GREEN COUNTY

LAND AND WATER RESOURCE MANAGEMENT PLAN

May 2021

Green County Land and Water
Resource Management Plan
was developed by the
Green County
Land and Water Conservation Department
under the administrative leadership of the
Green County
Land and Water Conservation Committee

Kristi Leonard, Chair
Jeff Williams, Vice-Chair
Oscar Olson
Erica Roth
Nick Hartwig
Dudley Timm

Green County
Land and Water Conservation Department

Todd Jenson, County Conservationist
Tonya Gratz, Soil Conservationist
Austin Loeffelholz, Technician

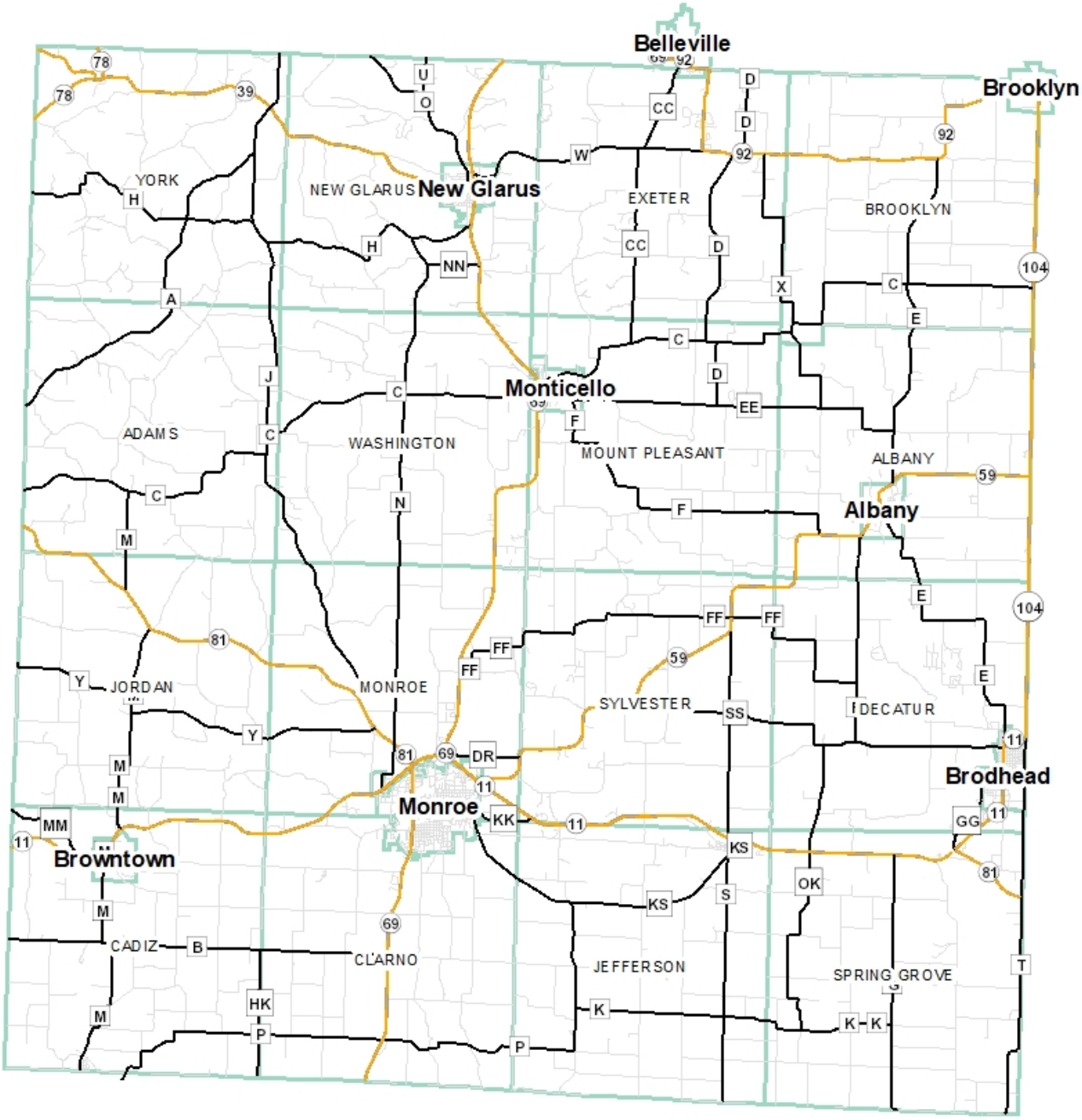
Members of the Local Workgroup

Jason Thomas, NRCS District Conservationist
Teresa Zimmer, FSA County Executive Director
Adam Wiegel, Zoning Administrator
Jackie McCarville, UWEX - Agriculture Agent
Dale Gasser, DNR Water Resources Management Specialist
Mike Gilbertson, DNR Water Resources Management Specialist
Andrew Craig, DNR Water Resources Management Specialist
Camille Bruhn, DNR Water Resources Management Specialist

Members of the Citizens Advisory Committee

Jerry Daniels, Farmer/Producer Led Watershed board member
Hans Justeson, P.E., Surveyor
Norman Williams, Green County Conservation League
Evan Lemanager, Farmer
Scott Timm, Farm Bureau
Ben Huber, Insight FS
Aaron Gifford, County Deer Advisory Committee
Brian Mooney, Agronomist
Joel Nall, Excavator
Mary Schmidt, Farmer
Dustin Williams, Professor at Blackhawk Tech

The Citizens Advisory Committee met on January 19, 2021. The members of the Local Workgroup met on February 19, 2021. A public hearing was held May 6, 2021 at 9:30am at the Green County Courthouse 1016 16th Avenue, Monroe to approve the final draft.



Highways

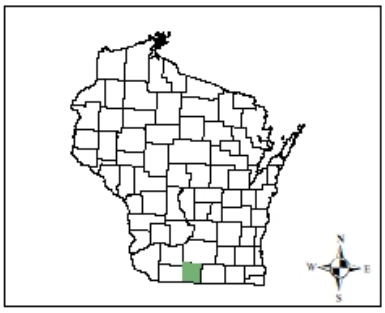
Other Road Class

RoadClass

State Hwy

County Hwy

Civil Townships & Municipalities



Green County Land and Water Conservation Dept. Feb 2021

Executive Summary

In Wisconsin, Counties have been assigned statutory authority to plan and implement conservation programs to meet local needs. State law (Chapter 92 and ATCP 50) requires each county to develop a County Land and Water Resource Management Plan. This plan has been developed to meet those requirements and to serve as a guide for local conservation efforts, administered by County, State, and Federal agencies.

A review of Green County's soil and water resources show that there is a trend in the county to increase agriculture production and wildlife habitat, yet still have space for rural developments. The points of interest in the various DNR watershed reports include reducing non-point source pollution, preserving rural character, groundwater contamination, and wildlife habitat and protection. The watersheds of Green County are shown with maps and special characteristics of individual streams.

The local workgroup set six plan priorities that the Green County LWCD will work on over the next 10 years. They are groundwater protection, nutrient management, soil health, producer led watersheds, CRP/CREP and education. Each priority is explained in detail and has goals listed. This plan's priorities and goals will be accomplished through coordination with local, state, and federal agencies and with the help of private organizations.

The NR151 Agricultural Performance Standards are identified in this plan and an implementation strategy is discussed. There are a variety of soil and water programs through the USDA, DNR and DATCP that offer cost share funds and technical assistance to incorporate and meet NR151 standards.

The components to the local process of implementing NR151 start with defining a priority farm, dispensing information and educating the landowners, and then monitoring and evaluation to assess our progress towards meeting this plan's priorities and goals. Other NR 151 components are: financial considerations within NR151, on site farm visits, documentation and NR151 status report, maintaining public records and landowner notification, technical assistance and cost sharing for voluntary and non-voluntary participation, re-evaluation of parcels for compliance, enforcement actions, and the process for appeal of a non-compliance decision.

By working on the plan's priorities, we will be working towards greater compliance with NR151. The NR151 assessment form and definitions are included in this plan to evaluate landowner's compliance.

Table of Contents

INTRODUCTION 1
Land and Water Resource Management Planning 1

Statutory Authority 1
What is a Land and Water Resource Management Plan? 1
GREEN COUNTY OVERVIEW 2

Geography 2

Soils 3
Green County General Soil Characteristics *3*

1. Dodgeville-Edmund Association 3

2. New Glarus-Sogn Association 3

3. Fayette-Tama Association 3

4. Dunbarton-Whalan Association 3

5. Hebron-Saylesville Association 4

6. Orion-Huntsville-Ettrick Association 4

7. Durand-Myrtle-Rockton Association 4

8. Dickinson-Meridian Association 4
General Soils Map 5
Land Capability Classes 6
Green County 2017 Ag Census Summary 7
Green County Watersheds 8
DNR Priority HUC 12 Watersheds Map 9
Honey and Richland Creeks Watershed Map 10
Honey and Richland Creeks (SP01) 11
East Branch Richland Creek 11
Hawthorne Creek 11
Honey Creek 11
Little Richland Creek 12
Richland Creek 12
Spring Creek 13

Thunder Branch……13
Twin Grove Branch……13
Whitehead Creek……13
Jordan and Skinner Creeks Watershed Map……..15
Jordan and Skinner Creeks (SP02) 16
Argus School Branch 16
Buckskin School Creek..... 16
Bushnell Creek..... 17
Jordan Creek 17
Pecatonica River 17
Skinner Creek 18
Smock Creek..... 18
Winn Creek 18
Zanders Creek 18
Lower East Branch Pecatonica Watershed Map……...19
Lower East Branch Pecatonica River (SP03) 20
Braezels Branch 20
Dougherty Creek……..……20
Erickson Creek……...21
Jockey Hollow Branch……...21
Prairie Brook……..…22
Sawmill Creek……22
Trotter Branch……23
Gordon Creek Watershed Map……..24
Gordon Creek Watershed (SP05)……...25
Lower Sugar River Watershed Map...……...26
Lower Sugar River (SP11)…….....27
Green Drainage System 27
Juda Branch..... 27
North Fork Juda Branch..... 28
Oakley Branch 28
OK Creek 29
Riley School Branch 29
Spring Creek 30
Sugar River 31
Sylvester Creek 31
Lower Sugar River Watershed Map……..33
Lower Middle Sugar River (SP12)……34
Marsh Creek..... 34
Norwegian Creek 34
Searles Creek 35
Sugar River 35
Allen Creek & Middle Sugar River Watershed Map……36
Allen Creek and Middle Sugar River (SP13)……37
Allen Creek 37
Gill Creek..... 37
Liberty Creek 38

Ross Crossing Creek 38
Albany Lake (Lake Winnetka) 38
Little Sugar River Watershed Map……39
Little Sugar River (SP14)……..40
Burgy Creek 40
Elmer School Branch 40
Hammerly Creek 40
Hefty Creek 41
Hefty Creek (Center Branch) 41
Hefty Creek (South Branch) 41
Hustad Valley Creek 41
Krieg Valley Creek 42
Lake Montesian……..44
Legler School Branch 42
Little Sugar River 43
Little Sugar River – West Branch 43
Pioneer Valley Creek 44
Silver School Branch 44
Spring Valley Creek 44
Ward Creek 45
Detailed charts for Impaired Waters in Watershed (SP01) 46
Impaired Waters in Watershed (SP02) 47
Impaired Waters in Watershed (SP03) 47
Impaired Waters in Watershed (SP11) 498
Impaired Waters in Watershed (SP12) 49
Impaired Waters in Watershed (SP13) 49
Impaired Waters in Watershed (SP14) 489
WORKGROUP PRIORITIES 51
1. Nutrient Management……51
Cost Shared NMPs in Green County Map……54
Green County Manure Storage Structures Map……55
2. Groundwater Protection……56
Green County Well Abandonment Inventory Map……57
Green County New Wells Permitted Since 9/2008 Map……...58
Green County Bedrock Geology Map……...59
Green County Depth to Bedrock Map……...60
Green County Water Table Map……61
Green County Groundwater Recharge Map……..62
Green County Groundwater Susceptibility Map……63
Five Year UWEX Groundwater Quality Trend Project …….....64
3. Soil Health/Cover Crops……66
4. Producer-led Watersheds……...69
Farmers of the Sugar River Map……70
Producer-led Watershed Groups in Green County Map……71
5. CREP/CRP……72
6. Education……...73
NR 151 Performance Standards 74

Best Management Practices (BMPs) 76
Local Implementation 76
Local Process Components 78
Definition of a Priority Farm 78
Information and Educational Activities 78
Monitoring and Evaluation 78
Financial Considerations Within NR 151 79
On Site Farm Visits 79
Documentation and NR 151 status report: 80
Maintaining Public Records and Landowner Notification 80
Technical Assistance & Cost Sharing To Install BMPs (Conservation Practices) 80
Re-evaluate Parcel for Compliance 81
Enforcement Action 81
Process for Appeal of Non-Compliance Decision 82
Where Does Implementation Start/Setting Inter-Departmental Priorities? 82
Response to Public Complaints Alleging Noncompliance 82
First five-year work plan 83
Priority 1: Nutrient Management Planning 83
Priority 2: Groundwater Protection 83
Priority 3: Soil Health 84
Priority 4: Producer-led Watersheds 85
Priority 5: CRP/CREP 85
Priority 6: Education 86
Inventory and Evaluation Form 89
Definitions used in NR 151 Evaluation 91

INTRODUCTION

Land and Water Resource Management Planning

In 1996, the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) proposed that conservation professionals come up with a list of changes that would improve soil and water conservation programs. In October of that year, the Wisconsin Land and Water Conservation Association (WLWCA) and the Wisconsin Association of Land Conservation Employees (WALCE) developed a document entitled "Recommendations for Wisconsin's Nonpoint Source and Soil and Water Resource Programs". The document you are reading is a third update to our 1999 Land and Water Resource Management Plan. The primary goal of the Land and Water Resource Management Plan is to allow for the setting of priorities at the local level to improve water quality by reducing sedimentation and nutrient loading to waters of the State of Wisconsin.

