# Nonpoint Source Control Plan for the Lower East Branch Pecatonica 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 **Green and Lafayette County Land Conservation Departments.**

## WATERSHED PLAN ORGANIZATION INFORMATION

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Dave Jelinski, Bureau of Land and Water Resources

# A NONPOINT SOURCE CONTROL PLAN

# FOR THE

# LOWER EAST BRANCH PECATONICA RIVER PRIORITY WATERSHED PROJECT

*Wisconsin Nonpoint Source Water Pollution Abatement Program*

JUNE 1992

PUBLICATION WR-288-92

**For copies of this document please contact:**

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Nonpoint Source and Land Management Section
P.O. Box 7291
Madison, Wisconsin 53707

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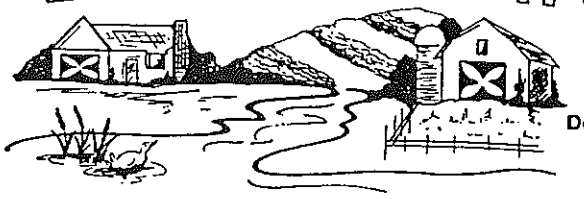
LOWER EAST PECATONICA



Priority Watershed

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2841 6th St., Ag. Bldg. - Box 497
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***Working with farmers and landowners for better water quality.***

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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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State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

27 September 1991

File REF: 3200

Mr. Robert Hoesly, Green County Board Chair
N8943 County O
New Glarus, Wisconsin 53574

Dear Mr. Hoesly,

I am pleased to approve A Nonpoint Source Control Plan For The Lower East Branch Pecatonica River Watershed. 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 Green and Lafayette counties and the Wisconsin Department of Agriculture, Trade, and Consumer Protection. This letter completes the approval process set forth in Wisconsin Statutes and allows for granting of funds through the Nonpoint Source and 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 Sugar-Pecatonica River Basin.

This plan, prepared jointly by the Department of Natural Resources, the Department of Agriculture, Trade, and Consumer Protection, and Green and Lafayette County Land Conservation Department staffs is an example of the cooperative efforts that can help improve and protect the streams, rivers, and wetlands of the Lower East Branch Pecatonica River Watershed. I'm confident the cooperative spirit shown throughout the development of this plan will continue during the implementation of this project.

Sincerely,

C. D. Besadny
Secretary

cc: Jim Huntoon, DNR Southern District Director
Dave Jelinski, Department of Agriculture, Trade, and Consumer Protection
Craig Karr, DNR Bureau Community Assistance Management

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

27 September 1991 File REF: 3200

Mr. Wayne Wilson, Lafayette County Board Chair
11012 County D
Argyle, Wisconsin 53504

Dear Mr. Wilson,

I am pleased to approve A Nonpoint Source Control Plan For The Lower East Branch Pecatonica River Watershed. 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 Green and Lafayette counties and the Wisconsin Department of Agriculture, Trade, and Consumer Protection. This letter completes the approval process set forth in Wisconsin Statutes and allows for granting of funds through the Nonpoint Source and 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 Sugar-Pecatonica River Basin.

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Sincerely,

C. D. Besadny
Secretary

cc: Jim Huntoon, DNR Southern District Director
Dave Jelinski, Department of Agriculture, Trade, and Consumer Protection
Craig Karr, DNR Bureau Community Assistance Management

State of Wisconsin
Department of Agriculture, Trade & Consumer Protection

Alan T. Tracy
Secretary

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

September 18, 1991

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

Dear ~~Mr. Baker~~ Bruce:

The Department of Agriculture, Trade and Consumer Protection has received your request to approve the "Nonpoint Source Control Plan For The Lower East Branch Pecatonica River Priority Watershed Project". The Department, hereby, approves the Lower East Branch Pecatonica River Watershed plan.

This plan is the first one completed for the priority watersheds which began planning in October, 1989. Although we missed our planning goal by a couple months, completion of this plan indicates that an eighteen month planning timeframe is realistic. The efforts of Charlotte Haynes, a new member of your staff, contributed greatly to completing the project on schedule.

We look forward to assisting DNR and the Land Conservation Committees in Green and Lafayette Counties in implementing the project.

Please contact Keith Foye (266-9496) 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) 266-0157

cc: Becky Wallace
Mike Powers, Green County Land Conservation Department
Clarence Keleher, Lafayette County Land Conservation

# LOWER EAST PECATONICA

Lafayette County
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(608) 776-4084

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Green County
Department of Land Conservation
2841 6th St., Ag. Bldg. - Box 497
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July 29,1991

RECEIVED
AUG 2 1 1991
WATER MANAGMT.

Mr. C. D. Besadny
Wisconsin Department of Natural Resources
101 S. Webster Street
P.O. Box 7921
Madison, WI 53707

Dear Mr. Besadny:

The Lower East Branch Pecatonica River Priority Watershed Project was accepted by both Green and Lafayette Counties in the Fall of 1989.

Watershed inventory results have lead to the development of an Implementation Plan. The plan sets procedures for providing technical and financial assistance to eligible landowners who install Best Management Practices controlling non-point source pollution.

The implementation plan has been reviewed by the public during a public hearing held on June 25, 1991.

Both Green and Lafayette Counties' Board of Supervisors have reviewed the plan and have approved the goals and objectives as well as the implementation procedures for the project. We are requesting your approval and support of the watershed plan.

Thank you for your cooperation thus far in the project. We look forward to the long term commitment of financial and technical support from the DNR.

Sincerely,

Robert Hoesly, Chairman
Green County Board of Supervisors

Wayne Wilson, Chairman
Lafayette County Board of Supervisors



*Working with farmers and landowners for better water quality*

**Lafayette County Land Conservation Department**
Ag Center, Court House - Darlington, WI 53530 - Phone (608) 776-4084

RESOLUTION 56-91

ADOPTING THE LOWER EAST BRANCH PECATONICA RIVER WATERSHED PLAN

WHEREAS, Green County and Lafayette County Land Conservation Departments have inventoried the Lower East Branch Pecatonica River Watershed. All barnyards, cropland and streambanks were inventoried and

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

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

WHEREAS, the watershed plan has been reviewed by the public during a public information hearing meeting which was held on June 25, 1991.

NOW THEREFORE BE IT RESOLVED, that the Lafayette County Land Conservation Committee hereby adopt the Lower East Branch Pecatonica Watershed plan and support its implementation.

July 16, 1991 - Date Adopted

LAND CONSERVATION COMMITTEE

Byron Berg — George Wand
Alton Martin — Richard Beyer
Erwin Heins — Wayne Wilson
Charles Davis — Walt Byatt

ATTEST: This is to certify that the above is a true and correct copy of Resolution 56-91 passed at the Lafayette County Board of Supervisors Meeting held in Darlington on July 29, 1991.

Arlene E. Kluesner, Deputy
Arlene E. Kluesner, Deputy County Clerk

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# SUMMARY

# SUMMARY

## INTRODUCTION

The plan for the Lower East Branch of the Pecatonica River Priority Watershed Project assesses the nonpoint sources of pollution in the Lower East Branch Pecatonica River Watershed and guides the implementation of nonpoint source control measures. These control measures are needed to meet specific water resources objectives for the Lower East Branch Pecatonica and its tributaries. Nonpoint sources of pollutants most commonly found in this watershed include: polluted runoff from barnyards and feedlots; sediment from cropland erosion; and sediment from eroding streambanks. The purpose of this project is to reduce the amount of pollutants originating from nonpoint sources that reach surface water and groundwater within the Lower East Branch Pecatonica 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 Green and Lafayette County Land Conservation Departments (LCDs), with assistance from the University of Wisconsin-Extension. The DNR selected the Lower East Branch Pecatonica River Watershed as a priority watershed project through the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1989. It joined approximately 40 similar watershed projects statewide in which nonpoint source pollution control measures are being planned and implemented. The Nonpoint Source Water Pollution Abatement Program was created in 1978 by the Wisconsin State Legislature. The program provides financial and technical assistance to landowners and local governments to reduce nonpoint source pollution.

The DNR and the DATCP administer the project on the state level. The Green and Lafayette County LCDs will 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 Lower East Branch of the Pecatonica River Watershed drains 145 square miles of land in Green and Lafayette counties in southern Wisconsin. The watershed is part of the Sugar-Pecatonica River Basin. The Pecatonica River is a tributary of Sugar River which in turn contributes flow to the Rock River drainage system. The Lower East Branch Pecatonica River Watershed was divided into 17 smaller drainage areas, called subwatersheds, for this planning effort (Map 3).

Land use in the watershed, as shown in Table 1, is mainly agricultural, and is currently dominated by dairy farming. The watershed population is small -- approximately 2,800 people. Most of the watershed population lives outside incorporated areas, in small enclaves of residential development or on farmsteads.

Table 1. Land Use in the Lower East Branch Pecatonica River Watershed

| Land Use | Percent of Watershed |
|---|---|
| Agricultural | 82% |
| pasture | 16% |
| cropland | 64% |
| farmstead | 2% |
| Woodland | 17% |
| Urban | 0.4% |
| Wetlands | 0.6% |

## WATER QUALITY

The Lower East Branch of the Pecatonica River supports diverse warm water fisheries, and the upland watershed contains over 100 miles of cold water streams including 49 miles of classified trout waters. Most of these streams contain significant reaches of Class III and to a lesser extent Class II trout water. The streams are not reaching their highest potential use due to pollution from nonpoint sources. Eroding croplands and streambanks and improperly managed livestock operations are the major source of pollution in the watershed.

Segments of the following creeks were identified as currently supporting good quality (Class III) cold water sport fisheries with strong potential for improvement to Class II trout fisheries: Apple Branch, Sawmill Creek, Brennan Creek, Dougherty Creek, and Erickson Creek. Braezels Branch and Cherry Branch presently support warm water forage fisheries but have the potential to support a cold water fishery. The details of these assessments are discussed later in this watershed plan.

An inventory of groundwater quality was done in conjunction with the animal lot inventories. Results show that of the 279 well samples collected, 22 percent had nitrate levels over the enforcement standard of 10 milligrams per liter (mg/l) and 55 percent had nitrate levels between 2 mg/l, the preventative action limit, and 10 mg/l. These nitrate levels are significant--landowners will be offered a follow-up test for nitrate and a triazine tests if their wells had nitrate levels over 10 mg/l. Landowners with nitrate levels between 2 and 10 mg/l will be offered a follow-up nitrate test.

## SOURCES OF POLLUTION

The Green and Lafayette 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 Lower East Branch Pecatonica River Watershed, about 70 percent of the sediment deposited in streams annually is derived from agricultural upland erosion. Twenty-three percent of the sediment reaching creeks originates from streambank erosion. Approximately 10 percent of total sediment is contributed from gullies.

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

***Barnyard Runoff Inventory Results***:

* Three hundred seventy barnyards were assessed.

* Ninety-seven barnyards were found to contribute 70 percent of the organic pollutants that reach creeks.

***Manure Spreading Inventory Results***:

* About 4,770 total acres have manure applied.

* About 2,065 acres have high pollution potential.

* About 132 landowners spread on 15 or more acres which have high pollution potential.

***Streambank Erosion Inventory Results***:

* One hundred ninety stream miles were inventoried.

* An amount of 6,084 tons of sediment reach streams from eroding sites (23 percent of total sediment).

* There are 37 miles of eroding sites (19 percent of streambanks inventoried).

***Upland Sediment Inventory Results***:

* A total of 89,112 acres were inventoried.

* An amount of 17,897 tons of sediment are delivered to streams (68 percent of total sediment): 82 percent from cropland; three percent from grazed woodlots; nine percent from pastures.

* There are 89,112 acres that deliver 68 percent of the total sediment.

*Gully Erosion Inventory Results*:

* An amount of 2,361 tons of sediment are delivered to streams (nine percent of the total sediment).

*Wetland Inventory Results*:

* A total of 4,213 acres of wetlands were inventoried.
* Presently, 1,801 acres exist as wetlands.
* There are 2,531 acres of converted but restorable wetlands.

## POLLUTANT REDUCTION LEVELS

To improve water quality in the Lower East Branch of the Pecatonica River and its tributaries, this plan calls for:

1. A 25 percent reduction in the sediment reaching streams from agricultural uplands in all subwatersheds.
2. A 40 percent reduction in streambank sediment delivered to all streams and a 25 percent overall repair of bank habitat in all subwatersheds.
3. A 60 percent reduction in organic pollutants from barnyards in all subwatersheds with an emphasis on the following high priority creeks: Apple Branch, Brennan Creek, Dougherty Creek, Erickson Creek, Mud Branch, Sawmill Creek, and Whiteside Creek.
4. A 50 percent reduction in organic pollutants from winter-spread manure on "unsuitable" acres in all subwatersheds.
5. A restoration of 30 percent of degraded wetlands.
6. Control of gullies producing over 30 tons of sediment per site per year.

## 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 BMPs. As shown in Table 2, cost-share rates range from 50 to 70 percent.

Table 2. Best Management Practices Eligible for Cost-Share Funding Through The Lower East Branch Pecatonica Priority Watershed Project

| Best Management Practice | 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 |
| 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 $10,000 including no more than $5,000 for manure transfer equipment.

\+ With matching county cost-share funding, the state share may be increased up to 80 percent.

During the project's implementation, the Green and Lafayette County Land Conservation Departments will contact all landowners who are eligible to receive cost-share funds. All Category I sources of nonpoint pollutants must be controlled if a landowner wishes to participate in any aspect of the program.

The Green and Lafayette County Land Conservation Department will assist landowners in applying BMPs. Practices range from alterations in farm management (such as changes in manure spreading and crop rotations) to engineered structures (such as diversions, sediment basins, and manure storage facilities), and are tailored to specific landowner situations. Participation in the program is voluntary.

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

## AGRICULTURAL LANDS

All agricultural lands contributing sediment to streams at a rate greater than 0.26 tons per acre per year and greater than "T", the tolerable soil loss, will be eligible for cost-share funding and must be brought down to a rate of 0.26 tons/acre/year and "T". This involves an estimated 27,268 critical acres of cropland, or 31 percent of the land in the watershed.

