1992

<u>Map Number</u>	<u>Small-scale Priority Watershed Project</u>	<u>County(ies)</u>	<u>Year Project Selected</u>
SS-1	Bass Lake*	Marinette	1985
SS-90-1	Dunlap Creek	Dane	1990
SS-90-2	Lowes Creek	Eau Claire	1990
SS-90-3	Port Edwards - Groundwater Prototype	Wood	1990
SS-91-1	Whittlesey Creek	Bayfield	1991
SS-91-2	Spring Creek	Rock	1991

<u>Map Number</u>	<u>Priority Lake Project</u>	<u>County(ies)</u>	<u>Year Project Selected</u>
PL-90-1	Minocqua Lake	Oneida	1990
PL-90-2	Lake Tomah	Monroe	1990
PL-91-1	Little Muskego, Big Muskego and Wind Lakes	Waukesha, Racine, Milwaukee	1991
PL-92-1	Lake Noquebay	Marinette	1992
PL-92-2	Lake Ripley	Jefferson	1992

*Project completed

Priority Watershed Projects in Wisconsin 1992



An outline map of the state of Wisconsin, including its various islands and peninsulas. The map is centered on the page and serves as a background for the text.

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.