Statutory Authority

Through the 1997 Wisconsin Act 27, (1997-1999 Biennial Budget), land and water resource management plans became a reality. Chapter 91.10 of State Statutes was amended to create a county land and water resource management planning program. This plan has been prepared to meet the requirements of Wisconsin State Statutes 92.10(6)(a) 1-5. It is required to be reviewed every five years.

What is a Land and Water Resource Management Plan?

This land and water resource management plan is intended to be a working, dynamic document; the major goals of the plans are to:

- Outline a seamless approach for program integration
- Outline and prioritize resource concerns of the county
- Develop a strategy for local partnerships
- Develop an information and education strategy
- Develop a progress tracking system
- Coordinate local, state and federal resources

GREEN COUNTY OVERVIEW

Geography

Green County is situated in south central Wisconsin. It is bordered by Illinois to the south, Lafayette County to the west, Dane County to the North, and Rock County to the east. The square district consists of 374,625 acres or 585 square miles. Of this acreage, 307,000 are currently in farmland with 240,000 acres of it being cropped. The county seat, Monroe, is located in the south-central part of the county.

Green County lies partly in the unglaciated area commonly referred to as the driftless area and partly in the glaciated part of Wisconsin. Most of the western part of the county is in the driftless area. The Pecatonica River and the Sugar River are the two major drainage basins within the county. Most land in Green County was originally covered by a central hardwood forest along with scattered areas of oak savanna, although about one-third was prairie.

A definite ethic of caring for the land has existed in Green County since the first settlers in the early 1800's. However, in the midst of this prosperous agricultural area, the soil, which is the basic resource of agriculture, is being eroded in places faster than it is being replenished.

Cropland soil loss due to sheet and rill erosion currently averages 2.7 tons per acre per year for the county as a whole. The average "T" value of Green County is three. "T" value is the abbreviated form of tolerable soil loss. It represents the rate of sheet and rill erosion which may occur without diminishing the long-term productivity of the soil. Current data shows that 76% of the county is being farmed at or below "T". 94% of Green County landowners participate in USDA programs and they need only meet a soil loss that is two times the average "T" value. This significantly drives up the average soil loss, but any conservation plan revisions are written to "T"- no matter their program participation.

Over one-half of a million tons of soil erosion are presently occurring each year in Green County due to sheet and rill erosion from cropland. Although seemingly massive, this amount of excessive erosion is often hard to detect on a given field in a given year because of the relatively thin layer of soil it represents. Onsite damages from this erosion are mainly in the long-term loss in soil productivity due to changes in soil structure, chemistry, and reduction in thickness. The relatively small annual losses in productivity from this excessive erosion have been masked with improved seed varieties, fertilization, and use of herbicides and pesticides; although, it has cost the farmer extra dollars to make up for the lost natural fertility. Working with landowners to increase the use of no-till planting and cover crops will help curtail this problem.

Soils

Green County General Soil Characteristics

The soils of Green County may be grouped into soil associations. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil. The soils in one association may occur in another, but in a different pattern.

A description of the eight soil associations present in Green County can serve to explain the value and use of the different land areas for agriculture and other purposes. Each association has somewhat different capabilities for agriculture and requires generally different management practices.

1. Dodgeville-Edmund Association

Moderately deep to shallow, nearly level to moderately steep soils that have a clayey subsoil; underlain by dolomite bedrock.

This association is in the central and northwestern parts of the county. It consists of gently sloping to moderately steep soils on uplands and silty valley fill.

The association covers about 15 percent of the county.

2. New Glarus-Sogn Association

Moderately deep to shallow, gently sloping to moderately steep soils, some of which have a clayey subsoil; underlain by dolomite or sandstone.

This association is mostly in the northern and western parts of the county. It consists of gently sloping to very steep soils on uplands and gently sloping soils made up of valley fill. Soils in this association are moderately deep to shallow over dolomite or sandstone.

This association occupies about 43 percent of the county.

3. Fayette-Tama Association

Deep, nearly level to sloping soils that have a silty subsoil and substratum, on benches in valleys.

This association is west of the Sugar River, south of Albany, and west of Brodhead. It is on a high bench left by the glacial Sugar River as it meandered across the valley.

This association occupies about 3 percent of the county.

4. Dunbarton-Whalan Association

Shallow and moderately deep, gently sloping to moderately steep soils that have a loamy and clayey subsoil over loam till; underlain by dolomite.

This association is mostly in the southern one-third of the county on uplands and high benches. Slopes are gently sloping to moderately steep. Many different kinds of soils formed in many different kinds of materials in this association. Except for major soils, however, the proportion of each individual soil is relatively small in respect to the overall association.

This association covers about 14 percent of the county.

5. Hebron-Saylesville Association

Deep, nearly level to gently sloping soils that have a loamy and clayey subsoil and substratum; in basins that were formerly lakes.

This association is on very low to high benches in old lake basins. It is mostly in the Sugar River valley east of Albany and north of Brodhead. Another very small area is southwest of Browntown.

This association occupies about 1 percent of the county.

6. Orion-Huntsville-Ettrick Association

Deep, nearly level and gently sloping soils that are silty throughout; on flood plains and in low areas.

This association is on low benches and bottoms in stream valleys throughout the county. The soils are subject to flooding.

The association covers about 14 percent of the county.

7. Durand-Myrtle-Rockton Association

Moderately deep and deep, gently sloping to moderately steep soils that have a loamy subsoil and substratum; on glaciated uplands.

This association is in the southern part of the county on uplands and high benches. The soils are gently sloping to moderately steep. Natural vegetation is prairie grasses. Many different kinds of soil formed in many different kinds of material in this association. Except for major soils, however, the proportion of each individual soil is relatively small in respect to the overall association.

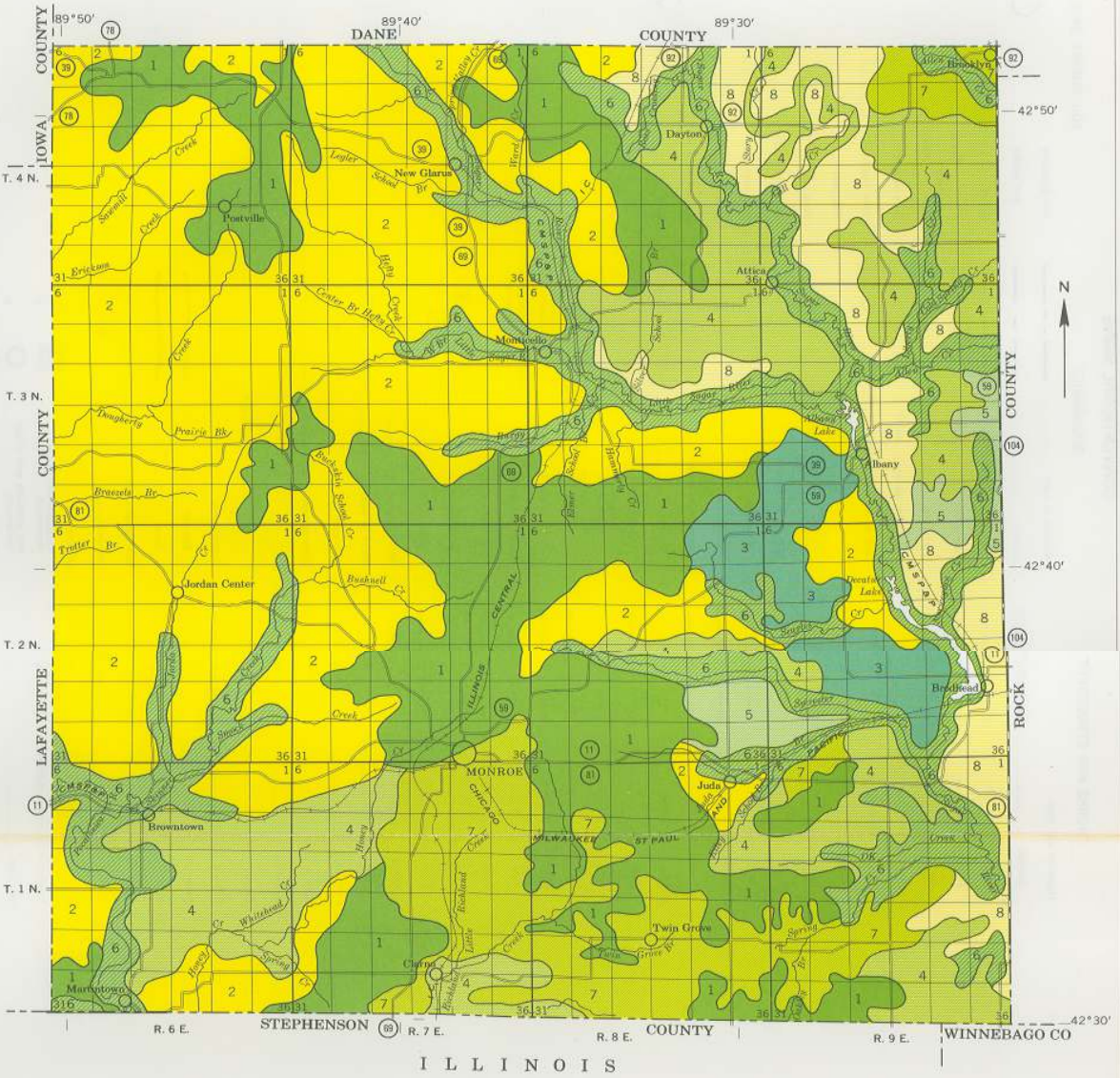
This association covers about 6 percent of the county

8. Dickinson-Meridian Association

Deep, nearly level to sloping soils that have a loamy subsoil; underlain by outwash sand or sand and gravel.

This association is on benches of Sugar River, Allen Creek, Story Creek, and Little Sugar River. Slopes are predominantly nearly level and gently sloping.

This association occupies about 4 percent of the county.



SOIL ASSOCIATIONS

1 — Dodgeville-Edmund association: Moderately deep to shallow, nearly level to moderately steep soils that have a clayey subsoil; underlain by dolomite bedrock

2 — NewGlarus-Sogn association: Moderately deep to shallow, gently sloping to moderately steep soils, some of which have a clayey subsoil; underlain by dolomite or sandstone

3 — Fayette-Tama association: Deep, nearly level to sloping soils that have a silty subsoil and substratum; on benches in valleys

4 — Dunbarton-Whalan association: Shallow and moderately deep, gently sloping to moderately steep soils that have a loamy and clayey subsoil over loam till; underlain by dolomite

5 — Hebron-Saylesville association: Deep, nearly level to gently sloping soils that have a loamy and clayey subsoil and substratum; in basins that were formerly lakes

6 — Orion-Huntsville-Ettrick association: Deep, nearly level and gently sloping soils that are silty throughout; on flood plains and in low areas

7 — Durand-Myrtle-Rockton association: Moderately deep and deep, gently sloping to moderately steep soils that have a loamy subsoil and substratum; on glaciated uplands

8 — Dickinson-Meridian association: Deep, nearly level to sloping soils that have a loamy subsoil; underlain by outwash sand or sand and gravel

Compiled 1972

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

UNIVERSITY OF WISCONSIN, DEPARTMENT OF SOIL SCIENCE;
WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY;
AND WISCONSIN AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

GREEN COUNTY, WISCONSIN

Scale 1:190,080

1 0 1 2 3 4 Miles

Land Capability Classes

A widely used system of classification of soils primarily for agricultural purposes is called "land capability classification". This system is based on the most intensive longtime use for agricultural land; site, surface and subsoil characteristics; soil limitations for safe use in crop production; and conservation practices for most intensive longtime land use needed to correct limitations and/or potential soil management problems, serve as classification criteria. In this classification system, soils are grouped according to their potential and limitations (if any) for sustained production of common crops. This classification system places all soils in eight capability classes. This risk of soil damage or limitations in use becomes greater in progressing from Class I thru Class VIII. Soils in Classes I, II, III, and IV, with good soil conservation management, are suited for cultivation. Soils in Classes V, VI, and VII, with good soil conservation management, are suited for pasture, woodland and wildlife. Soils in Class VIII generally are non-productive for agricultural purposes and are recommended for wildlife habitat.