The BMPs identified by the Green and Lafayette County Land Conservation Departments emphasize both improving farm management and controlling pollutants. Table 2 shows the eligible practices and cost-share rates.

## ANIMAL LOTS

The manure from barnyards that is carried in runoff needs to be controlled at about 97 of the 370 livestock operations. The highest level of control is needed for animal lots in the Apple Branch, Sawmill Creek, Brennan Creek, Dougherty Creek, and Erickson Creek subwatersheds. All barnyards contributing more than seven pounds of phosphorus will be Category I for cost-sharing and need to be brought down to the five pound level or less. Category II barnyards, those which contribute between seven and five pounds of phosphorus, will be eligible for cost-sharing and will need to be brought down to the five pound level, or less.

## MANURE-SPREADING

The Lower East Branch Pecatonica River project participants who winterspread manure on more than 20 acres of "unsuitable" land will be targeted as Category I for control measures. These landowners are required to implement and adhere to a Soil Conservation Service's (SCS) "590 Nutrient Management" Plan. Category II landowners are those who winterspread manure on 10 to 20 critical acres. In this project "unsuitable" lands for winter manure spreading are those lands with greater than six percent slope or which are flood prone. The Green and Lafayette 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, Green and Lafayette Counties are required to enact a manure management ordinance which implements requirements outlined by the DATCP.

### STREAMBANKS

Project participants with sites identified as eroding at a rate of 0.07 tons per linear foot of eroding bank per year or over 2000 feet of trampled sites are considered Category I. Those with erosion rates between 0.07 and 0.015 tons/linear foot and less than 2000 trampled feet, are considered Category II. Overall, approximately 2,434 tons of sediment from streambanks must be controlled in the Lower East Branch of the Pecatonica River Watershed.

There will be an emphasis on controlling bank erosion and improving wildlife habitat in the main stem of the Lower East Branch of the Pecatonica to enhance water quality and recreational opportunities.

## FUNDS NEEDED FOR COST-SHARING, STAFFING, AND EDUCATIONAL ACTIVITIES

The DNR will award grants to Green and Lafayette Counties for cost-share funding, staff support and educational activities. Table 3 includes estimates of the financial assistance needed to implement needed nonpoint source controls in the Lower East Branch Pecatonica River Watershed, assuming a 75 percent participation rate of eligible landowners.

Table 3. Cost Estimates for the Lower East Branch Pecatonica River Priority Watershed Project

| Type of Source | Total Cost | State Share |
|---|---|---|
| Cost-sharing: | $6,272,725 | $3,071,800 |
| Easements: | $478,400 | $358,800 |
| Green and Lafayette LCD Staffing | $1,380,835 | (44 staff years) |
| Educational activities | $105,700 | |
| Total | $8,237,660 | |

## PROJECT IMPLEMENTATION SCHEDULE

Project implementation is scheduled to begin in Fall 1991. The first three years of implementation is the period for participants to sign cost-share agreements. There is a five year period for practice installation. While an eligible landowner or operator has three years to determine whether to participate in the program, the installation of practices can begin as soon as a landowner has signed a cost-share agreement with the Green and Lafayette County LCDs.

## INFORMATION AND EDUCATION

An information and education program will be conducted throughout the project period with the Green and Lafayette County LCDs having overall responsibility for the program. University of Wisconsin-Extension staff in the county and in the area office will provide assistance. This program will be most intensive during the first four 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 the DATCP quarterly.

***Pollutant Reduction Levels***: Reductions in nonpoint source pollutant loadings resulting from changes in land use practices will be calculated by the LCD and reported to DNR and the 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 I
# 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 Wisconsin 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 145 square-mile Lower East Branch Pecatonica River Watershed, located in Green and Lafayette Counties, was designated a "priority watershed" in 1989.

Nonpoint sources of pollution include eroding agricultural lands, streambanks, roadsides, 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, snowmelt, and seepage.

The following is an overview of the program:

* The Department of Natural Resources (DNR) and the Department of Agriculture, Trade, and Consumer Protection (DATCP) program administers the nonpoint source program. The program focuses on critical hydrologic units called priority watersheds, and the program is implemented through priority watershed projects.

* The priority watershed project is guided through a plan which is prepared cooperatively by the DNR, the DATCP and local units of government, with input from a local citizens advisory committee. Project staff evaluate the conditions of surface water and groundwater, and inventory the types of land use and nonpoint sources of pollution throughout the watershed. The priority watershed plan assesses nonpoint and other sources of water pollution and identifies best management practices (BMPs) needed to control pollutants to meet specific water resource objectives. The plan guides implementation of these practices in an effort to improve water quality.

* After state and local authorities approve the watershed plan, local units of government implement the plan. Water quality improvement is achieved through voluntary implementation of nonpoint source controls (BMPs) and the adoption of ordinances. Landowners, land renters, counties, cities, villages, towns, sanitary districts, lake districts, and regional planning commissions are eligible to participate.

* Technical assistance is provided to aid in the design of BMPs. State level cost-share assistance is available to help offset the cost of installing these practices. The county Land Conservation Departments (LCDs) contact eligible landowners and local units of government to determine their interest in voluntarily installing the BMPs 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 the DATCP review the progress of the counties and other implementing units of government, and provide assistance throughout the eight-year project. The DNR monitors improvements in water quality resulting from control of nonpoint sources in the watershed.

## LEGAL STATUS OF THE NONPOINT SOURCE CONTROL PLAN

The Lower East Branch Pecatonica 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 the DNR, the DATCP, the Green and Lafayette County Land Conservation Departments, local units of government and the Lower East Branch Pecatonica River Citizens Advisory Committee.

This plan is the basis for the DNR to enter into cost-sharing 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 II, "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 III, "Water Quality Conditions, Objectives and Nonpoint Pollution Sources", presents field inventory results and identifies the water quality or water resource problems and improvements that can be obtained through 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 IV, "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 V, "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 VI, "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 VII, "Integrated Resource Management Program", presents the strategy for involving the DNR resource management programs (fisheries management, wildlife, etc.) in the nonpoint source pollution abatement efforts in the Lower East Branch Pecatonica River Watershed.

## PART THREE - PROJECT EVALUATION

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

Chapter IX, "Evaluation Monitoring", presents a strategy and schedule for monitoring to determine the water quality impacts of implementing nonpoint source controls in the Lower East Branch Pecatonica River Watershed.

# PART ONE

# THE WATERSHED ASSESSMENT

| | |
|---|---|
| Chapter II: | General Watershed Characteristics |
| Chapter III: | Water Quality Conditions, Water Resource Objectives, and Nonpoint Sources |
| Chapter IV: | Recommended Management Actions: Control Needs and Eligibility for Cost-Share Funding |

# CHAPTER II
# GENERAL WATERSHED CHARACTERISTICS

## LOCATION

The Lower East Branch Pecatonica River Watershed is a 145 square-mile drainage basin located in southern Wisconsin, about 10 miles north of the Wisconsin-Illinois border. (Map 1). The watershed contains the lower section of the East Branch Pecatonica River and all lands draining to it between the lower end of the village of Blanchardville to the north and the confluence of the West Branch of the Pecatonica River to the south. It includes rural portions of Lafayette and Green counties. The watershed is almost entirely agricultural. The Lower East Branch Pecatonica Watershed is a part of the Sugar-Pecatonica River Basin. The Pecatonica River is a tributary of the Sugar River which in turn contributes flow to the Rock River drainage system.

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

## CULTURAL FEATURES

### CIVIL DIVISIONS

Over half of the land area in the Lower East Branch Pecatonica River Watershed lies within Lafayette County (56 percent or 82 square miles). Forty-four percent is in Green County (63 square miles). Incorporated areas in the watershed include the village of Argyle and a small portion of the village of Blanchardville. The main public land within the watershed is the Argyle Public Hunting and Fishing Grounds, which consist of 2,796 acres. Also within the watershed is the Blackhawk Memorial Park at Woodford which is 159 acres and contains Bloody Lake.

### POPULATION SIZE AND DISTRIBUTION

The 1991 watershed population is estimated to be about 2,800 persons, with the majority residing in Lafayette County. Most of the watershed population lives outside incorporated areas, in small enclaves of residential development or on farmsteads. An estimated 30 percent of the watershed's population live in "urban" centers. The fastest growing area in the watershed is the village of Argyle which experienced a population increase of about seven percent in the last decade. Population in the surrounding townships declined. Regional trends suggest that the watershed's population will remain about the same or decrease slightly over the next 20 years.

## LAND USES

Rural land uses predominate in the watershed. Agricultural and related open space are the most important land uses, comprising 82 percent. Dairy farming and rotational cropping of corn and alfalfa are the primary enterprises, with the average farm size being 185 acres. Woodlands are abundant and cover 17 percent of the land area. Urban land uses occupy less than 0.4 percent of the watershed. (See Table 4)

Table 4. Summary of Land Uses in the Watershed

| Land Uses | Acres | Percent |
|---|---|---|
| Agricultural | 72,967 | 82% |
| pasture | 14,185 | 16% |
| cropland | 57,197 | 64% |
| farmstead | 1,585 | 2% |
| Woodland | 14,992 | 17% |
| Urban | 508 | 0.4% |
| Wetland* | 557 | 0.6% |

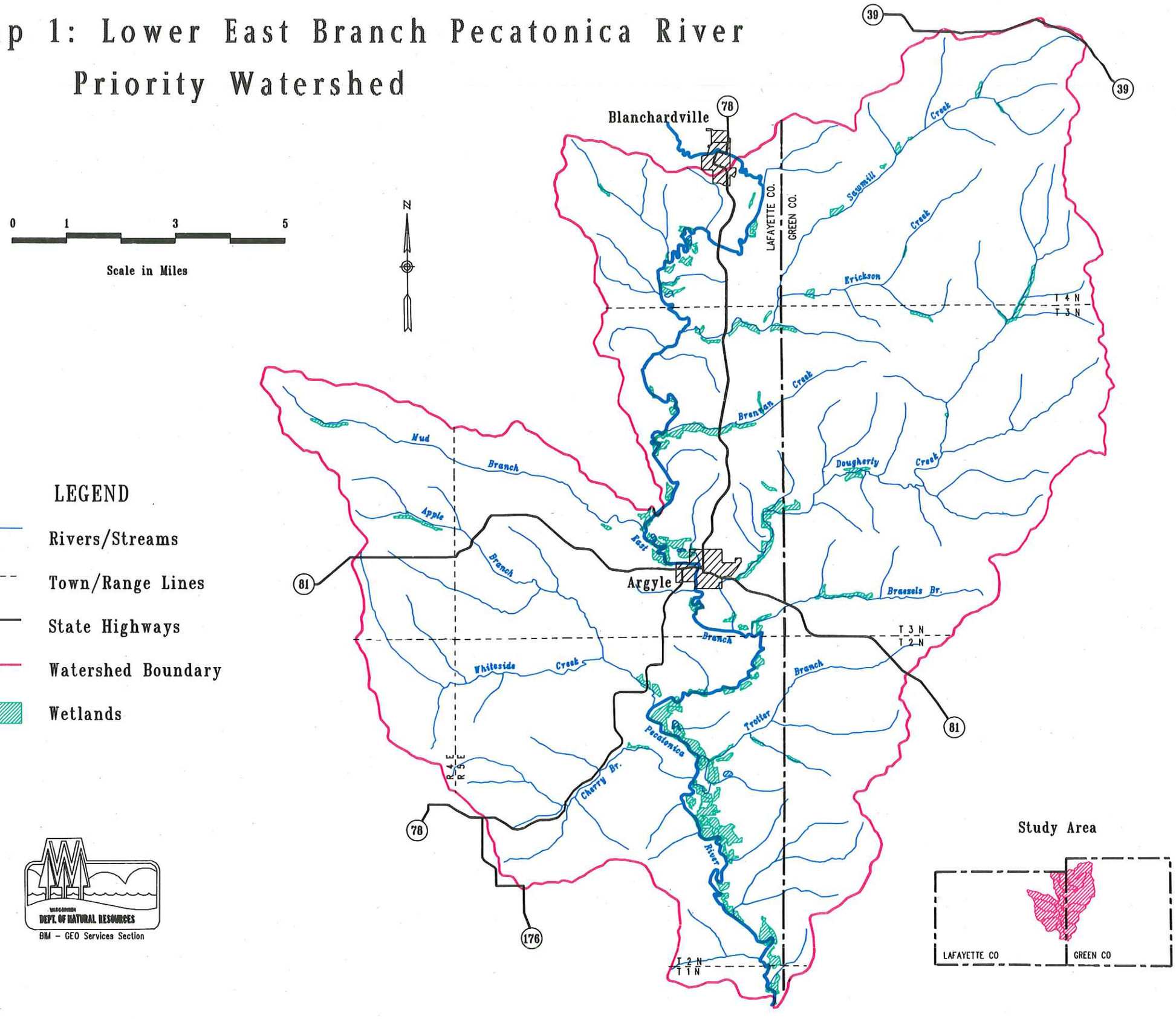
* These are estimates of wetland acres based on WIN inventory data. The estimates are of actual wetland acres, not cropped wet fields. See wetland section in this chapter for a more comprehensive estimate of wetland acreage.

Sources: Green and Lafayette County Land Conservation Departments

## PUBLIC WATER SOURCES

All potable water in the watershed is obtained from groundwater sources. Two principal aquifers from which groundwater is obtained lie beneath the watershed—the sandstone aquifer in the uplands, and the alluvial sands and gravel in the valleys. Water obtained from these aquifers is either pumped from individual wells owned by homeowners or businesses, or is obtained by municipal pumping facilities. Municipal water supply systems serve about 30 percent of the area's population. The two villages in the watershed operate municipal supply systems which draw from the sandstone aquifer.

# Map 1: Lower East Branch Pecatonica River Priority Watershed




LEGEND

- Rivers/Streams
- Town/Range Lines
- State Highways
- Watershed Boundary
- Wetlands

WISCONSIN DEPT. OF NATURAL RESOURCES
BIM – GEO Services Section

### SANITARY SEWER SERVICE

Sanitary sewer service is available within the villages of Argyle and Blanchardville. Approximately 850 persons, or 30 percent of the watershed population receives service. Sewage treatment plants for both municipalities provide secondary treatment with seasonal disinfection and deliver effluent directly to the East Branch Pecatonica River. The remainder of the watershed residents are not served by sanitary sewer service and rely on private on-site systems.

## PHYSICAL SETTING

### CLIMATE AND PRECIPITATION

The frequency, duration and amount of precipitation influences surface and groundwater quality and quantity, soil moisture content, runoff characteristics, and the physical condition of waterways. The Lower East Branch Pecatonica River Watershed lies in the temperate continental zone which is characterized by winters which are cold and snowy and summers which are mostly warm with periods of hot humid conditions. Average annual precipitation for the region is about 32 inches of rain and melted snow; the majority falls in the form of thunderstorms during the growing season (May-September).

The ridge and valley topography of the area is conducive to fast runoff and often results in flash flooding as steep gradient feeder streams deliver runoff water to the relatively slowly flowing East Branch Pecatonica River. Runoff averages about nine inches annually. Most runoff occurs in February, March, and April when the land surface is frozen and soil moisture is highest.

### TOPOGRAPHY

The Lower East Branch Pecatonica Watershed is located entirely within the unglaciated Wisconsin Driftless Area and lies within the geographical province known as the Southwestern Uplands. The landscape is shaped largely by the bedrock surface in this region. In general, topography in the watershed is characterized by an upland plateau dissected by a maze of steep ridges, deep narrow valleys, and numerous small springfed streams. Bedrock outcroppings—common along the ridgetops—are generally associated with silty soils. Agricultural production on the relatively steep slopes of the region often results in severe erosion.

### GEOLOGY AND SOILS

Dolomitic limestone and sandstone are the two basic bedrocks of the region. The oldest underlying rock formation is the Cambrian sandstone which is evident along the deepest valleys. Above this the St. Peter Sandstone may occur. The Galena-Platteville dolomite underlies the ridges in the watershed, and may be exposed at the surface.

Most of the watershed is underlain by soils derived from sedimentary rocks. The watershed is located just west of the glacial advance in Wisconsin, and therefore also contains surface lake deposits (stratified clay, silt and sand) laid down during the melting

stages of glaciation. All of the watershed is covered by a layer of loess (or silt) spread over the region by westerly winds following glaciation of surrounding lands. In valley areas, loess, alluvium and colluvium form the uppermost deposits. These materials, in addition to weathered bedrock, are the parent materials for many of the soils in the region.

The predominant soils in the Lower East Branch Pecatonica River Watershed are the silty loams of the rolling uplands and steep stony and rocky lands, and the sands and sandy loams of the valley floors. Soils of the valley slopes and upland ridges are generally rapid to well-drained with a high potential for soil loss. Valleys widen in the lower portion of the watershed. Stream terraces and bottom lands in this region are composed of fine-textured material washed down from uplands and are moderate to poorly drained loams and silty loams.

## WATER RESOURCES

Land drainage patterns in the Lower East Branch Pecatonica River Watershed are delineated as 17 individual subwatersheds. All convey surface water directly or via tributaries to the Lower East Branch Pecatonica River. Major tributaries, associated streams, lakes, wetlands, and subwatershed divides are shown in Map 2.

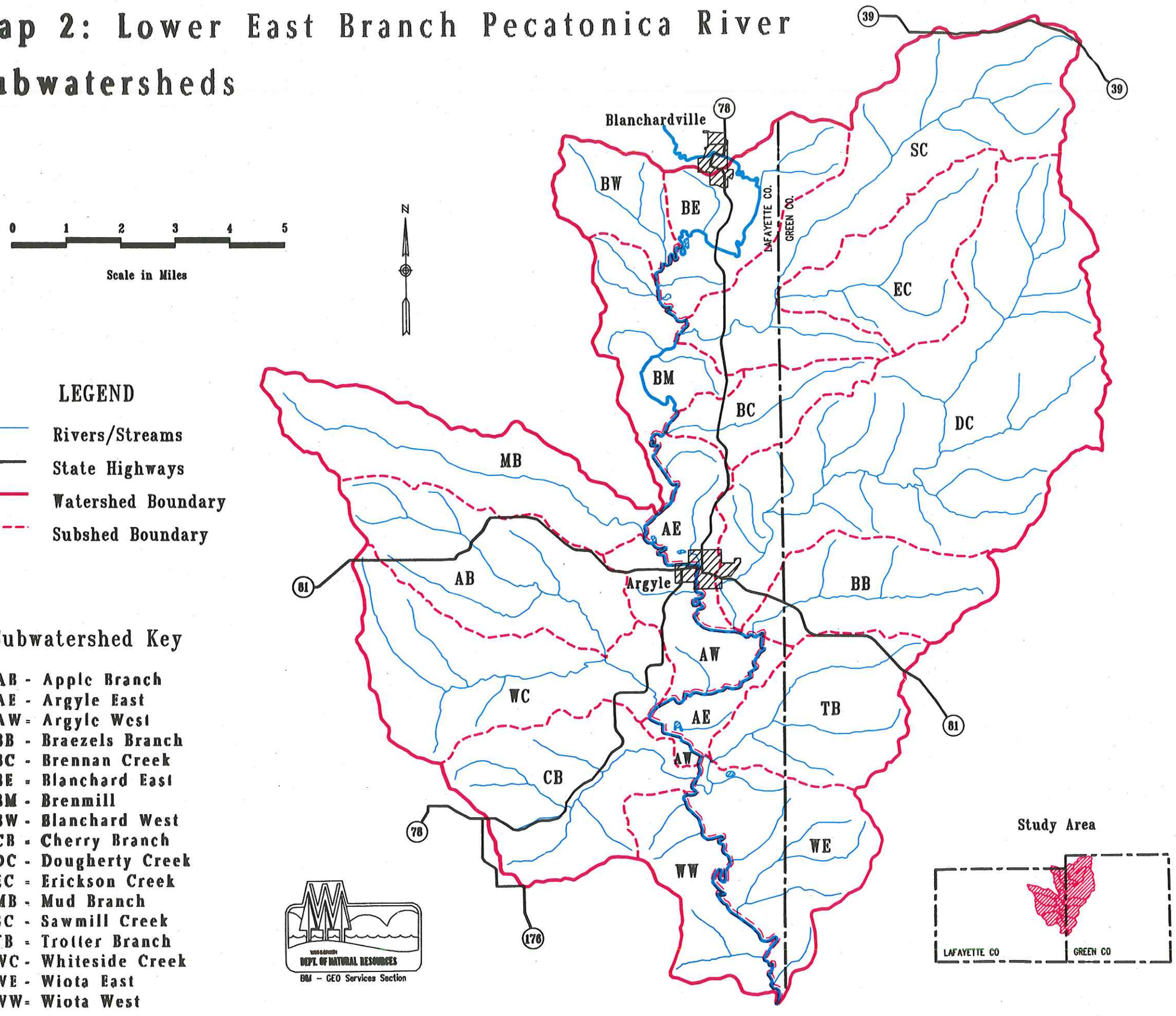
### STREAMS

Perennial and intermittent streams are the predominant surface water features. Perennial streams, which have a combined length of about 190 miles, maintain at least a small continuous flow throughout most of the year. The lower section of the East Branch of the Pecatonica River, from southern Blanchardville to the confluence of the West Branch Pecatonica River (20 miles in length), is the longest and principal perennial stream in the watershed. Other primary streams in the watershed are Apple Branch, Brennan Creek, Dougherty Creek, Sawmill Creek, and Whiteside Creek. Altogether, there are approximately 42 perennial streams in the watershed.

Contrast between the sluggish East Branch of the Pecatonica and upland high gradient streams provide ecological diversity to the watershed. While the East Branch of the Pecatonica supports diverse warm water fisheries, the upland watershed contains over 100 miles of cold water streams including 49 miles of classified trout waters. Most of these streams contain significant reaches of Class III and to a lesser extent Class II trout water. The streams are not reaching their highest potential use due to pollution from nonpoint sources. Eroding croplands and streambanks and improperly managed livestock operations are the major sources of pollution in the watershed.

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

# Map 2: Lower East Branch Pecatonica River Subwatersheds




## Subwatershed Key

AB - Apple Branch
AE - Argyle East
AW - Argyle West
BB - Braezels Branch
BC - Brennan Creek
BE - Blanchard East
BM - Brenmill
BW - Blanchard West
CB - Cherry Branch
DC - Dougherty Creek
EC - Erickson Creek
MB - Mud Branch
SC - Sawmill Creek
TB - Trotter Branch
WC - Whiteside Creek
WE - Wiota East
WW - Wiota West

## LAKES

Lakes are not a common feature of the driftless landscape; only four lakes are present in the Lower East Branch Pecatonica Watershed. All were formed as oxbows of the East Branch Pecatonica River. Bloody Lake, the largest (9.6 acres) supports a perennial bullhead fishery but usually winterkills. The other three unnamed lakes may contain seasonal populations of northern pike and walleye, however their shallow depths make them subject to winterkill conditions as well.

## 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 in the watershed are mainly in the East Branch floodplain. Floodplain wetlands support furbearers and water fowl populations and may provide seasonal habitat for sportfish.

A wetland inventory was done to identify existing and modified or converted wetlands for the purpose of protection from degradation or 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. Appendix A describes methods used in the inventory. Data was collected on 131 wetlands (4,213 acres), with an average of 30 acres/site. Data was gathered from the Soil Conservation Service (SCS) maps, air photos, and the Wisconsin Wetland Inventory, hence is a more comprehensive estimate than indicated in Table 5. Guidelines for wetland restoration, which will be a component of this project, are outlined in Chapter IV.

## GROUNDWATER RESOURCES

An aquifer is an underground rock or soil formation that stores and transmits water to lakes, streams, springs, and wells. Groundwater is available mainly from two aquifers underlying the watershed: the sand and gravel aquifer, and the sandstone aquifer.

The sand and gravel aquifer is found in limited areas within the watershed, mainly along the valley of the East Branch Pecatonica River in the lower portion of the watershed. It is composed of alluvial materials that contain water at depths of less than 50 feet. Water yield to wells in this aquifer is generally low (less than 100 gallons per minute.)

Groundwater in these deposits occurs and moves in the void spaces among grains of sand and gravel. It is locally important as a source of drinking water where there are relatively thick saturated unconsolidated deposits. The potential for contamination is high because of rapid infiltration and shallow depth to groundwater providing little attenuation of contaminants.

Table 5. Wetland Inventory Summary: Lower East Branch Pecatonica River Watershed

| Subwatershed | Total Inventoried Acres | # of Sites | Average Acres/ Site | Existing Wetlands Acres | Restorable Wetlands** Acres |
|---|---|---|---|---|---|
| Dougherty Creek | 1,101 | 35 | 31 | 371 | 730 |
| Wiota East | 896 | 13 | 69 | 454 | 442 |
| Sawmill Creek | 445 | 20 | 22 | 152 | 293 |
| Argyle West | 387 | 6 | 65 | 121 | 266 |
| Blanchard West | 228 | 5 | 46 | 52 | 176 |
| Blanchard East | 222 | 7 | 32 | 58 | 164 |
| Brenmill | 186 | 7 | 27 | 30 | 156 |
| Brennan Creek | 156 | 5 | 31 | 140 | 16 |
| Argyle East | 260 | 6 | 24 | 201 | 59 |
| Erickson Creek | 126 | 5 | 25 | 33 | 93 |
| Braezels Branch | 117 | 5 | 23 | 65 | 52 |
| Mud Branch | 58 | 3 | 19 | 34 | 24 |
| Apple Branch | 55 | 2 | 28 | 32 | 23 |
| Trotter Branch | 48 | 3 | 16 | 28 | 20 |
| Whiteside Creek | 37 | 2 | 19 | 30 | 7 |
| Wiota West | 10 | 1 | 10 | 0 | 10 |
| Cherry Branch | 0 | 0 | 0 | 0 | 0 |
| Total | 4,213 | 125 | 30 | 1,801 | 2,531 |

* Existing wetlands will be protected where feasible.
** Restorable wetlands are those that have been converted to other land uses.

Sources: Green and Lafayette County Land Conservation Departments

The sandstone aquifer is the most important source of groundwater in the watershed. This bedrock sandstone layer occurs at depths of 20 to 1700 feet, and is composed of St. Peter Sandstone and the Cambrian sandstones. The Cambrian sandstone is the most important water yielding formation and occurs throughout the Lower East Branch Pecatonica River Watershed. The sandstone aquifer may be up to 400 feet thick in the region and provides reliable supplies suitable for municipal, industrial, domestic, stock and irrigation uses. On ridge tops in the Driftless Area, this bedrock layer is commonly within five feet of the surface, and in places is exposed at the surface.

The sandstone aquifer in this region of the state is unconfined and is hydrologically connected to the aquifer above. Recharge to the sandstone aquifer passes through the unconsolidated sand and gravel aquifer where present or through surface soils, rendering this aquifer susceptible to contamination from surface land uses.

Well samples were taken on farmsteads during the animal lot inventory in the Fall of 1990. Of 279 samples collected, 22 percent had nitrate levels over the enforcement standard for nitrate (10 milligrams/liter (mg/l)) and 55 percent had levels between two and 10 mg/l (over preventative action limit of 2 mg/l).

Landowners with wells over the enforcement standard will be offered both a follow up nitrate test and a triazine pesticide screening. Landowners with nitrate levels exceeding the preventative action level (2 mg/l) will also be offered follow up nitrate tests. Results of the initial test for nitrates are shown in Table 6.

Table 6. Nitrate Test Results Lower East Branch Pecatonica River (Fall, 1990)

| Watershed/Subwatershed | Percent of Samples with N levels above 10 mg/l | Percent of Samples with N levels between 2 & 10 mg/l | Percent of Samples with N levels below 2 mg/l |
|---|---|---|---|
| Lower East Branch Pecatonica | 22 | 55 | 23 |
| Apple Branch | 33 | 57 | 10 |
| Argyle | 28 | 72 | 0 |
| Blanchard | 21 | 58 | 21 |
| Brennan/Brenmill | 14 | 72 | 14 |
| Braezels Branch | 0 | 78 | 22 |
| Cherry Branch | 22 | 26 | 52 |
| Dougherty Creek | 12 | 56 | 31 |
| Erickson Creek | 15 | 62 | 23 |
| Mud Branch | 28 | 44 | 28 |
| Sawmill Creek | 24 | 52 | 24 |
| Trotter Branch | 0 | 73 | 27 |
| Whiteside Creek | 52 | 35 | 13 |
| Wiota East/West | 21 | 58 | 21 |

Sources: Green and Lafayette County Land Conservation Departments

## ENDANGERED AND THREATENED RESOURCES

Information on threatened and endangered resources was obtained from the DNR Bureau of Endangered Resources (BER). It should be noted that comprehensive endangered resource surveys have **not** been completed for the entire Lower East Branch Pecatonica River Priority Watershed project area. Existing BER data files may be incomplete—however the absence of known occurrences does not preclude the possibility of their presence in the project area.