CAPABILITY CLASSIFICATION BY ACREAGE

Capability Class	Total Acres	% of County
I	6,259	1.7%
II	127,855	34.1%
III	107,187	28.6%
IV	71,399	19.1%
V	1,915	0.5%
VI	31,057	8.3%
VII	28,515	7.6%
VIII	112	0.03%

2017 CENSUS OF AGRICULTURE *County Profile*

Green County
Wisconsin

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	1,428	-8
Land in farms (acres)	292,368	-3
Average size of farm (acres)	205	+5
Total	($)	
Market value of products sold	221,048,000	+10
Government payments	3,648,000	-42
Farm-related income	10,418,000	-56
Total farm production expenses	188,234,000	-4
Net cash farm income	46,879,000	+35
Per farm average	($)	
Market value of products sold	154,796	+19
Government payments (average per farm receiving)	5,388	-19
Farm-related income	13,121	-50
Total farm production expenses	131,816	+4
Net cash farm income	32,829	+46

2 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	42
Livestock, poultry, and products	58

Land in Farms by Use (%) *

Cropland	82
Pastureland	6
Woodland	8
Other	5

Acres irrigated: 3,005
1% of land in farms

Land Use Practices (% of farms)

No till	30
Reduced till	27
Intensive till	17
Cover crop	12

Farms by Value of Sales

	Number	Percent of Total *
Less than $2,500	504	35
$2,500 to $4,999	98	7
$5,000 to $9,999	110	8
$10,000 to $24,999	123	9
$25,000 to $49,999	72	5
$50,000 to $99,999	131	9
$100,000 or more	390	27

Farms by Size

	Number	Percent of Total *
1 to 9 acres	172	12
10 to 49 acres	454	32
50 to 179 acres	382	27
180 to 499 acres	279	20
500 to 999 acres	92	6
1,000 + acres	49	3

USDA United States Department of Agriculture
National Agricultural Statistics Service
www.nass.usda.gov/AgCensus

Green County
Wisconsin, 2017
Page 2

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**221,048**	**19**	**72**	**440**	**3,077**
Crops	**92,237**	**12**	**72**	**615**	**3,073**
Grains, oilseeds, dry beans, dry peas	80,175	8	72	490	2,916
Tobacco	-	-	6	-	323
Cotton and cottonseed	-	-	-	-	647
Vegetables, melons, potatoes, sweet potatoes	2,262	30	72	526	2,821
Fruits, tree nuts, berries	343	42	71	783	2,748
Nursery, greenhouse, floriculture, sod	928	44	71	879	2,601
Cultivated Christmas trees, short rotation woody crops	-	-	64	-	1,384
Other crops and hay	8,510	7	72	303	3,040
Livestock, poultry, and products	**128,811**	**22**	**72**	**380**	**3,073**
Poultry and eggs	129	43	72	983	3,007
Cattle and calves	27,701	23	72	566	3,055
Milk from cows	98,867	16	68	88	1,892
Hogs and pigs	523	21	71	643	2,856
Sheep, goats, wool, mohair, milk	1,432	6	70	121	2,984
Horses, ponies, mules, burros, donkeys	109	35	69	1,386	2,970
Aquaculture	-	-	52	-	1,251
Other animals and animal products	50	53	70	990	2,878

Total Producers [c]	**2,443**
Sex	
Male	1,515
Female	928
Age	
<35	188
35 – 64	1,543
65 and older	712
Race	
American Indian/Alaska Native	1
Asian	2
Black or African American	-
Native Hawaiian/Pacific Islander	-
White	2,435
More than one race	5
Other characteristics	
Hispanic, Latino, Spanish origin	10
With military service	135
New and beginning farmers	471

Percent of farms that:

Have internet access	**83**
Farm organically	**1**
Sell directly to consumers	**7**
Hire farm labor	**29**
Are family farms	**97**

Top Crops in Acres [d]

Corn for grain	88,060
Soybeans for beans	56,347
Forage (hay/haylage), all	52,143
Corn for silage or greenchop	13,577
Wheat for grain, all	4,217

Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	1,282
Cattle and calves	70,376
Goats	3,376
Hogs and pigs	2,514
Horses and ponies	1,575
Layers	6,118
Pullets	571
Sheep and lambs	1,074
Turkeys	173

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

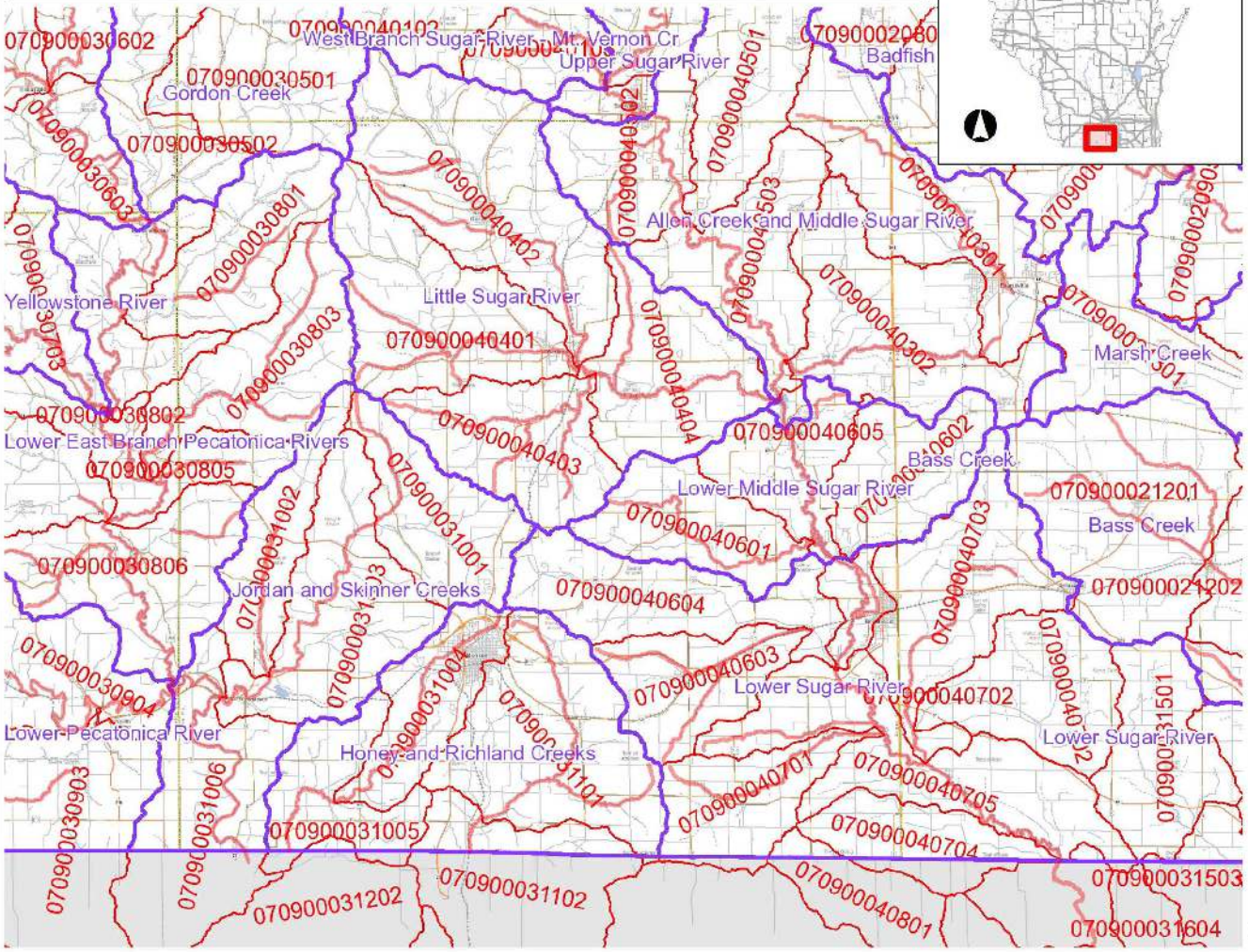
[a] May not add to 100% due to rounding. [b] Among counties whose rank can be displayed. [c] Data collected for a maximum of four producers per farm. [d] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. * Position below the line does not indicate rank. (D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

USDA is an equal opportunity provider, employer, and lender.

Green County Watersheds

The rest of this chapter is devoted to maps and descriptions of the eight different watersheds located in Green County. A chart located at the end of the maps and descriptions lists impaired waters and other pertinent information.

DNR Priority +HUC 12 Watersheds + Impaired Waters



Legend

- Impaired Rivers and Streams
- Impaired Lakes
- DNR Priority Watersheds
- 12-digit HUCs (Subwatersheds)
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

9.9 0 4.93 9.9 Miles

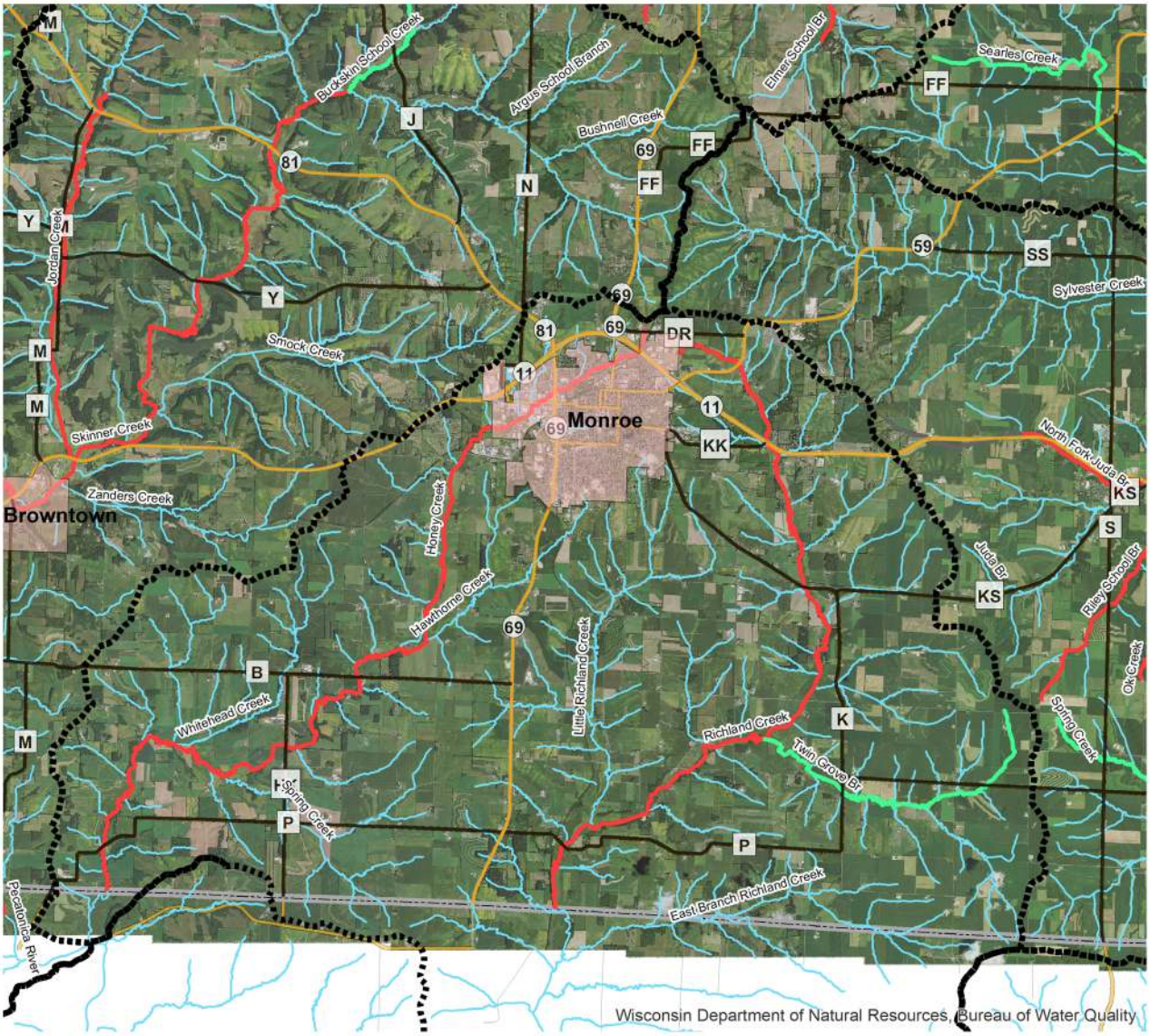
NAD_1983_HARN_Wisconsin_TM

1: 312,449

DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/legal/

Notes

Honey & Richland Creeks Watershed (SP01)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

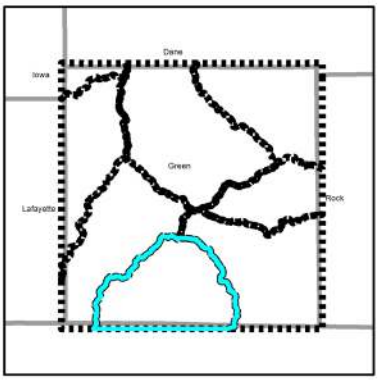
2020 Aerial Photo

Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

0 0.5 1 2 Miles

N W E S



Green County LWCD, April 2021

Honey and Richland Creeks (SP01)

The Honey and Richland Creeks Watershed in south central Green County are primarily agricultural. Basin assessment monitoring of some of the streams in the watershed indicates that agricultural non-point source pollution is a problem.

The Monroe sewage treatment facility discharges to Honey Creek and is the only municipal wastewater discharge to surface water. Four industrial facilities also discharge to surface water in the watershed.

East Branch Richland Creek

The East Branch Richland Creek is a 6 mile long stream near the Illinois border. It originates in Wisconsin, crosses the border for a short while before crossing back again and flowing 3 miles until it crosses back into Illinois and joins Richland Creek some 2.5 miles downstream. Studies conducted in the mid 1970's showed the stream to have a diversity of warm water non-game species, including the Ozark minnow, a threatened species (Fago, 1982). In 2005 a survey was conducted near Five Corners Road to see if the population of Ozark minnows still existed. None were found, but the general assemblage of central stonerollers, southern redbelly dace, fantail darters, common shiner, white sucker and creek chub still existed. Notably missing were the hornyhead chubs and the general abundance of fish. In 2010 a fishery survey was also conducted at this site. It found a similar species assemblage as the 2005 survey.

A site at Freeport Road was also surveyed in 2010. Although the stream was generally narrow and deep with good hard substrate, only a handful of specimens of brook stickleback and white sucker were found, along with 1 black bullhead. Biologists immediately noted the large amount of water cress and suspected that high spring flow might be contributing to low water temperatures of the stream and thus reducing species diversity. Temperature monitoring devices were placed in the stream at the beginning of July. From July through September, the maximum water temperature exceeded 20°C only once and generally stayed below 17°C. The average daily mean temperature was 13.7^{o}C. Water quality biologists and fisheries management should work with the Green County Land and Water Conservation Department (LWCD) to determine if land use, habitat, and water quality are sufficient to explore the possibility of introducing brook trout to this section of stream.

The diversity and number of fish has decreased since the 1970's. Because the habitat and status of the riparian corridor is not explained in the earlier survey, it is difficult to ascertain whether the species assemblage has changed due to degrading habitat conditions, or whether higher groundwater flows experienced over the last decade have contributed to lower water temperatures, thus limiting the species assemblage to some extent.

Hawthorne Creek

This is a small stream that originates on the south side of the city of Monroe. It has an existing use classification as a warm water forage fishery. Habitat in the creek is impaired by stream bank degradation due to grazing (Bush, 2000). No monitoring has been conducted on the stream recently.

Honey Creek

Honey Creek rises on the west side of the city of Monroe. The wastewater treatment plant discharges to the stream. Honey Creek is classified as a warm water sport fishery and contains bass and channel catfish. Recent monitoring has shown that Honey Creek has improved its condition since the 1970's and 1980's. Urban non-point sources of pollution, including increased runoff from urban impervious surfaces such as pavement, add to sedimentation problems in the creek. While the water quality and biota seem to have improved to the point where the stream is supporting its attainable use, there are still several areas that need to be addressed. In 1998, the City of Monroe passed a stormwater retention ordinance. Since then several retention basins have been constructed, vastly reducing the magnitude of flooding on agricultural land downstream of Monroe.

Little Richland Creek

Little Richland Creek begins just south of Monroe and flows 7 miles through farmland and pasture until it joins Richland Creek just east of Clarno. Very little data existed on the fishery assemblage of this stream prior to this survey. One survey done by Fago (1982) showed warm and cool-warm non-game fish in the stream. The species assemblage mirrors that of Richland Creek itself. The lower reaches contain a variety of non-game species as well as smallmouth bass and northern pike. As one travels upstream and the creek gets smaller, there are fewer species. The streams classification model (Lyons, 2008) shows Little Richland Creek to be a cool-warm transitional stream, and indeed this is reflected in the species assemblage. With the exception of the last station just upstream of its confluence with Richland Creek which showed very good cool-warm IBI, much of the rest of Little Richland Creek scored "fair" with the IBI. This rating appears to reflect the condition of the stream as noted by biologists. While there are many areas of the stream corridor with a good buffer, there are also some areas of pasturing and raw banks. The good gradient helps keep some areas of the creek scoured to hard bottom, but there are areas of moderate sediment deposition. The lower half of the stream could likely serve as a smallmouth bass nursery if certain BMPs could help limit the amount of sediment reaching the stream. Overall, Little Richland Creek is a stream with a diversity of non-game fish in fair condition, with potential to be a better resource if nonpoint source pollution can be mitigated.

Richland Creek

Richland Creek is a 14 mile long stream that originates east of Monroe and flows south into Illinois where it joins the Pecatonica River. The creek is considered an Exceptional Resource Water because it has historically been considered one of the best smallmouth bass fisheries in this area. There is very little data to put that into historical perspective. More recent surveys have shown that, while smallmouth bass are present in lower sections of the stream, they are not found in any great numbers. No young-of-the-year or yearling bass were captured in the 2010 surveys. The streams model (Lyons, 2008) indicates that Richland Creek is a cool-cold stream. However, IBIs run on the data generally show Richland Creek to be more of a cool-warm transitional water. Many sections scored "good" for the cool-warm IBI. The furthest downstream section surveyed, just upstream of Little Richland Creek, scored an "excellent" as a cool-warm transitional water as it contained a diversity of species and some gamefish. Except for the site at Blumer Road, the sites in this study were fairly well buffered.

Fisheries management has evaluated the stream to determine if it would benefit from habitat improvement. The fisheries biologist indicates that one of the limiting factors for Richland Creek's smallmouth potential is the lack of deep holes for overwintering populations of fish (Welke, Kurt- personal communication). Another is a lack of in-stream habitat. Large boulders would be beneficial and could be placed in the stream to help give the smallmouth bass some preferential cover. Another limiting factor is that smallmouth bass need dry conditions and low flows during the early summer period coinciding with the period of egg maturation (USGS, 1993). Unfortunately, high precipitation and runoff events over the past several years have not been conducive to smallmouth bass reproduction.

Richland Creek was added to the impaired waters list for total phosphorus in 2014. The 2016 assessments showed continued impairment by phosphorus; total phosphorus sample data exceeded 2016 WisCALM listing criteria for the Fish and Aquatic Life use, however, available biological data did not indicate impairment (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scored in the "poor" condition category). Based on the most updated information, no change in existing impaired waters listing is needed.

Richland Creek, like Little Richland Creek appears to be in fair to good condition based on the IBI scores. With the exception of a few sites, the stream is fairly well buffered. There are some areas of raw banks and streambank erosion, but the bedload of sediment and runoff from agricultural fields is probably a larger issue. As is the case with many streams in the region, Richland Creek would benefit by targeting lands of highest runoff potential with appropriate BMPs.

Spring Creek
Originating near the Illinois-Wisconsin border, this stream flows northwest for 4 miles where it joins Honey Creek. The creek supports a warmwater forage fishery. The stream has habitat impacts due to agricultural non-point source pollution and hydrologic modification.

Thunder Branch
This small, non-navigable tributary to Honey Creek serves as a discharge for stormwater from the west-central part of Monroe. Most of the creek runs in the storm sewer. There are several discharges of non-contact cooling water to the stream via storm sewer. The stream is not officially recognized on the USGS maps, nor does it have a water body identification code. It is classified as a limited forage fish stream. It has not been monitored in recent years.

Twin Grove Branch
This six mile long stream is on the state's list of impaired waters due to habitat degradation caused by sedimentation. Between Rahberger Road and CTH P, the landscape is mainly row crops, with a buffer of grasses, forbs, and shrubs. Upstream of CTH P, the land is pastured, but overall in pretty good shape with lots of sedges making up the riparian corridor. As one approaches the town of Twin Grove, there is a corridor of trees which leads to higher bank erosion. Upstream of Twin Grove Road, the stream flows through a heavily wooded area. The stream is wide and shallow, with much of the bottom covered in silt and clay. A survey conducted upstream of this road showed no fish. However, this heavily wooded corridor is the exception for the riparian corridor on this stream.
Surveys on this stream conducted in 2005 and 2010 showed the stream to contain 10-12 non-game species and dominated by white suckers, creek chubs, and common shiners. Sedimentation is moderate to heavy, especially in the lower sections of the stream with less gradient. The coolwater IBI was 50 or "fair" for both the cool-cold and cool-warm IBI. Assuming this IBI is more indicative of stream conditions as a whole (as compared to the site at Twin Grove Road) it would appear this indicates the stream is closer to maintaining its attainable use than an impaired water might be. However, biologist's qualitative assessment of habitat conditions still suggest there is a high bedload of sediment and that these conditions in the stream may not have improved to the point where it should be taken off the impaired waters list. Twin Grove Branch is part of the Sugar-Pecatonica River Basin and the sediment TMDLs were approved in 2005.

Whitehead Creek
Whitehead Creek is a small stream that joins Honey Creek. The stream is managed as a warm water forage fishery but has not been monitored in the last 10 years. It continues to be impaired by agricultural non-point source pollution and ditching.

Recommendations:

The DNR will continue to work with the City of Monroe to make sure specific elements of the storm water plan are being implemented**.**

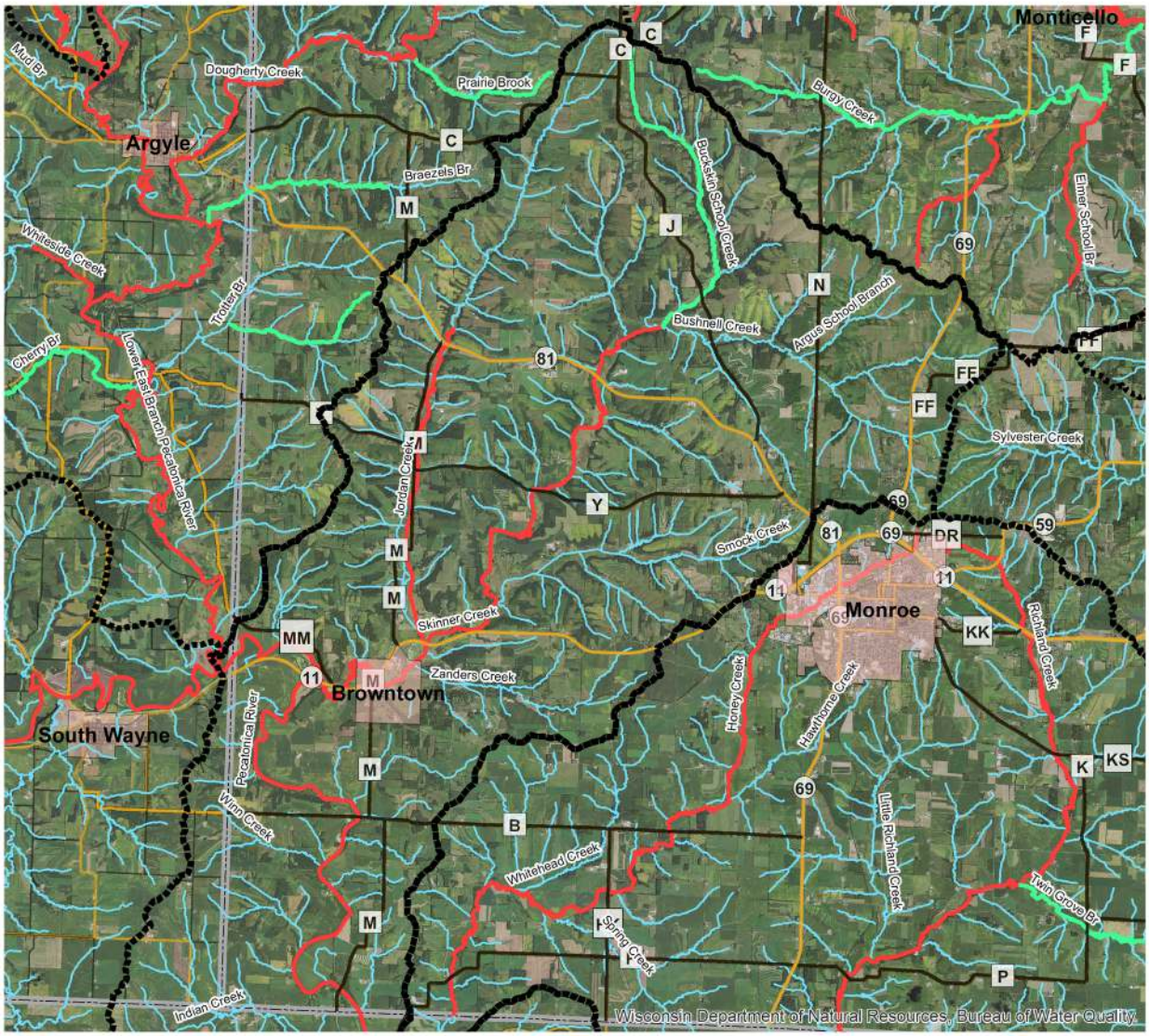
The DNR and LWCD will identify areas in Honey Creek and its tributaries which are not meeting the NR151 standards and prohibitions. The LWCD will approach landowners with alternatives such as rotational grazing, creation of buffers and clean water management, and ensure that farms are in compliance with the standards.

Richland Creek should be considered a high priority candidate for Targeted Runoff Management grant or other non-point source pollution reduction project.

Condition monitoring should be conducted on Thunder Branch to determine the impact on the creek from the point source discharge.