Purple Milkweed (*Asclepias purpurascens*) is the only species classified as state endangered in the vicinity of the Lower East Branch Pecatonica River Watershed. It was last observed in the region in 1972. State threatened species in the watershed include Bell's Vireo (*Vireo bellii*), a bird species last sited in 1987 and prairie thistle (*Cirsium hillii*) last sited in 1989. This plant is being considered for the federal threatened species list.

Species of Concern are those for which some problem of abundance or distribution is suspected in Wisconsin, but not yet proven. The purpose of this category is to focus attention on certain species before they become endangered or threatened. Species of Concern in the watershed include Eared False Foxglove (*Tomanthera auriculata*), Glade Mallow (*Napaea dioica*), and Redside Dace (*Clinostomus elongatus*).

## NATURAL AREA SITES

Natural areas are identified statewide by the Wisconsin Scientific Areas Preservation Council and the DNR's Bureau of Endangered Resources. These areas are contained exclusively in environmental corridors and isolated natural areas. They are tracts of land or water which exhibit pristine pre-settlement conditions and/or contain unique plant and animal communities.

Natural areas are classified in one of three categories: statewide or greater significance, county-wide or greater significance, and local significance. Many sites in the watershed area have been identified in the latter two categories.

**Rare communities in the watershed include:**

* Oxbow Marsh, a small oxbow lake.
* Scholfield Woods, a sugar maple/basswood forest.
* Blackhawk Marsh, which has swales and openings in river bottom forest and around three oxbow lakes.
* Sand Pit Prairie, a dry prairie.
* Oak Woods, a southern dry forest.
* Apple Brook Oak Woods, a southern dry mesic forest.
* Sawmill Creek Pine Relic.
* Brennan Creek Woods, a southern dry forest.
* Mud Branch Prairie, a dry mesic prairie.
* Argyle Oak Woods, a southern dry mesic forest.

* Argyle Marsh, a southern sedge meadow.

* Grant's Oak Woods, a southern dry forest.

* Zeigler-Anderson Woods, a southern dry mesic forest.

To the extent possible, these sites will be protected and properly managed through the Lower East Branch Pecatonica River Watershed Project. Activities that negatively affect these natural areas will not be cost-shared through the watershed project.

# CHAPTER III
# WATER QUALITY CONDITIONS, WATER RESOURCE OBJECTIVES, AND NONPOINT SOURCES

## INTRODUCTION

The first part of this chapter presents a general description of how nonpoint source pollutants impact water quality. The remainder of the chapter discusses the establishment of water resource objectives; the results of the nonpoint source inventories; individual subwatersheds' general characteristics, condition of water resources, nonpoint pollutant sources and water resource objectives; the amount of pollutant control necessary to achieve the desired water resource conditions; and other potential pollutant sources.

## WATER POLLUTION BASICS

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 an unbalanced fish community 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 the water quality and aquatic life. Manure entering a stream breaks down, resulting in depletion of the oxygen in the water which fish 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 algae and weed growth in the streams and lakes. Finally, the bacteria found in livestock manure is harmful to livestock drinking the water, and to humans using the water for recreation. The major sources of manure in this watershed are runoff from barnyards and runoff from improperly field-spread manure.

Steep 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 the streams is significant.

### SEDIMENT

Sediment adversely impacts the water resources in many ways. It degrades habitat for aquatic insects which support fish and other forms of aquatic life. High sediment concentrations abrade fish gills making the fish more susceptible to disease. Suspended sediment also causes the water to be warmer in the summer, and warm water cannot hold as much oxygen as cold water. The major sources of sediment in this watershed are upland erosion from croplands, gully erosion, and streambank erosion. Heavy or long term sediment deposits are not a problem in upland streams of the watershed. This is due to the fact that the steep gradients and high velocities 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 II.

## ESTABLISHING WATER RESOURCE OBJECTIVES

The DNR staff with assistance from the Green and Lafayette County staffs 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 Lower East Branch Pecatonica Water Resources Appraisal Report (1991).

Streams with high resource priority include Apple Branch, Brennan Creek, Dougherty Creek, Erickson, Mud Branch, Sawmill Creek, and Whiteside Creek. In these streams, the overall objective is to upgrade the current stream classification to each stream's potential classification. This objective also holds for the remaining streams in the watershed with the exception of the main stem of the Pecatonica.

## 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 Lower East Branch Pecatonica River Watershed. Livestock operations comprised of 370

animal lots are a source of 3,131 pounds of phosphorus, based on a 10-year, 24-hour rainfall event. (Table 7). Most of the oxygen-demanding pollutants and nutrients associated with these operations drain via concentrated flow to creeks and wetlands.

## UPLAND SEDIMENT

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

Upland sediment sources were evaluated for the entire watershed (145 square miles). The results of this inventory are summarized in Table 8. An estimated 174,401 tons of soil erode annually from croplands, farmsteads, pastures, woodlots, grassland, and other "open areas". About 10 percent of this amount (17,330 tons/year) are delivered directly to wetlands or streams in the watershed. Uplands are the source of 68 percent of the sediment delivered to surface waters. Gullies contribute nine percent of the total sediment delivered to surface waters.

## STREAMBANK EROSION

Streambank erosion contributes 23 percent of the total sediment to surface waters in the Lower East Branch of the Pecatonica River Watershed. Sediment delivery has seriously affected recreational activities such as fishing and canoeing in the main stem of the Lower East Branch Pecatonica River. Approximately 190 miles of streams were evaluated. Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 30 miles of streambank. An estimated 6,084 tons of sediment are eroding into streams annually. See Table 9 for streambank inventory results.

## WINTER-SPREADING OF MANURE

The most significant water quality problems associated with the spreading of livestock manure occur when wastes are spread on "critical" areas such as steeply sloped frozen ground, land in floodplains, or areas with shallow depth to groundwater. Estimates indicate livestock manure is spread on 2,807 "critical" acres from which runoff has a high potential to convey pollutants to both surface waters and groundwater.

Detailed results of nonpoint source inventories can be found in the following individual subwatershed descriptions.

**Table 7. Barnyard Inventory Results: Lower East Branch Pecatonica River Watershed**

| Subwatershed | Number of Barnyards | Total Phosphorous* (lbs) | Percent Watershed P Load |
|---|---|---|---|
| Apple Branch | 31 | 308.2 | 10 |
| Argyle East | 5 | 12.7 | 1 |
| Argyle West | 14 | 52.1 | 1 |
| Braezels Branch | 18 | 147.0 | 5 |
| Brennan Creek | 7 | 42.0 | 1 |
| Blanchard East | 7 | 19.6 | 1 |
| Bren Mill | 13 | 140.6 | 4 |
| Blanchard West | 14 | 73.2 | 2 |
| Cherry Branch | 36 | 460.4 | 15 |
| Dougherty Creek | 65 | 371.6 | 12 |
| Erickson Creek | 18 | 89.4 | 3 |
| Mud Branch | 26 | 129.8 | 4 |
| Sawmill Creek | 25 | 155.4 | 5 |
| Trotter Branch | 24 | 218.4 | 7 |
| Whiteside Creek | 28 | 366.1 | 12 |
| Wiota East | 19 | 126.3 | 4 |
| Wiota West | 20 | 417.8 | 13 |
| TOTALS | 370 | 3,130.6 | 100 |

* Based on ARS Model for 10-year, 24-hour rainfall
P = Phosphorous

Sources: Green and Lafayette County Land Conservation Departments, DNR, and DATCP

## Table 8. Upland Sediment Source Inventory Results: Lower East Branch Pecatonica River Watershed

| SUBWATER-SHED | | CROPLAND | % | FARMSTEAD | % | GRASSLAND | % | PASTURE | % | DV, RES, IND, OTH* | % | WOODLAND | % | GRAZED WOODLAND | % | WETLAND | % | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APPLE BRANCH | ACRES | 3657 | 62% | 112 | 2% | 52 | 1% | 1564 | 27% | 3 | 0% | 548 | 9% | 4 | 0% | 0 | 0% | 5940 |
| | SOIL LOSS | 12398 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 12398 |
| | SEDIMENT | 882 | 81% | 31 | 3% | 0 | 0% | 160 | 15% | 3 | 0% | 7 | 1% | 1 | 0% | 0 | 0% | 1084 |
| ARGYLE EAST | ACRES | 1349 | 46% | 53 | 2% | 313 | 11% | 295 | 10% | 140 | 5% | 473 | 16% | 19 | 1% | 307 | 10% | 2950 |
| | SOIL LOSS | 3681 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 3681 |
| | SEDIMENT | 342 | 66% | 15 | 3% | 7 | 1% | 22 | 4% | 67 | 13% | 17 | 3% | 12 | 2% | 34 | 7% | 516 |
| ARGYLE WEST | ACRES | 1596 | 67% | 40 | 2% | 120 | 5% | 317 | 13% | 126 | 5% | 130 | 5% | 0 | 0% | 53 | 2% | 2382 |
| | SOIL LOSS | 6135 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 6135 |
| | SEDIMENT | 502 | 84% | 9 | 2% | 1 | 0% | 26 | 4% | 49 | 8% | 8 | 1% | 0 | 0% | 1 | 0% | 596 |
| BRAEZELS BRANCH | ACRES | 1881 | 46% | 52 | 1% | 503 | 12% | 550 | 14% | 0 | 0% | 911 | 22% | 161 | 4% | 0 | 0% | 4058 |
| | SOIL LOSS | 5372 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 5372 |
| | SEDIMENT | 496 | 67% | 17 | 2% | 10 | 1% | 68 | 9% | 0 | 0% | 51 | 7% | 94 | 13% | 0 | 0% | 736 |
| BRENNAN CREEK | ACRES | 875 | 37% | 40 | 2% | 345 | 15% | 239 | 10% | 0 | 0% | 794 | 34% | 63 | 3% | 0 | 0% | 2356 |
| | SOIL LOSS | 2438 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 2438 |
| | SEDIMENT | 179 | 51% | 21 | 6% | 10 | 3% | 27 | 8% | 0 | 0% | 57 | 16% | 57 | 16% | 0 | 0% | 351 |
| BLANCHARD EAST | ACRES | 1157 | 44% | 32 | 1% | 248 | 9% | 479 | 19% | 0 | 0% | 617 | 23% | 70 | 3% | 48 | 2% | 2652 |
| | SOIL LOSS | 4338 | 99% | 0 | 0% | 0 | 0% | 15 | 1% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 4353 |
| | SEDIMENT | 357 | 69% | 12 | 2% | 2 | 0% | 46 | 9% | 0 | 0% | 36 | 7% | 45 | 9% | 18 | 3% | 516 |
| BRENMIL | ACRES | 1346 | 44% | 63 | 2% | 288 | 9% | 745 | 25% | 0 | 0% | 445 | 15% | 99 | 3% | 46 | 2% | 3031 |
| | SOIL LOSS | 5254 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 5254 |
| | SEDIMENT | 431 | 75% | 26 | 5% | 5 | 1% | 72 | 13% | 0 | 0% | 27 | 5% | 15 | 3% | 0 | 0% | 576 |
| BLANCHARD WEST | ACRES | 1355 | 40% | 54 | 2% | 409 | 12% | 946 | 28% | 39 | 1% | 464 | 14% | 134 | 4% | 3 | 0% | 3403 |
| | SOIL LOSS | 8218 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 8218 |
| | SEDIMENT | 670 | 83% | 16 | 2% | 3 | 0% | 75 | 9% | 8 | 1% | 15 | 2% | 20 | 2% | 0 | 0% | 807 |
| CHERRY BRANCH | ACRES | 3928 | 68% | 138 | 2% | 355 | 6% | 958 | 16% | 9 | 0% | 366 | 6% | 28 | 0% | 26 | 0% | 5809 |
| | SOIL LOSS | 10317 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 10317 |
| | SEDIMENT | 816 | 80% | 54 | 5% | 2 | 0% | 111 | 11% | 8 | 1% | 21 | 2% | 6 | 1% | 0 | 0% | 1018 |
| DOUGHERTY CREEK | ACRES | 10096 | 59% | 226 | 1% | 1231 | 7% | 1552 | 9% | 38 | 0% | 3835 | 22% | 184 | 1% | 65 | 0% | 17227 |
| | SOIL LOSS | 32909 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 32909 |
| | SEDIMENT | 2961 | 81% | 79 | 2% | 22 | 1% | 183 | 5% | 5 | 0% | 232 | 6% | 125 | 3% | 43 | 1% | 3650 |
| ERICKSON CREEK | ACRES | 2191 | 51% | 85 | 2% | 502 | 12% | 439 | 10% | 0 | 0% | 1086 | 25% | 0 | 0% | 0 | 0% | 4303 |
| | SOIL LOSS | 6806 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 6806 |
| | SEDIMENT | 537 | 78% | 32 | 5% | 15 | 2% | 41 | 6% | 0 | 0% | 63 | 9% | 0 | 0% | 0 | 0% | 688 |
| MUD BRANCH | ACRES | 3093 | 51% | 123 | 2% | 379 | 6% | 1533 | 26% | 5 | 0% | 761 | 13% | 113 | 2% | 6 | 0% | 6013 |
| | SOIL LOSS | 11528 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 11528 |
| | SEDIMENT | 825 | 76% | 45 | 4% | 3 | 0% | 151 | 14% | 2 | 0% | 30 | 3% | 14 | 1% | 14 | 1% | 1084 |
| SAWMILL CREEK | ACRES | 5112 | 51% | 138 | 1% | 1174 | 12% | 883 | 9% | 3 | 0% | 2601 | 26% | 101 | 1% | 0 | 0% | 10012 |
| | SOIL LOSS | 17938 | 99% | 58 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 120 | 1% | 0 | 0% | 18116 |
| | SEDIMENT | 1526 | 76% | 58 | 3% | 27 | 1% | 296 | 15% | 0 | 0% | 0 | 0% | 103 | 5% | 0 | 0% | 2010 |
| TROTTER BRANCH | ACRES | 2860 | 62% | 114 | 2% | 753 | 16% | 310 | 7% | 23 | 1% | 518 | 11% | 0 | 0% | 4 | 0% | 4582 |
| | SOIL LOSS | 13025 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 13025 |
| | SEDIMENT | 1146 | 90% | 48 | 4% | 17 | 1% | 33 | 3% | 6 | 0% | 22 | 2% | 0 | 0% | 3 | 0% | 1275 |