The DNR should monitor the East Branch Richland Creek to track the status of state endangered and threatened species and state species of concern.

Jordan & Skinner Creeks Watershed (SP02)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

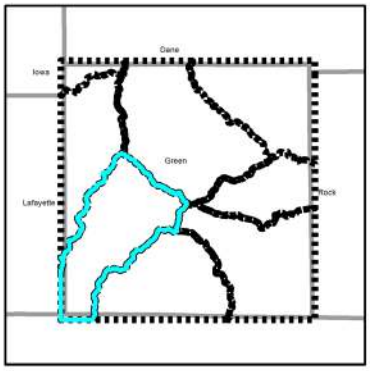
2020 Aerial Photo

Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

0 0.75 1.5 3 Miles

N
W E
S



Green County LWCD, April 2021

Jordan and Skinner Creeks (SP02)

The Jordan and Skinner Creeks Watershed is located in southwest Green County. Agriculture is the dominant land use in the Jordan and Skinner Creeks Watershed. The only surface water permitted point source discharger is the community of Browntown. Little is known about water quality or in-stream habitat in the watershed, though it is assumed polluted runoff affects water quality and in-stream habitat. The major site of publicly owned land in the watershed is the Browntown-Cadiz Springs State Recreation Area.

Argus School Branch

Argus School Branch is a cold or cool-cold water stream that flows southwesterly through the driftless area to Bushnell Creek. While it is classified as supporting warm water sport fish, the lower portion of the creek can likely support a Class II trout fishery. In the past, brown trout were stocked in the lower portion of the stream, but records indicate it has not been stocked since 1997. In 1998, Argus School Branch was placed on the state's 303(d) list of impaired waters because streambank pasturing and cropping practices had led to degradation of habitat and temperature (WDNR, 2003). Since that time, many land use practices have changed with many farms going out of production. Of the 1260 acres in this subwatershed, there currently are only 77 acres (6 %) of land in row crops and no cattle in the watershed (T. Jenson, personal communication). In 2011, a survey was undertaken to determine if Argus School Branch was meeting its attainable use and could be removed from the impaired waters list. The 2011 fishery assemblage indicated this stream is a cold or cool-cold natural community. Instantaneous water temperatures taken on two different days during the fishery assessments were 14.9°C and 15.5°C and showed water temperatures to be well within the definition of a coldwater community (Lyons, 2008). A few trout may make their way up Argus School Branch from trout stocked Bushnell Creek, although limited flow and lack of pool areas likely keeps any significant numbers of trout from populating the stream. The 2011 surveys also found that while habitat is limited, it is sufficient for adult sculpin, which currently inhabit the stream. Land use in the watershed is as favorable to water quality as any in southern Wisconsin. The stream may take some time to move the sediment from the bed and the culvert under CTH N will always cause some accumulation of sediment directly above it. This water was assessed by DNR during the 2014 listing cycle and is recommended for delisting based on habitat survey results indicating that no further management action need be taken. Biological sample data met 2014 WisCALM listing thresholds for the Fish and Aquatic Life use (i.e. macroinvertebrate or fish Index of Biotic Integrity (IBI) average scored in the fair to excellent condition categories). This water was assessed by DNR during the 2018 listing cycle; available biological data do not indicate impairment according to 2018 WisCALM listing criteria for the Fish and Aquatic Life use (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scored in the "poor" condition category).

Buckskin School Creek

Originating in a farm pond, this creek flows southward and joins Bushnell Creek to form Skinner Creek. The creek currently supports warm water forage fish but has the potential to be a Class II trout stream. It is degraded by agricultural non-point source pollution and stream bank erosion. This water is impaired due to sediment pollutants and associated quality impacts.

The six-mile long stream is on the 303(d) list for degraded habitat resulting from sedimentation from agricultural non-point source pollution and stream bank erosion. In 2004, a qualitative habitat stream survey was performed at Buckskin Road, which yielded a score of 191, suggesting "fair" habitat quality. A more thorough habitat evaluation was conducted near the mouth of the stream, at the CTH J crossing, and found that habitat quality for this section of the stream also was "fair" based on substrate composition (50% fines). This creek is part of a sediment TMDL approved in 2005.

Bushnell Creek
This moderate sized trout stream originates from a series of spring fed tributaries north of Monroe and flows westward joining Buskskin School Creek to form Skinner Creek. While the lower 1.2 miles are managed as a warmwater sport fishery, the upper five miles are classified as trout waters. Bushnell Creek is impacted by bank erosion and some riprapping has been done on severely eroding sections.

Jordan Creek
This warm water creek is classified as a default warm water sport fishery stream. During wet years, it receives an influx of game species from the Pecatonica River. However, due to severe agricultural non-point source pollution, the stream mainly contains limited amounts of non-game species. The stream was extensively monitored in 2006 through 2008. The study showed that while habitat is certainly a limiting factor in Jordan Creek, especially in the lower half of the stream, one question that remains is whether the temperature is a limiting factor for certain species of fish. There are a number of springs that feed the stream. The tile lines draining the hydric soils add cold water and nutrients to the system and may present an issue for some species that prefer warmer water such as common shiners and hornyhead chubs or less tolerant species which do not tolerate nutrient loads. The low diversity of species and the domination by certain eurythermal species which can tolerate cooler water would certainly suggest this.
It is unknown whether the stream could ever sustain a cool/coldwater fishery. There is little historic data on the stream and none that would suggest cool/coldwater indicator species lived there at one time. Certainly there are other resources in the area that contain cool/coldwater indicator species. Surveys conducted on Skinner Creek have shown the presence mottled sculpin and an occasional brown trout. Lyons (2008) model indicates Jordan Creek has the potential to be a cool/cold transitional stream, but the model is considerably less accurate in the driftless area of the state (Lyons, personal communication). There is no doubt that the stream has been significantly altered by agriculture and hydrologic modification. The section from STH 81 downstream to the confluence with Skinner Creek was added to the state's 303(d) list in 2010 as the habitat has been negatively influenced and the stream could certainly be considered impaired. This stream is impaired due to degraded habitat from sediment/total suspended solids The reality, however, is that the chances of making any meaningful, significant changes to the land use (i.e. buffers and wetland restoration) or channel morphology (i.e. re-establishing stream meanders and shaping/sloping banks) in the foreseeable future are slim.

Pecatonica River
A twelve mile section of the river runs through this watershed. Skinner Creek and several unnamed tributaries join the Pecatonica in this area. The river serves as a sanctuary for sport fish during times of low water. The assemblage of biological, chemical and physical measures indicates that the non-wadable portions of the Pecatonica River system are impacted most certainly by habitat quality issues and possibly water quality (particularly TSS) issues as well. In 2014, the Pecatonica system was added to the state's 303(d) list of impaired waters due to total phosphorus in exceedance of the criteria. The fishery assemblage and associated IBI show a variation in quality ranging from "fair" to "excellent", with most sites with an index in the "good" range. This is in comparison to the Sugar River system (WDNR, 2015), in which all the sites had an IBIs from 80 -100 or "excellent". Overall qualitative habitat scores were consistent and in the "fair" range for all sites. A lack of diversity of habitat as well as an absence of rocky substrate was a common issue at all sites. Streambank erosion was noted as an issue at most sites, owing to the river's incised nature in a heavily agrarian basin.
Because the Pecatonica system encompasses such a large area, improvements to the river system will come slowly. Work in smaller, HUC 12 watersheds provides a practical size area to implement best management practices on the landscape such as soil health, barnyard and pasture management, and streambank stabilization to reduce runoff of sediment and nutrients from fields and reduce streambank erosion. Work in these smaller, individual watersheds will not be

reflected in the Pecatonica system immediately. The idea is to continue to work progressively on these smaller watersheds, and then presumably this will someday improve the river as a whole.

Skinner Creek

Originating at the confluence of Bushnell and Buckskin School Creeks, this large stream flows southwesterly and joins the Pecatonica near Browntown. The creek has an abundance of forage fish, but also contains sport fish. Fish such as smallmouth bass, northern pike and channel catfish are more prevalent in periods of high water. The stream once ran through an extensive area of wetlands, but now only 120 acres of wetland remains.

Skinner Creek was placed on the impaired waters list for total phosphorus in 2012. The 2016 assessments showed continued impairment by phosphorus; total phosphorus sample data exceeded 2016 WisCALM listing criteria for the Fish and Aquatic Life use, however, available biological data did not indicate impairment (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scored in the "poor" condition category). Based on the most updated information, no change in existing impaired waters listing is needed.

Smock Creek

Smock Creek is a warm water stream that flow west and joins Skinner Creek northeast of Browntown. The creek used to be stocked with trout, but now supports mainly a forage fishery with a few smallmouth bass present.

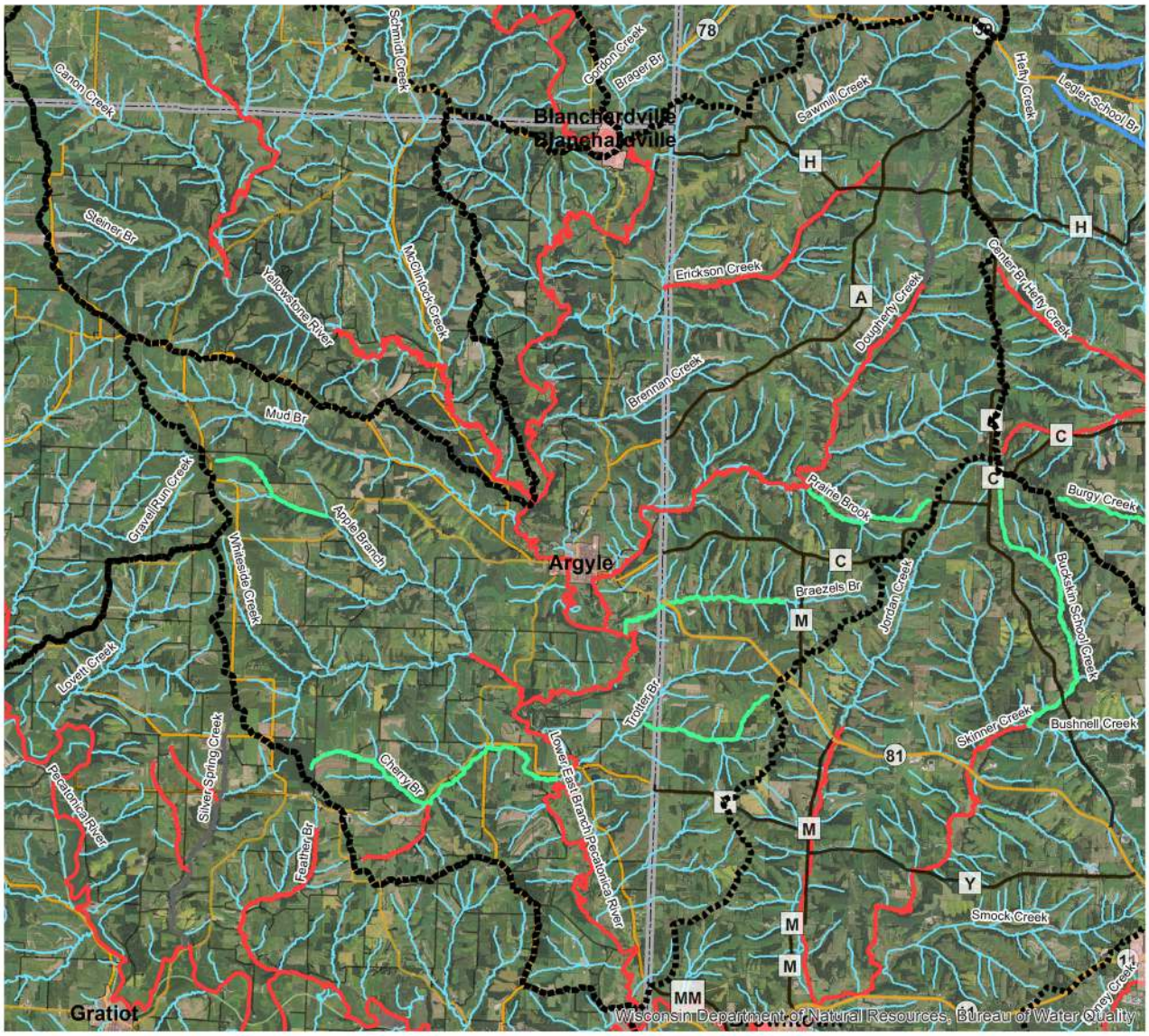
Winn Creek

This small creek originates from a spring pond in Lafayette County and flows east where it enters the Pecatonica River in Green County. Winn Creek is a warm water forage fishery.

Zanders Creek

This small stream flows westward and has been diverted to provide water for Zanders Lake and Beckman Lake. After leaving Beckman Lake, it flows west and enters Skinner Creek. A large spring flows into the stream above Zanders Lake, providing the necessary water temperatures to support trout. The water temperature along with the habitat work done, enhance the stream's existing use as a Class II trout stream.

Lower East Branch Pecatonica Watershed (SP03)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

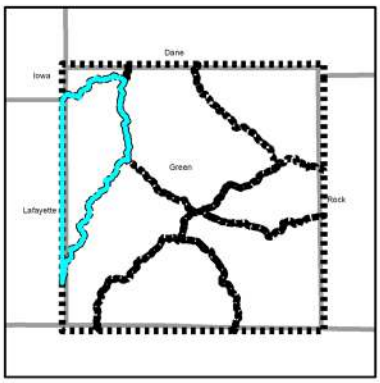
Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

2020 Aerial Photo

0 0.75 1.5 3 Miles

N
W E
S



Green County LWCD, April 2021

Lower East Branch Pecatonica River (SP03)

The Lower East Branch Pecatonica River Watershed, in the western part of Green County and northeastern Lafayette County was a priority watershed project under the Wisconsin Nonpoint Source Water Pollution Abatement Program. A number of smaller trout streams in the watershed (WDNR, 1980) are affected by polluted runoff. A detailed description of water quality conditions in the watershed prior to the beginning of the priority watershed project can be found in *Lower East Branch Pecatonica Priority Watershed Project: Water Resources Appraisal Report* (Marshall, 1991). The objectives of the priority watershed project were to improve wildlife habitat, increase diversity of forage species, protect and restore wetlands and to reduce bank erosion. In 2009, a follow-up report for the completed watershed project, ("An Assessment of the Water Quality in the Lower East Branch of the Pecatonica Watershed") was published. The following narratives for Green County streams in the LEBP watershed come from the latest assessment.

Two permitted facilities discharge to surface water in the watershed, the villages of Argyle and Blanchardville.

Braezels Branch

This stream originates in Green County and flows westward primarily through pastureland. It enters Lafayette County where it converges with the East Branch Pecatonica River. The warm water forage stream is on the state's list of impaired waters but has the potential to be a cool-cold water stream. A fish shocking survey conducted in 1990 showed the presence of tolerant and very tolerant warm water forage fish species. Macroinvertebrate sampling conducted that same year indicated "very good" water quality although the streambank substrate was predominantly sand and streambank erosion reduced habitat (Marshall, 1991).

Sampling in 2007 generally confirmed what was reported during the 1990's. Even though the stream is stocked routinely with brown, brook and rainbow trout, there does not appear to be much carry-over from year to year. Tolerant fish dominate the assemblage though no species is present in very high numbers. This is likely due to lack of habitat rather that water quality. The stream meanders through wet meadow and agricultural land. The HBI continues to indicate low organic loading and *Gammarus pseudolimnaeus*, an indicator of high groundwater flow, dominate the macroinvertebrate assemblage. The stream may be too cool to harbor a large variety of eurythermal species with a preference for warmer water, and devoid enough of habitat needed to accommodate cool/coldwater indicators and especially top level predators. Braezels Branch should remain on the list of impaired waters. If the DNR continues stocking the stream, regular surveys should be conducted to determine survivability of the trout. This stream is impaired due to sediment/ total suspended solids and associated degraded habitat impacts. The stream is part of a 2005 approved TMDL for sediment/degraded habitat.

Dougherty Creek

Dougherty Creek is a moderate sized stream that has an existing use as a Class II trout stream for much of its length. The upper 2 miles has an existing use as a limited forage fishery and is on the state's list of impaired waters for habitat degradation and dissolved oxygen problems. While most of this short section of stream has now been put in a set-aside program, there are several barnyards at the headwaters of the stream that were identified as sources of nutrients and biochemical oxygen demand (BOD) to the stream (Marshall, 1991; WDNR, 2008). The stream flows through small patches of forest, cropland, and wetland, but also through pasture where it suffers severe bank erosion. The stream bottom above Apple Grove Road is primarily gravel. Below this area, silt and clay become more prevalent and the water is more turbid (Marshall, 1991).

While most of the stream is managed for brown trout, some rainbow trout have been stocked and show up in stream surveys. Tolerant, eurythermal forage fish species are common in the stream including white sucker and creek chub. Mottled sculpin, and intolerant species, are found in low to moderate numbers.

Goals of the priority watershed project were to improve the trout fishery, reduce organic loading and erosion, increase aquatic diversity and improve wildlife habitat. There has been some habitat improvement work done on the stream, primarily upstream from Prairie View Road. These have resulted in localized improvements in trout numbers with 2007 coldwater IBI ratings of "fair" to "good". Small sections have been fenced and certain areas of the riparian corridor have been returned to prairie – especially in the upper ½ of the stream. The lower ½ of the stream runs through row crops and grazed wet meadows. Biologists noted that the U-shaped channel offers little in the way of habitat save for depth and overhanging grasses and banks. This bigger water could offer an opportunity to attract higher numbers of larger fish if habitat could be improved.

Dougherty Creek (mile 0-13.98): Assessment results during the 2020 listing cycle show total phosphorus levels too high for healthy aquatic communities like plants, bugs, and fish, according to 2020 WisCALM standards. Fish and bug sample data were also in poor condition (i.e., at least one macroinvertebrate and fish Index of Biotic Integrity scored in the poor condition category). Based on the most updated information, this water was proposed for the impaired waters list in 2020.

Dougherty Creek (mile 13.97-16.59): This portion of the creek has been listed as impaired since 1998 for total suspended solids, biochemical oxygen demand, and total phosphorus and since 2016 for an unknown pollutant causing elevated water temperature.

Erickson Creek

Erickson Creek flows toward the southwest where it joins Sawmill Creek just across the Green/Lafayette County border. The stream is a moderate sized, Class II trout stream and despite some problems associated with nonpoint source pollution and channel straightening, this creek displays the best water quality in the watershed (Marshall, 1991). Erickson Creek is managed as put and take fisheries with yearling rainbow and domestic brown trout stocking. Several properties in the watershed had streambank rip-rapping and fish habitat improvement structures installed in the past that are currently in various states. A local watershed group and landowners have shown interest in improving water quality in the streams in this watershed and consequently, Erickson Creek was monitored as part of the Sawmill Creek watershed assessment in 2018. While Erickson Creek is currently functioning as a coldwater system, it is not pristine. Macroinvertebrate sampling shows good to very good water quality from an organic loading standpoint. Macroinvertebrate IBIs vary between fair and good. Indications are that the stream has moved more toward a cold-water system and is now dominated by trout and mottled sculpin. The transition to a colder community could be the result of colder water temperatures due to increased precipitation resulting in a more enhanced water table and thus discharge to these streams. It could also be the result of better farming practices which have allowed for better infiltration of water and reduced runoff. Erickson Creek was added to the state's 303(d) list of impaired waters due to total phosphorus in 2020 after being recently evaluated during the ten-year period of 2009 through 2018 for results that were reported to the USEPA for the 2020 Clean Water Act condition report. Assessment results during the 2020 listing cycle show total phosphorus levels too high for healthy aquatic communities like plants, bugs, and fish, according to 2020 WisCALM standards.

Jockey Hollow Branch

This very small stream originates in western Green County and flows westward where it feeds into Trotter Branch just inside the Lafayette County line. The stream is on the state's list of impaired waters because it suffers from poor habitat, low flow and channel straightening.

Sampling conducting in 1985 and 1990 showed only the presence of brook stickleback (Marshall, 1991). Surveys conducted in 2007 and 2008 at Jordan-Wiota Road and Duncan Hollow Road, respectively, continued to show a lack of fish. For the most part, the stream flows mainly through a box elder corridor. This leads to bank slumping and erosion causing the stream to become wide, shallow, and lacking in habitat. The upper portions of the stream do contain some gravel riffle areas. Macroinvertebrates, dominated by *Gammarus pseudolimnaeus*, show good water quality from an organic loading standpoint. The macroinvertebrate IBI showed very poor indications of habitat/land use in the upper sections and good in the lower section. This is not consistent with biologist's observations. Because of low flow, and possibly cool temperatures, the stream will always be limited in the number and diversity of fish it can support. However, habitat continues to be a limiting factor to this stream achieving its potential. Jockey Hollow Creek is currently impaired due to sediment pollutants and associated quality impacts; it was placed on the 303(d) list in 2006.
Jockey Hollow Creek (miles 0-3.1) is part of the Sugar-Pecatonica River Basin and the sediment TMDLs approved by the USEPA August 24, 2005.

Prairie Brook

This small steep stream drains an unglaciated valley and serves as a tributary to Dougherty Creek. The stream is valuable because it provides a source of cold water to Dougherty Creek (Surface Water Resources of Green Co, 1980). Heavily pastured, it suffers from streambank erosion; however the steep gradient maintains a sandy bottom with small amounts of gravel and cobble. Prairie Brook is a Class III trout stream whose potential is somewhat limited by flow. In 1998 the Prairie Brook was added to the state's list of impaired waters. The DNR and LWCD should work with landowners to install best management practices and enforce NR151 to improve the riparian corridor of the stream. The stream was stocked with brook trout in 2005. It has not been monitored recently.

Sawmill Creek

This tributary to the East Branch of the Pecatonica River begins in the driftless area of Green County and flows southwestward into Lafayette County. Most of the stream is managed as a Class II trout fishery. Sawmill is stocked with large fingerling brown trout. In the flatter stretches, the bottom is composed primarily of silt, while the steeper sections contain mostly gravel and rubble (Surface Water Resources of Green County, 1980). The headwater area upstream of Badger Road flows through a large wet meadow and thus has good gradient and hard substrate and likely serve as trout spawning areas. Sawmill Creek suffers from sediment deposition, turbidity, and erosion in the lower reaches. Several properties in the watershed had streambank rip-rapping and fish habitat improvement structures installed in the past that are currently in various states. A local watershed group and landowners have shown interest in improving water quality in the stream and consequently, a watershed monitoring assessment was completed in 2018.
Monitoring conducted in 2004 and 2007 showed the stream to contain brown trout as well as eurythermal species. The 2018 monitoring determined that the fish assemblage is dominated by coldwater species. While Sawmill Creek is currently functioning as a coldwater system, it is not pristine. Macroinvertebrate samples from 2018 continue to show good to excellent water quality from an organic loading standpoint. Macroinvertebrate IBIs vary between fair and excellent. Indications are that the stream has moved more toward a cold-water system and is now dominated by trout and mottled sculpin. There is also evidence of trout natural reproduction in the stream. The transition to a colder community could be the result of colder water temperatures due to increased precipitation resulting in a more enhanced water table and thus discharge to these

streams. It could also be the result of better farming practices which have allowed for better infiltration of water and reduced runoff.

Trotter Branch

This small stream flows westward into Lafayette County and is joined by Jockey Hollow Branch before it enters the East Branch of the Pecatonica River. Although a 1980 fisheries survey reported small numbers of stonerollers, creek chubs and American Brook Lamprey, a 1990 study found only brook stickleback. It suffers from poor habitat, low flow, and channel straightening. The goal of the priority watershed project was to reduce organic loading and erosion, increase aquatic diversity, and improve wildlife habitat.

Sampling conducted in 2007 and 2008 showed very few trout and a low amount of other individuals, mostly made up of tolerant species. Like many lower areas of tributaries to the East Branch Pecatonica River, northern pike made their way up Trotter Branch in spring 2008 to spawn. Young-of-the-year pike were found at the (lower) Trotter Road crossing in 2008 whereas none were found there in 2007. Another survey conducted just downstream from Jockey Hollow Creek yielded only four brook stickleback. Macroinvertebrate HBI samples continue to indicate "very good" to "excellent" water quality. The DNR, in consideration of adding Trotter Branch to the list of impaired streams, should conduct further monitoring, including temperature, flow and habitat, and investigate land-use in the area to determine why the stream is lacking in fish.

Recommendations:

The DNR, Green and Lafayette county staff should work with progressive farmers and landowners to promote agricultural practices such as no-till and cover crops which promote infiltration of water.

The DNR should conduct temperature monitoring to determine the contemporary thermal regime of Sawmill and Erickson Creeks.

Maintain the trout Class II designation for the Sawmill Creek and Erickson Creek watershed while working towards improving the Yearling and Adult survival and YOY capacity of the brown trout fishery.

Public angling opportunities are severely lacking in the Sawmill Creek and Erickson Creek watershed and increasing public access through easements and acquisitions is a high priority.

Continue stocking program of large fingerling brown trout at appropriate levels and locations that have documented survival in the Sawmill Creek and Erickson Creek watershed.