## Table 8. Upland Sediment Source Inventory Results: Lower East Branch Pecatonica River Watershed

| SUBWATER-SHED | | CROPLAND | % | FARMSTEAD | % | GRASSLAND | % | PASTURE | % | DV, RES, IND, OTH* | % | WOODLAND | % | GRAZED WOODLAND | % | WETLAND | % | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WHITESIDE CREEK | ACRES | 4128 | 63% | 103 | 2% | 241 | 4% | 1450 | 22% | 10 | 0% | 552 | 8% | 90 | 1% | 9 | 0% | 6583 |
| | SOIL LOSS | 16362 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 16362 |
| | SEDIMENT | 1077 | 83% | 32 | 2% | 4 | 0% | 155 | 12% | 1 | 0% | 20 | 2% | 13 | 1% | 0 | 0% | 1302 |
| WIOTA EAST | ACRES | 2725 | 56% | 122 | 3% | 571 | 12% | 602 | 12% | 13 | 0% | 623 | 13% | 14 | 0% | 201 | 4% | 4871 |
| | SOIL LOSS | 9978 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 9978 |
| | SEDIMENT | 915 | 84% | 39 | 4% | 9 | 1% | 39 | 4% | 1 | 0% | 23 | 2% | 7 | 1% | 51 | 5% | 1084 |
| WIOTA WEST | ACRES | 1900 | 65% | 61 | 2% | 162 | 6% | 348 | 12% | 0 | 0% | 422 | 14% | 28 | 1% | 20 | 1% | 2941 |
| | SOIL LOSS | 7511 | 100% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 7511 |
| | SEDIMENT | 605 | 89% | 26 | 4% | 0 | 0% | 27 | 4% | 0 | 0% | 14 | 2% | 8 | 1% | 0 | 0% | 680 |
| TOTAL | ACRES | 49249 | 55% | 1556 | 2% | 7646 | 9% | 13210 | 15% | 409 | 0% | 15146 | 17% | 1108 | 1% | 788 | 0% | 89112 |
| TOTAL | SOIL LOSS | 174208 | 99% | 58 | 0% | 0 | 0% | 15 | 0% | 0 | 0% | 0 | 0% | 120 | 1% | 0 | 0% | 174401 |
| TOTAL | SEDIMENT | 14267 | 82% | 560 | 3% | 137 | 0% | 1532 | 96% | 150 | 0% | 643 | 4% | 520 | 3% | 164 | 1% | 17973 |

* DV = DEVELOPED
RES = RESIDENTIAL
IND = INDUSTRIAL

OTH = OTHER

**Table 9. Streambank Inventory Results: Lower East Branch Pecatonica River Watershed**

| Subwatershed* | Inventoried Stream Length Feet | Eroded Sites** Total Length Feet | Percent of Inventoried Stream Length | Total Sediment Loss Tons/Year | Sediment Loading Rate Tons/Stream Mile |
|---|---|---|---|---|---|
| Blanchard East | 6,200 | 330 | 5% | 4 | 3 |
| Blanchard West | 51,000 | 1,860 | 4% | 29 | 3 |
| Braezels | 34,830 | 5,575 | 7% | 125 | 19 |
| Mud Branch | 93,900 | 9,845 | 10% | 464 | 26 |
| Argyle West | 7,200 | 105 | 1% | 4 | 3 |
| Brenmill | 17,000 | 155 | 0% | 2 | 0 |
| Brennan Creek | 37,000 | 2,315 | 6% | 39 | 6 |
| Whiteside Creek | 135,725 | 13,259 | 9% | 858 | 33 |
| Apple Branch | 129,600 | 13,712 | 10% | 383 | 16 |
| Cherry Branch | 85,700 | 14,621 | 17% | 879 | 54 |
| Wiota East | 42,400 | 3,015 | 7% | 59 | 7 |
| Wiota West | 28,200 | 2,250 | 7% | 32 | 6 |
| Dougherty | 152,300 | 37,001 | 24% | 1,504 | 52 |
| Erickson | 45,500 | 10,775 | 23% | 347 | 40 |
| Sawmill | 98,830 | 29,946 | 30% | 1,142 | 61 |
| Trotter | 38,600 | 8,086 | 20% | 210 | 29 |
| Total | 1,003,985 | 152,850 | | 6,081 | 358 |

## SUBWATERSHED DISCUSSIONS

Abbreviations for designated biological uses in the subwatershed discussions follow:

* **COLD**= Cold Water Communities include surface waters capable of supporting a community of cold water fish and other aquatic life or serving as a spawning area for cold water fish species.

* **WWSF**= Warm Water Sport Fish Communities include surface waters capable of supporting a community of warm water sport fish and/or serving as a spawning area for warm water sport fish.

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

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** streams are high quality, and populations are sustained by natural reproduction.

* **Class II** streams have some natural reproduction but may need stocking to maintain a desirable fishery.

* **Class III** streams have no natural reproduction and require annual stocking of legal-size fish to provide sport fishing.

### BLANCHARD EAST SUBWATERSHED (BE)

***Description***: Blanchard East (Map 3) lies between Sawmill Creek Subwatershed and the Lower East Pecatonica River. It is the second smallest with 2,651 acres, or three percent of the total watershed area. Blanchard East lies just east of Blanchardville in the northern portion of the watershed.

***Water Resource Conditions***: Unnamed spring fed streams drain this subwatershed flowing westward and emptying into the Lower East Branch Pecatonica River. The actual surface waters represent an insignificant resource and therefore have not been appraised.

***Nonpoint Pollutant Sources***: Blanchard East Subwatershed contains only seven animal lots and adds just 20 pounds of oxygen depleting phosphorous to the Lower East Branch Pecatonica's surface water resources. This is the second lowest contribution of all subwatersheds. Two barnyards supply 54 percent of the load.

The Blanchard East Subwatershed contributes only four tons of sediment annually from its streambanks. However, livestock have trampled 20 percent of the length (1,240 feet).

The Blanchard East Subwatershed upland sediment delivery is 516 pounds annually, or three percent of the entire watershed load. This is the second smallest tonnage being added. Cropland is the major source at 69 percent of the load with pasture and grazed woodlots adding another 17 percent.

***Water Resources Objectives***: Protect and restore wetlands and improve wildlife habitat.

## BLANCHARD WEST SUBWATERSHED (BW)

***Description***: Blanchard West Subwatershed (Map 3) consists of 3,403 acres or four percent of the watershed. A small portion of the village of Blanchardville lies in this subwatershed. Blanchard West is the northwestern border of the watershed. This subwatershed consists of 28 percent pasture and 40 percent cropland.

***Water Resource Conditions***: Unnamed spring fed streams drain this subwatershed flowing eastward and emptying into the Lower East Branch Pecatonica River. The actual surface waters represent an insignificant resource and therefore have not been appraised.

***Nonpoint Pollutant Sources***: A total of 14 barnyards were inventoried in Blanchard West. Seventy-three pounds of phosphorus are delivered to the streams from these yards. A little over half of the total load is coming from two yards.

An estimated 5,650 feet of streambank in Blanchard West Subwatershed is either eroding or trampled by cattle. There are 29 tons eroding annually from 1,860 feet.

The uplands in the subwatershed add a relatively low sediment load of 804 tons per year. Cropland supplies 670 tons or 83 percent of the subwatershed load. Pasture and grazed woodland add another 11 percent.

***Water Resources Objectives***: Objectives are to restore and protect wetlands and improve wildlife habitat.

## SAWMILL CREEK SUBWATERSHED (SC)

***Description***: Sawmill Creek (Map 4) is the second largest subwatershed covering 11.2 percent of the total land area or 10,011 acres. Sawmill is located in the north-eastern corner of the watershed and is bounded by Blanchard East, Erickson Creek and Brennan Creek. Wetlands identified in this subwatershed comprise 445 acres and are located in 20 different sites.

***Water Resource Conditions***: This moderate-sized trout stream flows southwestward through the driftless area of Green County and into Lafayette County, where it enters the East Branch of the Pecatonica River. An unnamed tributary enters Sawmill Creek and Erickson Creek, another trout stream, enters just inside the Lafayette County line. The creek flows through cropland, pasture and hardwood forest. In the flatter stretches

the bottom is composed primarily of silt, while in the steeper segments the bottom is predominantly gravel and rubble. Bank erosion is moderate to heavy in the pastured areas and the water is generally turbid.

Sawmill Creek is managed as Class II brown trout water in its entirety. Most spawning occurs where there is a gravel bottom and a good pool-riffle ratio. The lack of good spawning substrate in other stretches limits natural trout reproduction. Forage fish densities are very high and a few northern pike are present.

***Nonpoint Pollutant Sources***: Twenty-five barnyards collectively contribute 155 pounds of phosphorous to the Sawmill Creek Subwatershed during the 10-year, 24-hour rainfall event (4.2 inches). Four barnyards account for 49 percent of the load in the subwatershed.

Streambanks in the Sawmill Creek Subwatershed contribute 1,142 tons of sediment annually to the Lower East Branch Pecatonica system. This is the second highest amount, or 19 percent of the sediment in the whole watershed. Sawmill Creek has the highest erosion rate at 61 tons per mile. Thirty-eight percent of the streambank is either eroded, trampled or slumping.

Upland sources in the Sawmill Creek Subwatershed contribute 1,957 tons of sediment annually to the Lower East Branch Pecatonica system. Sawmill Creek Subwatershed has the second highest sediment loss in the watershed, adding 11 percent of the entire watershed load. Cropland supplies 78 percent of this load (1,526 tons), but covers only 51 percent of the land area (5,098 acres).

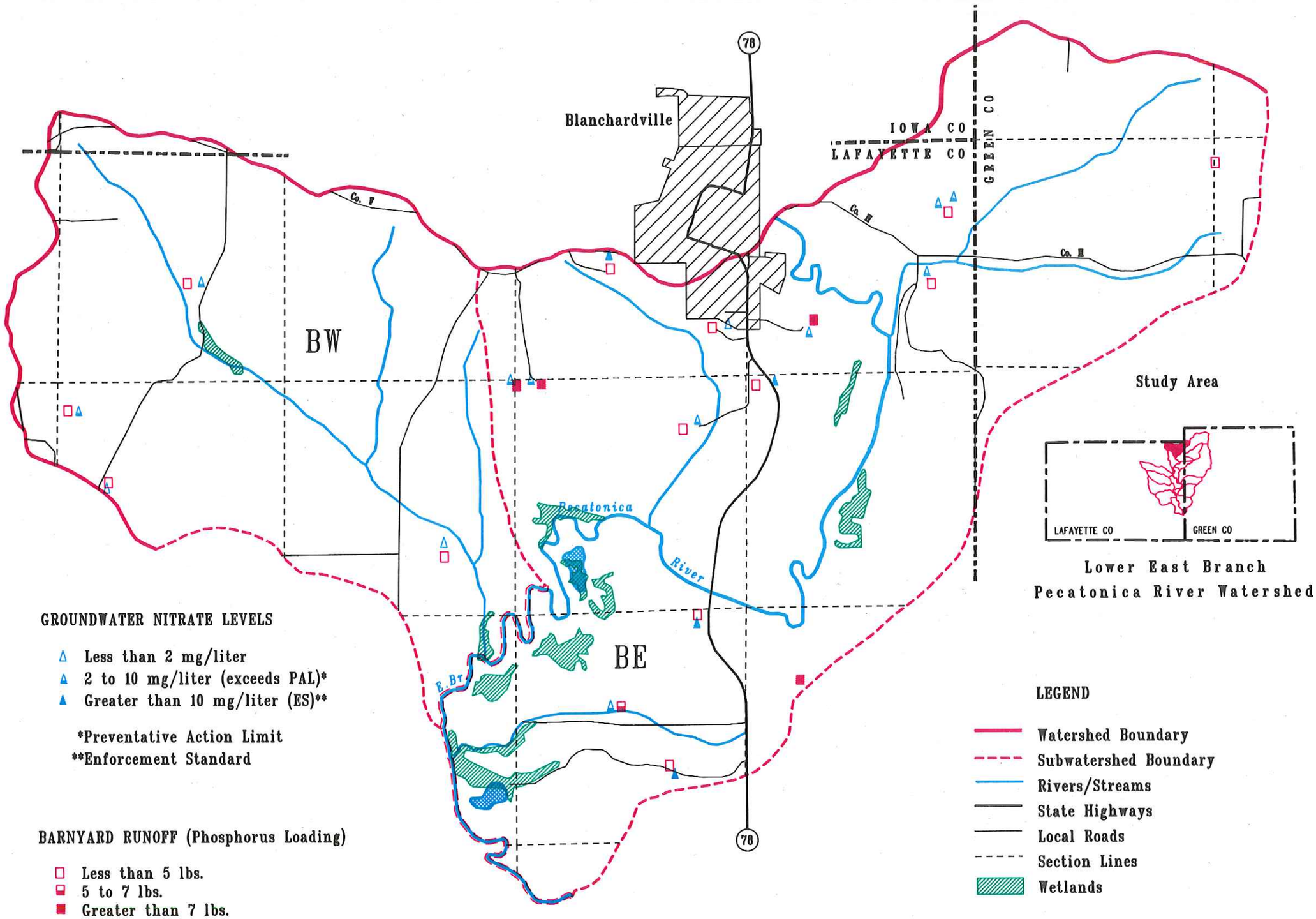
***Water Resource Objectives***: Objectives are to improve trout habitat, reduce organic loading and erosion by 50 percent, increase aquatic diversity, protect and restore wetlands and improve wildlife habitat. A segment of Sawmill Creek will be upgraded from Cold III to Cold II.

## ERICKSON CREEK SUBWATERSHED (EC)

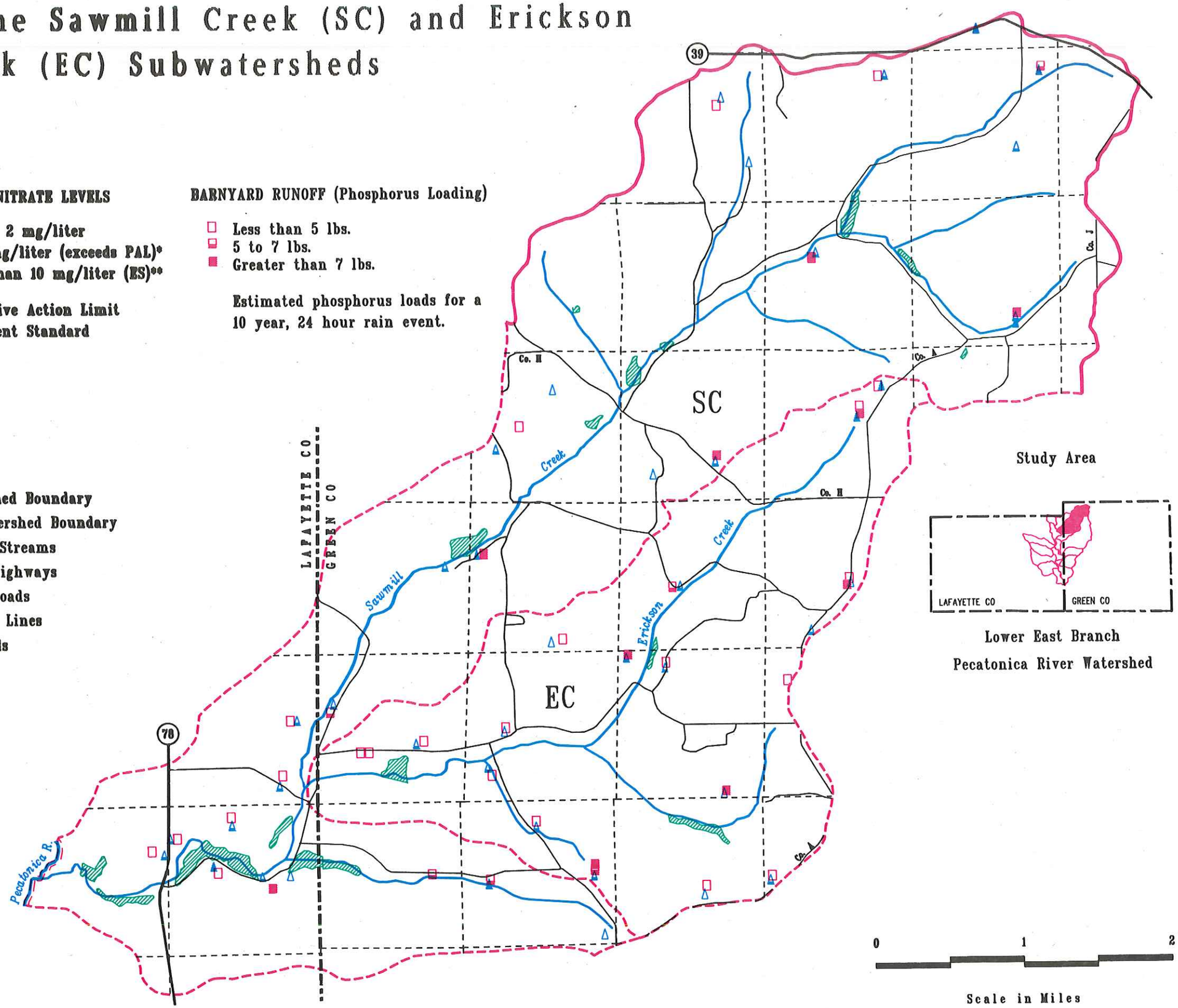
***Description***: This subwatershed is located between Sawmill Creek Subwatershed to the north and Dougherty Creek Subwatershed to the south (Map 4). Erickson is relatively small with only 4,303 acres, or 4.8 percent land area. Erickson Creek drains Yankee Hollow Valley and delivers its load into Sawmill Creek. Fifty-one percent or 2,195 acres of Erickson is currently cropland.

***Water Resource Conditions***: Flowing westward through the driftless area, this moderate-sized trout stream enters Lafayette County and joins Sawmill Creek. It flows primarily through pastured land and suffers moderate to heavy bank erosion. In the high gradient sections of the stream, the bottom consists of gravel and rubble, while silt covers the bottom in the flatter areas. The water normally runs clear and lacks macrophytic vegetation. Cold water is supplied to the stream from one unnamed tributary and several spring feeders.

# Map 3: Groundwater Nitrate Levels and Barnyard Runoff Results in the Blanchard East (BE) and Blanchard West (BW) Subwatersheds



# Map 4: Groundwater Nitrate Levels and Barnyard Runoff Results in the Sawmill Creek (SC) and Erickson Creek (EC) Subwatersheds



Erickson Creek has a fishery for brown and rainbow trout, and forage fish are also abundant. It is considered to be the second best trout stream in the county and shows evidence of natural brown trout reproduction. Above V & W Road in Section 32 the stream is Class II trout water, while the rest of the stream is Class III.

In spite of watershed problems (including streambank erosion, barnyard runoff, and to a lesser extent cropland runoff and channel straightening), Erickson Creek displays the best water quality in the watershed.

***Nonpoint Pollutant Sources***: Eighteen animal lots produce phosphorous loads totalling 89 pounds in the Erickson Creek Subwatershed. This is only three percent of the total watershed phosphorous load. Four animal lots generate 50 percent of the load in the subwatershed.

Eroded, trampled, or slumping sites are located along 37 percent of the streambank in the Erickson Creek Subwatershed. This is the third highest percentage, but it also has the fourth highest sediment rate at 40 tons per mile of stream. Streambanks contribute 347 tons of sediment per year to Erickson Creek, or about six percent of the total watershed load.

The Erickson Creek Subwatershed is not a major contributor of upland sediment, adding only 680 tons annually, or less than four percent of the entire watershed load. Seventy-eight percent of the subwatershed sediment is delivered from cropland fields (2,191 acres).

***Water Resources Objectives***: Objectives are to improve wildlife habitat, improve trout habitat, reduce organic loading and erosion by 50 percent, protect and restore wetlands and increase aquatic diversity. A segment of the creek will be upgraded from Cold III to Cold II.

## BRENMILL CREEK SUBWATERSHED (BM)

***Description***: Brenmill Creek (Map 5) is 3,031 acres or three percent of the watershed. The western boundary of Brenmill Creek is part of the northwestern border for the Lower East Branch Pecatonica Watershed. Brenmill Creek is located on either side of the Pecatonica River. It is bordered by Blanchard West to the north. Brenmill drains primarily into the Pecatonica River.

***Water Resource Conditions***: Unnamed spring-fed streams drain this subwatershed and empty into the Lower East Branch Pecatonica River. The actual surface waters represent an insignificant resource and therefore were not appraised.

***Nonpoint Pollutant Sources***: A total of 13 barnyards were inventoried in Brenmill Subwatershed. These barnyards deliver approximately 141 pounds of phosphorus. Five of these yards are responsible for over 87 percent of the pollutant load.

Brenmill Subwatershed has virtually no erosion taking place along its streambanks. Of the 17,000 feet inventoried only one percent had active erosion occurring for a total of two tons per year.

Runoff from cropland supplies 74 percent of the upland sediment load in the Brenmill Subwatershed. Pasture and grazed woodlots contribute an additional 87 tons, or 16 percent, and farmsteads and woodlots account for another 5 percent each.

***Water Resource Objectives***: Objectives are to restore and protect wetlands and improve wildlife habitat.

## BRENNAN CREEK SUBWATERSHED (BC)

***Description***: Brennan Creek (Map 5) is the smallest subwatershed at 2.6 percent of the total watershed area or 2,356 acres. Over one-third (36 percent) of the land area is wooded and another 37 percent is cropland. Brennan Creek drains this subwatershed. It is bounded by Sawmill, Dougherty and Argyle Subwatersheds.

***Water Resource Conditions***: Originating from surface springs, this stream trickles westward through hardwood forest and pasture into Lafayette County, where it eventually enters the East Branch of the Pecatonica River. The bottom is primarily a mixture of gravel, muck and silt, although some sand, rubble and boulders are also present.

In Lafayette County, the stream provides fishing for both brown and brook trout, but in Green County it is too small to be stocked with yearling trout. Occasional trout undoubtedly enter Green County from the lower stretches and the headwaters probably provide an important habitat for trout fingerlings.

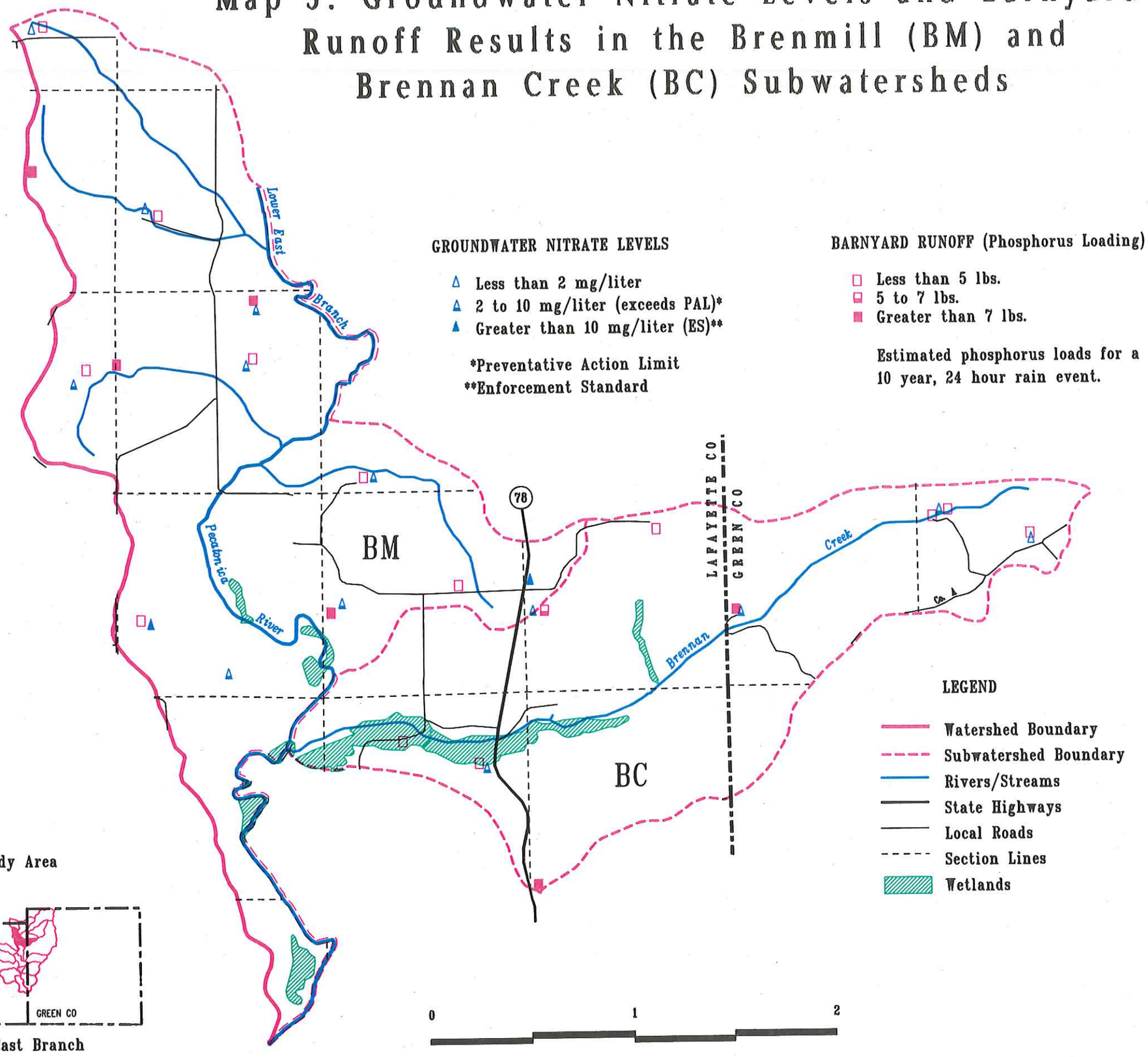
***Nonpoint Pollutant Sources***: Brennan Creek adds an insignificant portion of phosphorous to the entire watershed with 42 pounds, or only one percent of the total load. Two animal lots contribute 53 percent of the phosphorous load in the subwatershed.

Streambank sources in the Brennan Creek Subwatershed contribute only 41 tons of sediment annually (less than one percent of the total watershed load). This is about 5.9 tons per mile of sediment with 19 percent of the banks (6940 feet) either eroded, trampled, or slumping.

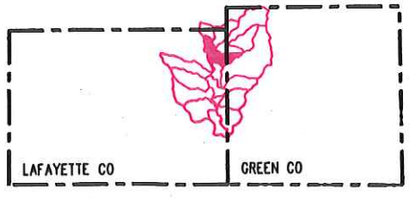
Brennan Creek is the lowest upland sediment contributor adding only 351 pounds of sediment to the Lower East Branch Pecatonica Watershed surface water resources, two percent of the upland sediment. About half of this sediment comes from cropland with woodlots and grazed woodlots each adding another 16 percent each.

***Water Resources Objectives***: Objectives are to reduce erosion by 50 percent, improve trout fisheries, improve stream habitat, increase aquatic diversity, improve wildlife habitat, protect and restore wetlands and reduce organic loading. A segment of Brennan Creek will be upgraded from Cold III to Cold II.