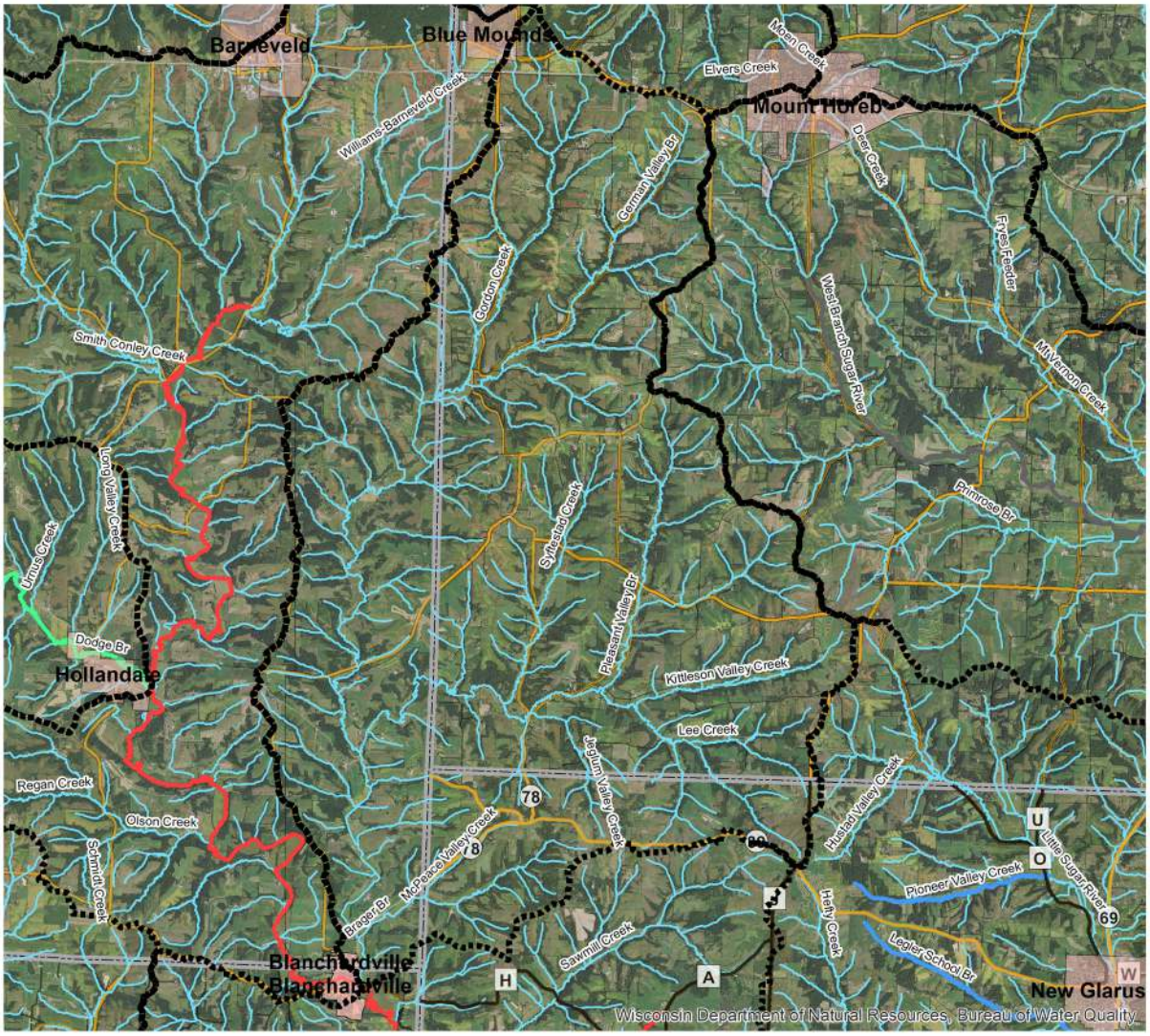
Maintain harvest opportunities with current regulation of 8" minimum, 3 daily bag limit in the Sawmill Creek and Erickson Creek watershed.

Revisit trout classifications of Sawmill, Erickson, Dougherty, Brennan, Bushnell, and Prairie Brook Creeks in 2024 rotation schedule.

Deploy temperature logging devices and collect higher resolution flow data to examine thermal and hydrologic qualities of the entire Sawmill-Erickson watershed throughout the calendar year next survey scheduled in 2024.

Evaluate angler-use of stocked streams in the Sawmill-Erickson watershed using angler creel survey before next 2024 sampling effort.

Gordon Creek Watershed (SP05)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

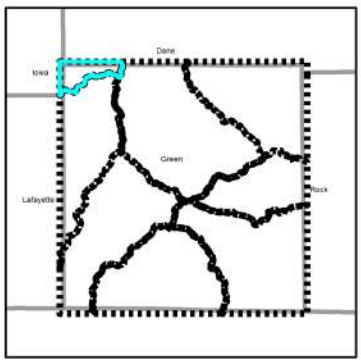
2020 Aerial Photo

Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

0 0.75 1.5 3 Miles

N W E S

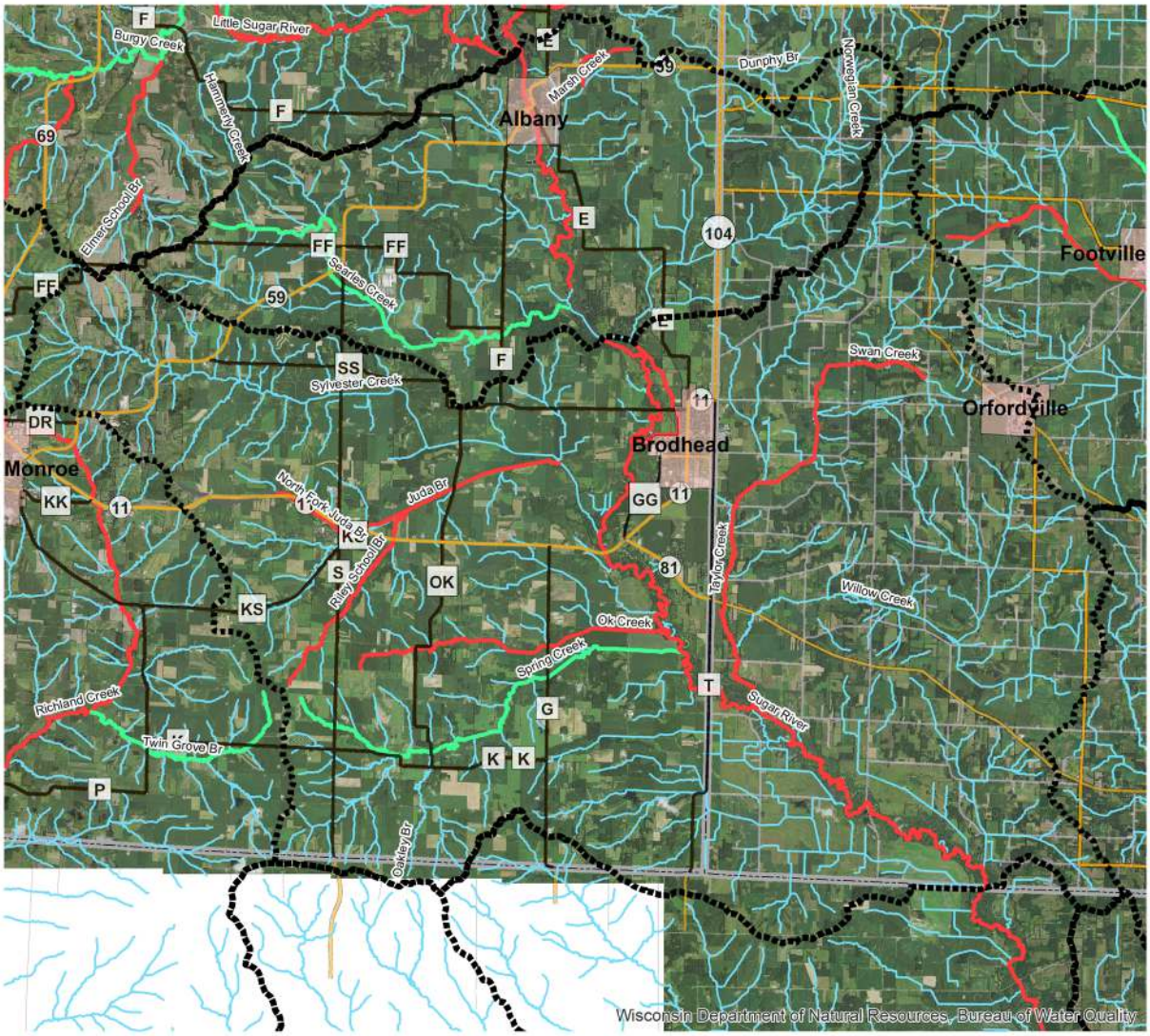


Green County LWCD, April 2021

Gordon Creek Watershed (SP05)

The Gordon Creek Watershed, in southwestern Dane, northwestern Green, and southeastern Iowa counties, is an agricultural watershed in the driftless part of the state, with no incorporated areas in it. Polluted runoff problems exist in the watershed, but the extent of the problem has not been fully evaluated.

Lower Sugar River Watershed (SP11)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

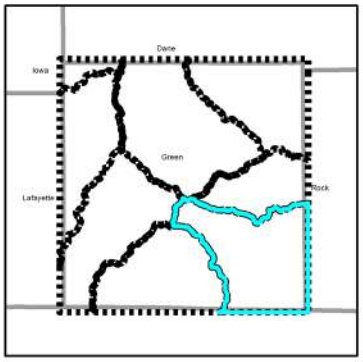
2020 Aerial Photo

Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

0 1 2 4 Miles

N W E S



Green County LWCD, April 2021

Lower Sugar River (SP11)

The Lower Sugar River Watershed in western Rock County and eastern Green County. The watershed is intensively agricultural. Two municipal wastewater treatment facilities discharge to surface waters in the watershed: Brodhead and Orfordville. The Juda Wastewater Treatment facility discharges to groundwater. One industrial facility discharges to surface water: Grande. Polluted runoff is the primary cause of water quality and in-stream habitat problems in the watershed, though one of the wastewater treatment facilities has presented problems.

Large, important floodplain wetland complexes exist along the Sugar River. These wetland complexes have a high value for wildlife and water quality. Many of these wetlands are encompassed in the Avon Bottoms State Wildlife Area and Avon Bottoms State Natural Area in Rock County. In 2009, landowners had the chance to apply to enroll their land in the Emergency Watershed Protection Program. Of the 44 applications for the program, nine were approved. NRCS holds a perpetual easement on these 717 acres enrolled in the program. Restoration work was done to create better habitat for all sorts of animals.

Green Drainage System

Constructed in 1900 as a deep flow furrow, this stream has since eroded and is now contained within steep banks. The system originated in a low-lying cropland area in Southeast Green County but flows for most of its length through the Sugar River bottomlands of Rock County where it joins the Sugar River (Surface Waters of Green Co). It feeds into the Avon Drainage District in Rock County. The system holds populations of forage fish and gamefish, the latter are likely migrants from the Sugar River. The system has not been monitored in recent years.

Juda Branch

This 7 mile long, fairly low gradient stream originates west of Juda, flows eastward and joins Sylvester Creek. It has fairly low flow in the upper half of the stream as it meanders southeastward following CTH KS. It picks up flow as it enters the sedge meadow and is joined by an unnamed tributary (WBIC = 877800) just southwest of the village of Juda. The remaining 4 miles downstream from CTH S in Juda are almost entirely channelized and follow a railroad line. In 2013, the stream was sampled at 4 locations (from upstream to downstream): Giese Road, CTH S, Bagley Road, and CTH O.K. Juda Branch is modeled to be a cool-cold transitional stream for its entire length (Lyons, 2008). The draft verification model (Lyons, 2013) showed that to be essentially true, save for the lower section at CTH O.K. Small numbers of brown trout have historically been found in the stream (WDNR, 1980) and were found in a survey conducted at CTH S in 2004 and at CTH O.K. in 2013. In 2006, a specimen of redfin shiner, a state threatened species, was found in the creek. The upper two sites at Giese Road and CTH S were dominated by tolerant species, creek chubs and white suckers in particular. Interestingly, the lower half of the stream had poorer habitat, but contained a higher number of species and trended toward a more warm water environment. One could argue this is a result of environmental degradation; however, the percent tolerant species at these lower two sites was within the range of this metric. Despite this and the fact that the appropriately applied IBIs are fair to good, there is no way to ignore the fact that the lower half of Juda Branch is straight, wide, shallow, and deeply entrenched with steep eroding banks and a high amount of soft sediment. This is reflected in the habitat scores.

Juda Branch was added to the state's 303(d) list of impaired waters in 2016 for total phosphorus as well as degraded habitat due to sediment. One item of note: the Green County Drainage District has been emphasizing the removal of trees along the banks. This has been occurring periodically over the past 5 years on different sections of this stream. The DNR should work with

the county, the drainage district, and landowners to emphasize good management practices such as stabilizing the banks when removing trees from the banks.

North Fork Juda Branch

In 2013 a survey was conducted at 3 sites in the North Fork Juda Branch. The surveys were conducted at STH 11 (lowest crossing); at Juda Park (upstream of Grande effluent discharge) and at CTH S (downstream of the discharge). Physical water quality parameters of temperature, dissolved oxygen, pH, specific conductivity, transparency and flow were taken as well as a qualitative habitat evaluation was conducted. Each site was also shocked using a backpack shocker to determine fishery assemblage. Creek chub and common shiner were the predominant species. Species diversity and numbers increased as one proceeded downstream. It should be noted that volunteer monitors reported the stream dried up at Balls Mill Road (approx. 2 miles upstream of the discharge) during the drought of 2012. This may have affected (limited) the fishery assemblage at the most upstream location (STH 11).

The fishery assemblage at the CTH S site is quite different from the 2004 survey which showed johnny darter as the most prevalent species with only a few specimens of creek chub, stickleback, and white sucker. It also noted that the habitat was very poor in the upper 2/3 of the station. This was not noted by biologists in the 2013 survey. Qualitative habitat surveys showed the best habitat (good) at STH 11, while the sites upstream and downstream from the effluent discharge were similar as low "fairs".