# Map 5: Groundwater Nitrate Levels and Barnyard Runoff Results in the Brenmill (BM) and Brennan Creek (BC) Subwatersheds




Study Area




Lower East Branch
Pecatonica River Watershed

## DOUGHERTY CREEK SUBWATERSHED (DC)

***Description***: Dougherty Creek (Map 6) is the largest subwatershed in the Lower East Branch Pecatonica Watershed covering almost 20 percent , or 17,227 acres of the total area. County Highway A bounds Dougherty Creek on the north and west, County Highway C on the south, and County Highway J on the east. It also contains a small portion of the village of Argyle. Prairie Brook empties into Dougherty Creek, which runs the length of this subwatershed. This subwatershed contains the most wetland acres--1,101 acres.

***Water Resource Conditions***: This moderate-sized trout stream flows from the driftless area of western Green County and joins the East Branch of the Pecatonica River in Lafayette County. Dougherty Creek is fed by three small and three large tributaries including Prairie Brook, a Class II trout stream. The stream flows through small patches of forest, cropland and wetland, but primarily through pasture where its streambanks suffer severe erosion. The bottom is primarily gravel, silt and muck, and the water is occasionally turbid. Small amounts of fencing and habitat improvement along the stream were completed over the years, but much more needs to be done.

The entire length of Dougherty Creek in Green County is managed for brown trout, although rainbow trout have occasionally been stocked in the past. The stream above Section 20 is considered to be Class II trout water, while that below is primarily Class III. Trout spawning generally takes place within two fish management easements. Forage fish are plentiful throughout the stream, and catfish and carp are found in the lower portions.

Draining an unglaciated valley, Prairie Brook, a small, steep trout stream flows westward to Dougherty Creek. Running primarily through pasture, it has considerable bank erosion, however the steep gradient maintains a sandy bottom with small amounts of gravel and rubble. The water is usually clear. Prairie Brook is fed by runoff, one spring-fed tributary, and two springs, one of which has been impounded for a private fishing pond. This stream is valuable because it provides a source of clear, cold water to Dougherty Creek, another trout stream.

All of Prairie Brook is managed for brown trout, with the lower half being Class II and the remainder Class III. Small flow prevents the establishment of a sustained trout fishery and there is almost a complete annual harvest of trout by fishermen. Therefore, forage fish are generally much more abundant than trout.

***Nonpoint Pollutant Sources***: The amount of phosphorous reaching Dougherty Creek and its tributaries from barnyard runoff is 372 pounds. This is 12 percent of the total phosphorous load in the whole watershed. Six out of 65 active barnyards contribute 57 percent of load in this subwatershed.

Dougherty Creek Subwatershed has the highest delivery of sediment from streambank erosion in the whole watershed with 1,504 tons contributed annually. This is six percent of the total sediment load in the whole watershed. This equates to a rate of 52 tons of

sediment per stream mile. Dougherty Creek and its tributaries also have the most miles of stream in the watershed. Almost 29 miles out of a total 190 miles were inventoried. Upland sediment loading in the Dougherty Creek Subwatershed is 3,653 tons of soil annually. This is 69 percent of the total sediment in the subwatershed and 14 percent of the total sediment in the entire watershed. Cropland alone contributes 2,948 tons, or 81 percent, with pasture and woodland adding another 11 percent.

***Water Resources Objectives***: Objectives are to improve trout fisheries, reduce organic loading, improve fish habitat, reduce erosion by 50 percent, protect and restore wetlands and to improve wildlife habitat. A segment of the creek classified as Cold III will be upgraded to Cold II and another segment will be upgraded from Limited Forage Fishery (LFF) to WWFF.

## MUD BRANCH SUBWATERSHED (MB)

***Description***: Mud Branch (Map 7) has 6,012 acres or seven percent of the watershed. County G runs parallel with Mud Branch Creek along the northern boundary. It drains directly into the Pecatonica River. Apple Branch Subwatershed borders Mud Branch on the south.

***Water Resource Conditions***: Mud Branch is classified as a warm water drainage stream, although there are some good springs feeding into it. It flows southeasterly into the East Branch of the Pecatonica River. Feeder streams are limited to two brooks. Recent surveys indicate that the stream may have possibilities as a marginal trout stream owing to its good water quality and bank cover. However, the lower sections of the stream exhibit heavy bank erosion. Presently, the stream is managed for forage fishes. Most of the floodplain is in meadow and firm pasture with upland hardwoods near the mouth and on the plains.

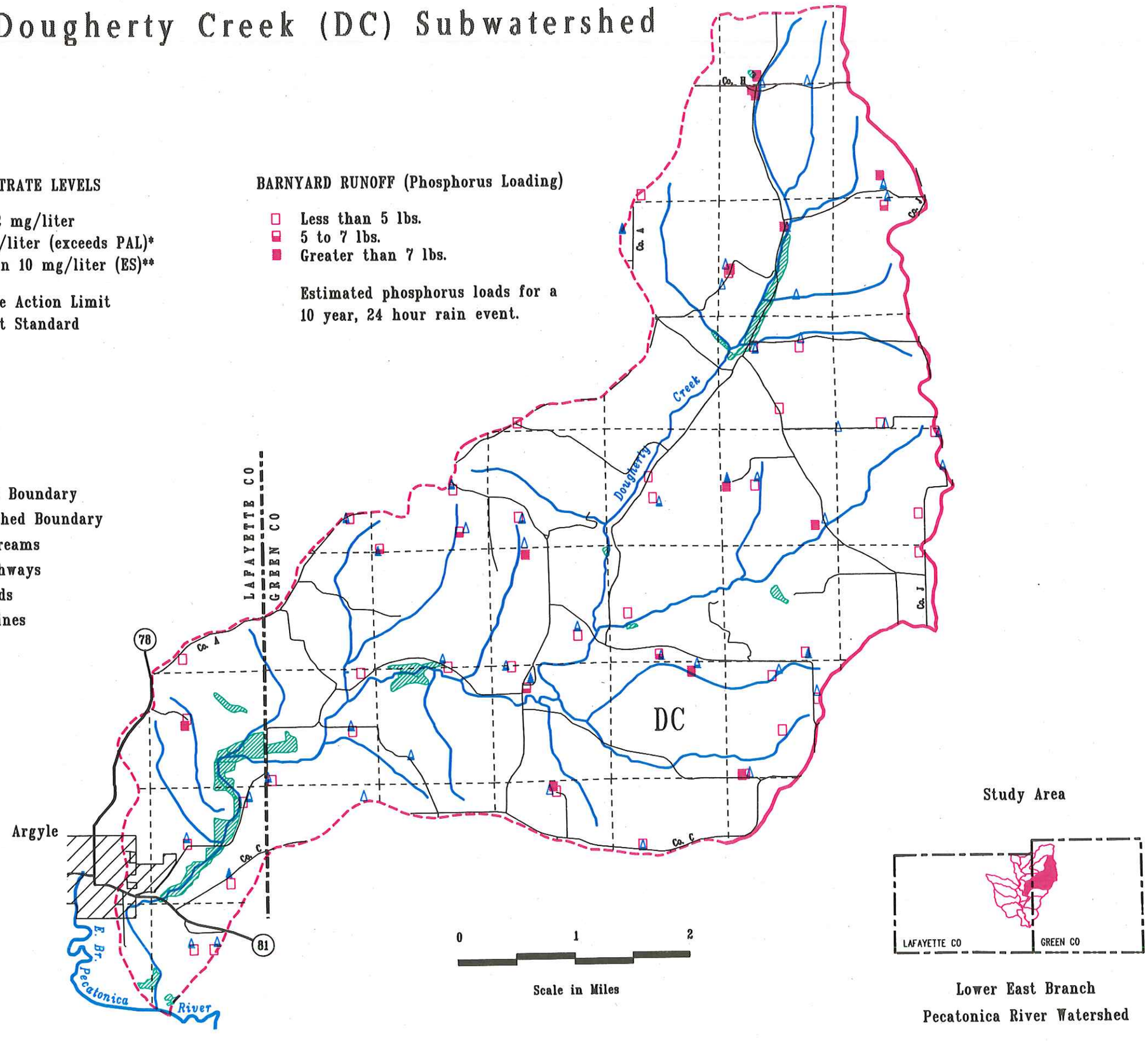
***Nonpoint Pollutant Sources***: There are 26 barnyards in Mud Branch Subwatershed. These barnyards are delivering a total of 130.7 pounds of phosphorus. Of the barnyards inventoried, five are delivering 52 percent of the phosphorus load.

An estimated 20 percent (19,200 feet) of the Mud Branch Creek is either eroded, trampled or slumping. Eroded sites along Mud Branch Creek are delivering 464 tons of sediment annually.

Cropland accounts for 51 percent of the land use but contributes 77 percent of the upland sediment reaching the surface waters of the Mud Branch Subwatershed. Mud Branch contributes 1,070 tons of sediment which is six percent of the upland sediment in the entire watershed.

***Water Resources Objectives***: Objectives are to improve trout fisheries, improve trout habitat, reduce organic loading, and erosion by 50 percent, to protect and restore wetlands and to improve wildlife habitat. A segment of Mud Branch will be upgraded from Cold III to Cold II.

# Map 6: Groundwater Nitrate Levels and Barnyard Runoff Results in the Dougherty Creek (DC) Subwatershed



## APPLE BRANCH SUBWATERSHED (AB)

***Description***: Apple Branch Subwatershed (Map 7) consists of 5,900 acres or seven percent of the watershed. Apple Branch Creek drains into Whiteside Creek in its lower southeastern corner. Highway 81 runs east and west through the subwatershed. Mud Branch Creek borders to the north and Whiteside borders to the south.

***Water Resource Conditions***: Apple Branch is a spring-fed trout stream which flows easterly into Whiteside Creek. The bottom type is about half rubble and half gravel. It abounds with forage fishes of varied species. Rainbow and brown trout are common and brook trout are present. Presently, it is stocked annually with fingerling brown trout. Most of the watershed is in pasture or crops.

***Nonpoint Pollutant Sources***: Apple Branch Subwatershed contains 31 barnyards which are the source of 308 pounds of phosphorus. Six yards account for 82 percent of the total phosphorus load being delivered to the creek. Phosphorus is an indication of organic and oxygen demanding substances that are being delivered to streams.

In the Apple Branch Subwatershed 383 tons of sediment are eroded annually from approximately 20,757 feet of streambank. Forty-one percent of the erosion occurring in this subwatershed is from only five sites.

Runoff from upland sources in the Apple Branch Subwatershed generates 1,087 tons of sediment annually. Most of the sediment (81 percent) is derived from cropland. Pastures add another 15 percent, or 160 tons. Apple Branch upland sources account for six percent of the total watershed sediment load.

***Water Resource Objectives***: Objectives are to improve trout fisheries, improve stream habitat, reduce erosion by 50 percent, reduce organic loading, protect and restore wetlands and to improve wildlife habitat. A segment of the Apple Branch is targeted to upgrade current stream classification from Cold III to Cold II, another segment will be upgraded from Warm Water Forage Fishery (WWFF) to Cold Water Fishery (Cold).

## WHITESIDE CREEK SUBWATERSHED (WC)

***Description***: Whiteside Creek (Map 8) is one of the larger subwatersheds with 6,554 acres, this is approximately seven percent of the total watershed. The unincorporated community of Lamont is located in the very north western corner of this subwatershed. County D runs north/south along the western boundary. Apple Branch and Cherry Branch Subwatersheds lie on the northern and southern boundaries respectively. Whiteside Creek crosses Highway 78 and drains directly into the Pecatonica River on the eastern side of this subwatershed.

***Water Resource Conditions***: Whiteside Creek is a warm water drainage stream flowing easterly into the East Branch of the Pecatonica River. About two miles above its mouth Whiteside Creek is joined by Apple Branch which contributes 42 percent of Whiteside Creek's base flow. Not far from its headwaters the stream forks into two branches which are nearly equal in size. The land use in the watershed is primarily agricultural with

meadow and firm pasture in the floodplain with woodlands and crops on slopes and ridge tops. Gravel is the bottom type commonly found throughout with rubble and silt present in some sections. Moderate bank erosion is common throughout, and severe flooding occurs after periods of heavy precipitation and during the spring thaw. Throughout its length, except in the upper extremities, deep pools and stretches of fairly deep water characterize the stream. Presently, it is managed for smallmouth bass which are common. Largemouth bass, channel catfish, and brown trout are also present.

***Nonpoint Pollutant Sources***: Twenty-eight barnyards in Whiteside Creek Subwatershed were inventoried and found to be delivering 366 pounds of phosphorus to surface waters. Eighty-eight percent of the total pounds of phosphorus is coming from only nine barnyards. Whiteside Creek ranks fourth in runoff from barnyards.

A total of 135,725 feet of streambank were inventoried in Whiteside Creek Subwatershed. Annually, 858 tons of soil are eroding from approximately 22,291 feet of Whiteside Creek.

The Whiteside Creek Subwatershed delivers 1,303 tons of sediment from uplands annually. This is just over seven percent of the entire watershed load. Cropland supplies 1,076 tons (83 percent) and pastureland contributes another 155 tons. Cropland covers only 62 percent of the land area.

***Water Resources Objectives***: Objectives are to improve warm water fisheries, reduce organic loading and erosion by 50 percent, protect and restore wetlands and improve wildlife habitat.

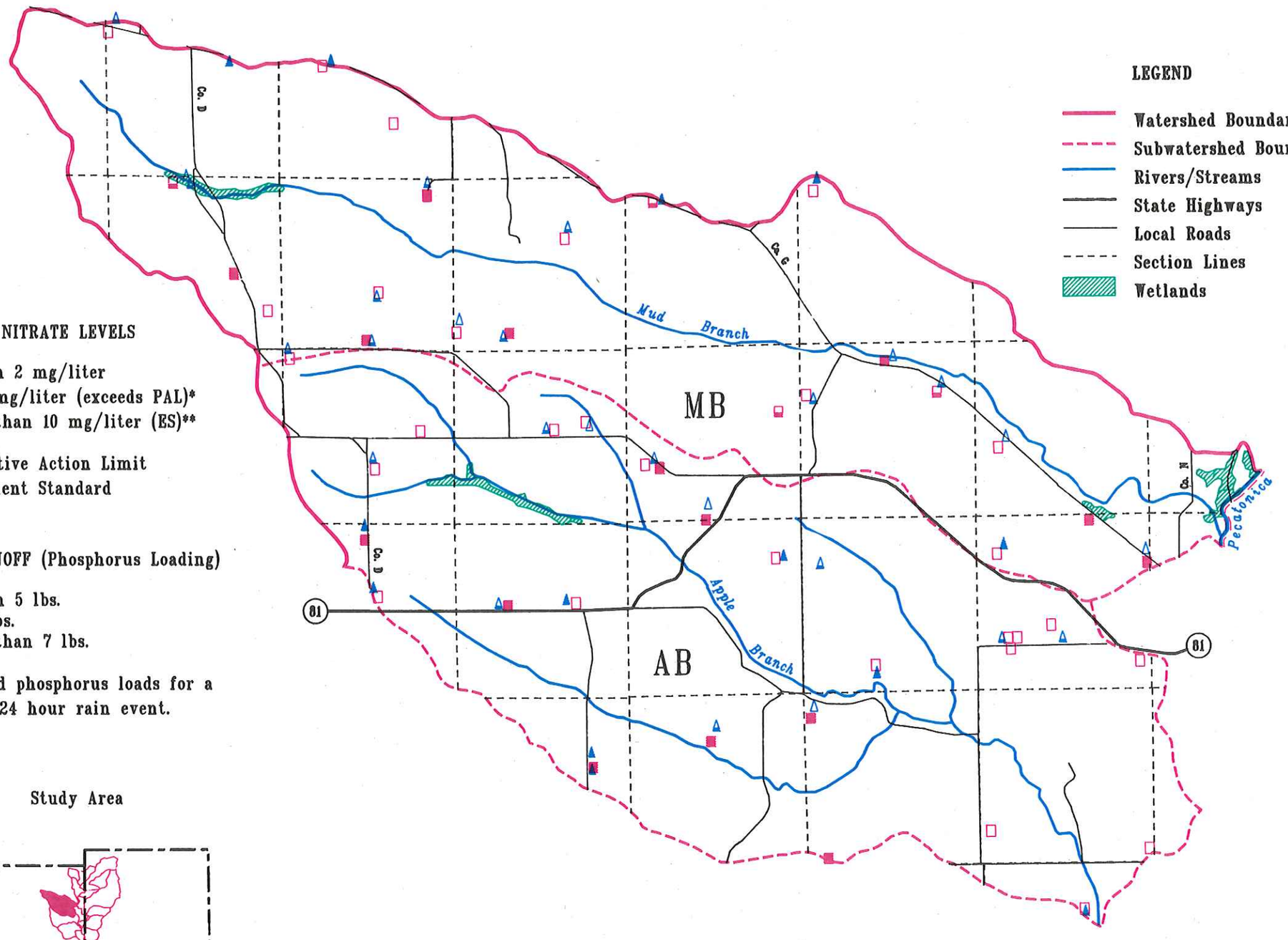
## CHERRY BRANCH SUBWATERSHED (CB)

***Description***: Total acres for Cherry Branch (Map 8) is 5,797 or seven percent of the watershed. Sixty-eight percent of the land in Cherry Branch is in cropland. Highway 126 borders Cherry Branch to the west while Whiteside Creek lies to the north. Cherry Branch Subwatershed is located in the southwestern corner of the watershed. Cherry Branch Creek drains directly into the Pecatonica River.

***Water Resource Conditions***: In the past Cherry Branch was classified and managed as a trout stream because of its spring-fed character. Current management is for forage fishes. Reevaluation is in order since there are several good feeder springs which are located in its direct drainage area. With favorable survey results, this stream may once again be stocked. In general, bottom types consist of silt in the lower one-third and gravel in the upper two-thirds. The extent of erosion varies from light to moderate. Over half of the watershed area is used for agricultural purposes. Flowing in an easterly direction, Cherry Branch empties into the East Branch of the Pecatonica River.

***Nonpoint Pollutant Sources***: Cherry Branch Subwatershed contains 36 active barnyards. Total phosphorus load from these yards is 460 pounds. This is the highest load of all of the subwatersheds. Eleven barnyards are contributing 81 percent of the pollutants.

# Map 7: Groundwater Nitrate Levels and Barnyard Runoff Results in the Mud Branch (MB) and Apple Branch (AB) Subwatersheds




**GROUNDWATER NITRATE LEVELS**

- Less than 2 mg/liter
- 2 to 10 mg/liter (exceeds PAL)*
- Greater than 10 mg/liter (ES)**

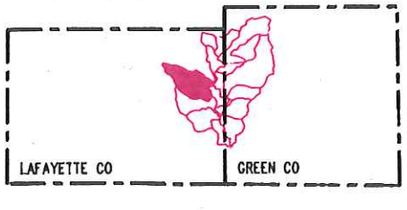
*Preventative Action Limit
**Enforcement Standard

**BARNYARD RUNOFF (Phosphorus Loading)**

- Less than 5 lbs.
- 5 to 7 lbs.
- Greater than 7 lbs.

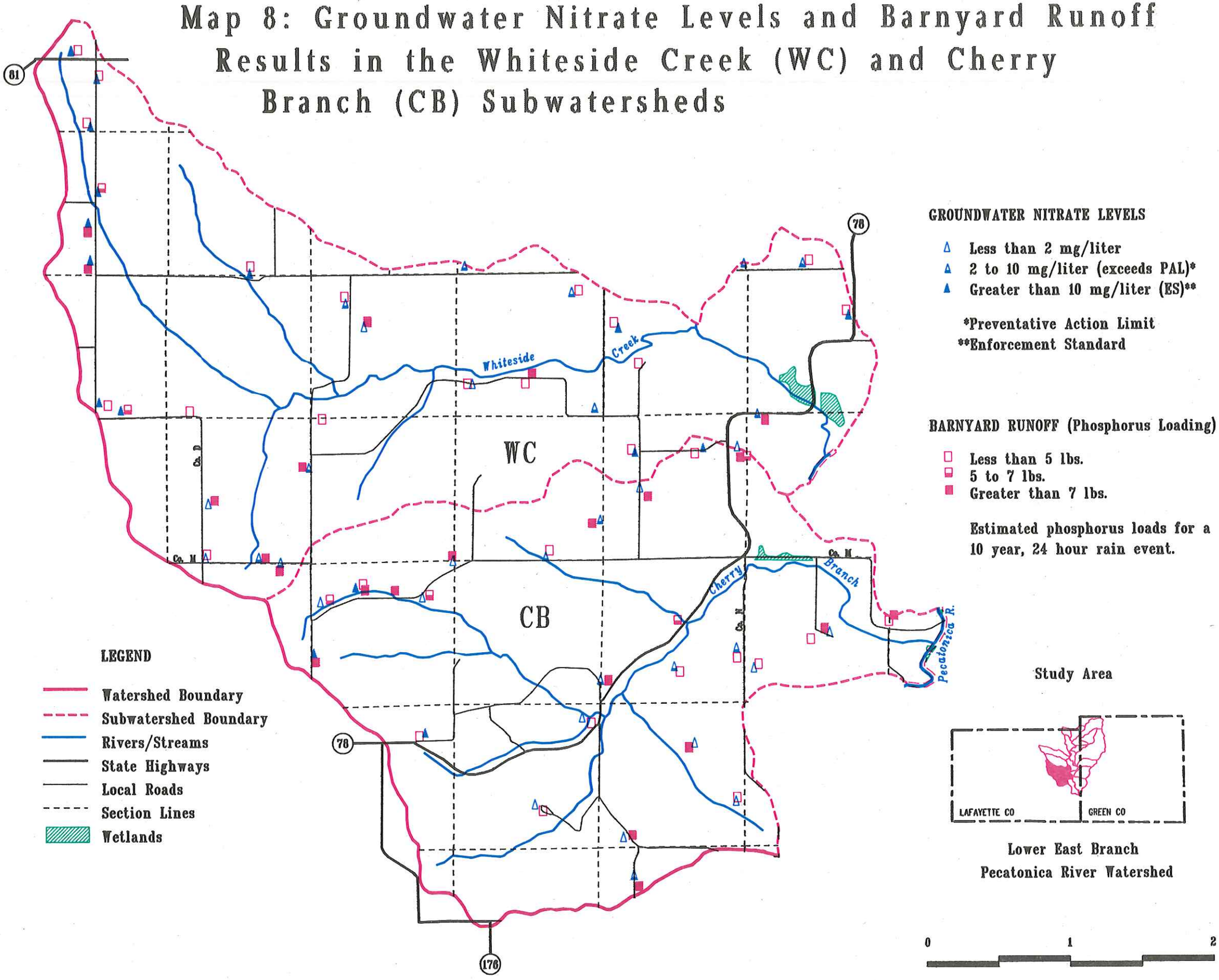
Estimated phosphorus loads for a 10 year, 24 hour rain event.

Study Area




Lower East Branch Pecatonica River Watershed

# Map 8: Groundwater Nitrate Levels and Barnyard Runoff Results in the Whiteside Creek (WC) and Cherry Branch (CB) Subwatersheds



A total of 85,700 feet of streambank was surveyed in the Cherry Branch Subwatershed. Annually, 879 tons are eroded from approximately 24,200 feet or 28 percent of the total length inventoried. This is the third highest amount of sediment lost in the entire watershed.

The Cherry Branch Subwatershed contributes 1,021 tons of upland sediment per year to the Lower East Branch Pecatonica water system. Cropland accounts for 80 percent of this load, or 816 tons, pastures add 11 percent and farmsteads five percent. Upland sediment from Cherry Branch is less than 6 percent of the entire watershed load.

***Water Resources Objectives***: Objectives are to reduce erosion and turbidity, reduce organic loading, increase aquatic diversity, protect and restore wetlands and improve wildlife habitat. The current stream classification of WWFF will be upgraded to COLD.

## ARGYLE SUBWATERSHED (AE & AW)

***Description***: The Argyle Subwatershed (East and West) (Map 9) lies in the geographic center of the Lower East Branch Pecatonica Watershed with 10 other subwatersheds bordering it. The Argyle Subwatershed contains 5,332 acres of land, of which 2,719 acres is cropland. A flood control dam interrupts the flow of the Lower East Branch Pecatonica River at the village of Argyle. Numerous unnamed oxbow lakes and wetland sites are located along the Lower East Pecatonica, with many well-traveled highways and a railway transecting this subwatershed.

***Water Resource Conditions***: Unnamed spring-fed streams drain this subwatershed and empty into the Lower East Branch Pecatonica River. The actual surface waters represent an insignificant resource and therefore have not been appraised.

***Nonpoint Pollutant Sources***: The Argyle Subwatershed contains 19 livestock operations from which about 65 pounds of phosphorous are added to the surface waters during the 10-year, 24-hour rainfall event (4.2 inches). This is less than two percent of the total organic load in the entire watershed.

The Argyle Subwatershed contributes four percent of the upland sediment load for the entire watershed at 1,155 pounds. Seventy-six percent of this load (841 pounds) is from cropland. Nine percent is from residential, the highest amount in the whole watershed.

***Water Resource Objectives***: To improve wildlife habitat and to protect and restore wetlands.

## BRAEZELS BRANCH SUBWATERSHED (BB)

***Description***: Braezels Branch (Map 10) is relatively small containing 4,058 acres or about 4.6 percent of the total watershed area. Braezels Branch stream runs the length of the subwatershed and drains into the Lower East Pecatonica River. Dougherty Creek Subwatershed bounds Braezels to the north and Trotter Branch Subwatershed on the south.

***Water Resource Conditions***: Flowing westward primarily through pastureland, this small cold water stream enters Lafayette County and converges with the East Branch of the Pecatonica River. The streambed is composed of sand and silt although some gravel and rubble are present. Spring floods scour the creek leaving insufficient cover for trout.

***Nonpoint Pollutant Sources***: Braezels Branch Subwatershed contains 18 barnyards. These barnyards contribute 147 pounds of phosphorous or five percent of the entire load in the watershed. Three barnyards supply 69 percent of the load.

The streambank erosion rate in Braezels Branch Subwatershed is an average of 19 tons per mile. The total sediment delivered is 125 tons. Twenty-four percent of the streambank has been either eroded, trampled by livestock, or slumped into the creek.

The Braezels Branch Subwatershed adds 735 pounds of sediment to the watershed, or about four percent of the upland sediment load. Sixty-seven percent is derived from cropland and another 22 percent from pasture and grazed woodland.

***Water Resources Objectives***: Objectives are to improve wildlife habitat, increase diversity of forage species, protect and restore wetlands and to reduce bank erosion. A segment of Braezels Creek will be upgraded from a WWFF to Cold.

## TROTTER BRANCH SUBWATERSHED (TB)

***Description***: Trotter Branch (Map 10) and Jockey Hollow Creeks drain the subwatershed as these streams flow easterly and exit into the Lower East Pecatonica River. The subwatershed consists of 4,581 acres of which 62 percent or 2,840 acres are in cropland. Trotter is bounded by Wiota to the south, Braezel to the north and Argyle to the west. Trotter also contains a small portion of the community of Woodford.

***Water Resource Conditions***: This small stream flows westward into Lafayette County and is joined by Jockey Hollow Branch before entering the east branch of the Pecatonica River. The stream flows through pastureland and several cattle yards. Consequently, the water is very turbid. The bottom consists primarily of sand, with gravel and silt in places.

Jockey Hollow Branch is a very small stream which flows westward and joins Trotter Branch just inside the Lafayette County line. The watershed is mostly cropland, but there are a few small patches of hardwood forest in the headwaters. The stream is flat with a sandy bottom and very little in-stream cover.

***Nonpoint Pollutant Sources***: Trotter Branch Subwatershed has 24 barnyards generating 22 pounds of phosphorous. Five of the 24 barnyards in the subwatershed contribute 70 percent of the organic load. Trotter Branch accounts for seven percent of the total phosphorous load reaching the Lower East Branch Pecatonica River system.

Trotter Branch Subwatershed contributes 210 tons of streambank sediment per year or less than four percent of the total load in the entire watershed. Eighty-one percent of the 10,036 feet of degraded streambank are eroded and the remainder mostly trampled.