The addition of the effluent does not appear to influence the fishery assemblage downstream of the discharge point as more species and higher numbers are present. However, many of the species present, including creek chub, white sucker, bluntnose minnow, brook stickleback, and green sunfish, are considered tolerant to disturbed habitat and/or low dissolved oxygen.

It should be noted that the North Fork Juda Branch is on the state's 303(d) list of impaired waters due to phosphorus and low dissolved oxygen. A continuous dissolved oxygen study was conducted at CTH S August 4 - 14, 2006 and showed dissolved oxygen readings below 3.5 mg/l for the duration of the study period. Since then, the effluent discharge has changed and a dredging project was conducted in 2007 to remove flocculent material that had accumulated in the stream channel immediately downstream of the effluent discharge. It is unknown what effects these changes have had on downstream dissolved oxygen readings.

The biology as indicated by the poor macroinvertebrate scores and modest fish IBIs and habitat scores indicate that North Fork Juda Branch is still an impaired system. The stream was segmented in 2020 due to distinct differences in water quality. This upstream segment (1.68-3.80 miles) was evaluated for phosphorus and levels were good. The phosphorus listing is proposed for deletion in the 2020 updates. All impairments remain for the lower segment. The DNR should continue to work with partners in the watershed to improve conditions so that the stream can meet its full attainable use and be removed from the state's 303(d) list of impaired waters. The DNR should conduct continuous temperature monitoring to determine if low dissolved oxygen is still an issue.

Oakley Branch

This small, 2 mile long stream has its source near the Illinois border and flows northward and converges with Spring Creek near the unincorporated community of Oakley. It historically flowed entirely through pasture and experienced the severe bank erosion associated with heavy grazing (WDNR, 1980). Near Oakley, a 0.5 acre spring pond discharges a small flow to the stream.

Very little monitoring data exists for this stream. It harbors about a dozen non-game species, predominately creek chubs and white sucker. In the 2014 survey, 1 Iowa darter, an intolerant warmwater species, was found along with 1 largemouth bass – most likely a stray from the spring

pond. The stream has good gradient which scours down to the gravel and rubble cobble bottom. However, there is 6-8 inches of silt in the small pools. The moderate bank erosion is testament to its flashy nature. Much of the upper half of the stream runs through fields, while the middle portion is now more wooded. The stream is adjacent to several barnyards and feed lots which may contribute sediment and nutrients to the stream. Despite this, the fishery community represents a good, cold-cool transitional community.

OK Creek

Several springs in a small upland area form the headwaters of OK Creek. It flows 5 miles easterly until it joins the Sugar River. Like many streams in the area, the western headwaters area has higher gradient, but then gives way to lower gradient as it nears the Sugar River. Most of the lower half of OK Creek has been ditched to drain the large wetland complexes of the lower Sugar River (WDNR, 1980).

Three sites were sampled in 2014. At Preston Road, near the headwaters, only brook stickleback and fathead minnows were found. Historic sampling showed a more diverse fishery with creek chubs, stoneroller, johnny darters, and white sucker present. This site scored "poor" from a fishery IBI standpoint even though the habitat was good.

Further down at CTH G, diversity increased with creek chubs being most prevalent, followed by johnny darter, stoneroller, bluntnose minnow, and fathead minnow also common. Here the stream flows through a wooded corridor which exacerbates bank erosion, contributing to a shallow, wide stream with a silty bottom. Habitat scores were modest. Tree blowdowns from recent storms in the area made shocking difficult.

At Mount Hope Road, the stream is channelized and highly entrenched. Several tile lines drain the fields and add cold water to the stream. The monotypic habitat of this site is typical of the channelized sections of this stream. Still, species diversity was good with 15 species being represented. This may be due in part to the closer proximity with the Sugar River. Creek chubs and bluntnose minnows, both species tolerant of habitat disturbance were the most prevalent. This section is modelled to be a cold-cool mainstem, but the fishery assemblage more closely resembles a cool-warm mainstem that is excellent. Habitat was considered "fair" at this site, although the metrics of pool area, riffle/bend ratio and fine sediments were "poor". Water samples were also collected from 2013 through 2015 and analyzed for phosphorus. The median concentration was 0.17 mg/l, which exceeds the state's water quality criteria of 0.075 mg/l. O.K Creek was added to the state's 303(d) list of impaired waters in 2016 for total phosphorus as well as habitat degradation due to sedimentation and channelization. The DNR should review land use and nutrient management efforts (plans) in this sub-watershed to determine if any improvements can be made to reduce phosphorus delivery to the stream.

The 2018 assessments of Ok Creek by DNR showed continued impairment by phosphorus; new total phosphorus sample data exceeded the 2018 WisCALM listing criteria for the Fish and Aquatic Life use. However, there was no new available biological data to observe further biological impairment (i.e. this water was listed in previous water evaluation cycles, but no new macroinvertebrate or fish Index of Biotic Integrity (IBI) scores were available). Based on the most updated information, no change in the existing impaired waters listing is needed.

Riley School Branch

This small, 3 mile long stream is a tributary to Juda Branch. It has a relatively good gradient, but is flow limited and suffers from habitat degradation due to bank erosion. Almost 90% of the watershed is in agriculture. Buffer width varies throughout the stream length. There are many areas where the stream runs through a wooded corridor and is plagued by eroding banks, making this flow limited stream even wider and shallower. Shocking surveys conducted at Giese Road and Bagley Road revealed a depauperate fish population which scored poor for the IBI. Habitat scores were poor or a low fair. One macroinvertebrate sample was poor and the other fair. A

combination of these scores reflect the poor condition of this stream and made it a candidate for 303(d) listing using only 1 year of data.
Riley School Branch was added to the state's 303(d) list of impaired waters in 2016 due to habitat degradation caused by sedimentation as well as total phosphorus. 2018 assessments of Riley School Branch by DNR showed continued impairment by phosphorus; 2018 total phosphorus sample data exceeded the 2018 WisCALM listing criteria for the Fish and Aquatic Life use. However, there was no new available biological data to observe further biological impairment.

Spring Creek

Spring Creek flows 10 miles in southeastern Green County and drains into the Sugar River. Much of its length has been ditched to drain cropland. The lower ten miles of the stream are on the state's 303(d) list of impaired waters for degraded habitat due to sedimentation (WDNR, 2003). Spring Creek was placed on the 303d list in 2006 and is part of a Sediment TMDL that was approved by USEPA in 2005.
It is modelled to be a cold-cool transitional stream, but the fishery assemblage more closely resembles that of a cool-warm system. Species diversity increases as one moves from the headwaters downstream toward the Sugar River. The variety of species found at Mt. Hope Road may be in part due to its proximity to the river. Creek chubs and white suckers are the predominant species at all sites sampled in 2014. Historic fishery surveys have shown similar species presence. The balance of the fishery is made up of a variety of species ranging from spotfin shiners to shorthead redhorse, suckermouth minnows to rock bass and northern pike and present in modest amounts. Most of these are warmwater species. Cool-warm IBI's range from 60 to 90 and are considered excellent. However, the habitat surveys showed a system that is only of moderate habitat quality, with qualitative habitat ratings of 35 to 43 or "fair". The stream suffers from severe bank erosion, lack of pools and lack of fish cover.
More specifically, the site at Town Center Road was unique in that it flowed through pastureland. It had many trampled banks, but the good gradient helped scour the bottom and create nice riffle/run complexes. Biologists noted that this portion of the stream, "reminded them a lot of the pastured streams of Lafayette and Grant counties". The other two stations sampled, at CTH OK, near the headwaters, and at Mt. Hope Road near the bottom end, were both in wooded corridors. As such, they both had raw eroding banks. Flow and temperature at the CTH OK site was influenced by springs in the area and the good gradient allowed the stream to scour to a rubble/cobble bottom in riffle areas. However, many areas also had silt over the hard substrate, likely from bank erosion. The lower site at Mt. Hope Road had more silt, sand and clay. However species diversity was greater, with 5 darter species being found during the survey. Biologists noted lots of blowdowns at both sites. While providing habitat for fish, these blowdowns also enhance bank erosion and increase the width- to-depth ratio.
In fall and winter of 2014/2015, a project was conducted on the stream at Mt. Hope Road that removed all the trees along the stream and sloped and stabilized the banks. Unfortunately, all the woody debris that was the only habitat in the stream was removed. However, the stream was narrowed this improved (lowered) the width/depth ratio. This type of project will also reduce the amount of bank erosion (and sediment delivery to the Sugar River) that had occurred in the past.
Phosphorus concentrations from 2013 through 2015 showed the median concentration to be 0.0749. This is just below the 0.075 mg/l criteria, however there were several samples that exceeded the criteria and therefore qualify Spring Creek as a "watch water" in the future.
Spring Creek was assessed again during the 2018 listing cycle; new total phosphorus sample data may exceed 2018 WisCALM listing criteria for the Fish and Aquatic Life use, however, available biological data do not indicate impairment (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scored in the "poor" condition category).
Assessments of new total phosphorus data during the 2020 listing cycle showed conditions unclear for healthy aquatic communities like plants, fish, and bugs.

The stream would benefit from harvest of nuisance species like box elder along the shoreline and then bank stabilization. Landowners should be encouraged to leave some woody debris in the stream as habitat for fish. While species diversity is good, enhanced stream management to improve the corridor could result in the lower portion of Spring Creek to be a refuge for some species like northern pike and smallmouth bass at certain times of the year. The DNR should monitor the stream at Mt. Hope Road to determine the effect of the recent management actions on the fishery and habitat indices.

Sugar River

An 18.4 mile stretch of the Sugar River runs through this watershed from below the dam at Decatur Lake to the Illinois-Wisconsin border. The lower one-half of the river, mainly in Rock County, runs through the lowlands and wetlands of the Avon Bottoms State Wildlife Area. The portion of the Sugar River in Green County is listed as an Exceptional Resource Water (ERW). Surveys conducted from 1992 to 1994 showed an excellent warm water fishery consisting of smallmouth bass, channel catfish, and northern pike in addition to the numerous forage fish species.

The Sugar River (mouth to east of unnamed stream; mile 0-10.99 segment) has been listed as impaired since 2012 for total Phosphorus. Assessment results from 2018 and 2020 show Total Phosphorus impairment at the following Sugar River segments: Unnamed stream to Decatur Lake (mile 10.99-31.88) segment; Albany dam (mile 33.2-38.45) to STH 92 (mile 38.45-56.14) segment; STH 92 to Paulson Rd segment (mile 56.14-82.33).

The Sugar River - Paulson Rd. to headwaters segment; mile 82.33-91.86- is in good condition for Aquatic life and Fish Consumption uses.

Sylvester Creek

This 14-mile long stream flows eastward through a broad, flat valley and enters the Sugar River south of Brodhead. It is designated as an Exceptional Resource Water (ERW). The upper 4 miles, upstream of Balls Mill Road, is managed as a Class III trout water and is stocked annually with brown and rainbow trout (WDNR, 2003). The lower portion, down by Ten Eyck Road contains low numbers of smallmouth bass, and occasional northern pike and a handful of brown trout. It is the only stream in the watershed with mottled sculpin, a coldwater indicator species. The natural communities' model predicts the stream to be a cool-cold transitional system throughout its length. The verification process (Lyons, 2013) as defined by the fishery assemblage showed this to be the case upstream of Balls Mill Road, but it appeared to be more of a cool-warm system downstream from there. As noted earlier, it is classified as a trout water upstream of Balls Mill Road. Interestingly, in the 2013 survey, the numbers of trout and sculpin encountered increased downstream of Balls Mills Road. With the exception of the site at Balls Mill Road, all coolwater IBI scores were "excellent".

Still, stream habitat is impacted by agricultural nonpoint source pollution, stream bank erosion, and channelization. Much of the stream is within the Green County Drainage district and has been channelized to augment drainage of agricultural fields. The Green County Drainage Board has been requiring landowners to remove nuisance trees from along the banks of streams within their jurisdiction. This practice has had mixed results on the streams. In many of these systems, prior to cutting the trees, the woody debris and overhead cover provided the only habitat for fish. Once the trees were removed, this habitat was gone. However, removal of the shade cover has allowed for the growth of grass along the steep banks and subsequent stabilization. Some slumping of banks into the creek has allowed for a small scale "remeandering" of the streams within the channel footprint. This has begun to narrow some of the streams leading to a better width-to-depth ratio as well as promoting scouring of the sand bottoms down to gravel. The small irregularities in the otherwise straight channel have created holes and quiescent habitat features for the fish to inhabit.

Where possible, encourage landowners to slope banks 3:1 to prevent erosion. Control regrowth of woody vegetation to prevent overgrowth and destabilization of the banks.
Fisheries management should consider expansion of the trout designation on Sylvester Creek to include waters from Balls Mill Road downstream to Ten Eyck Road. Fisheries management should also explore what additional habitat would do for carry-over of trout, especially in the area between CTH O.K. and Ten Eyck Road.

Recommendations:
Work with landowners in the watershed to encourage management of woody vegetation to prevent overgrowth along banks, to control regrowth and use management practices that avoid destabilization of banks (i.e. cutting and grubbing of the shoreline with no shaping, sloping or mulching). This would allow for stabilization of grasses, embrace natural "re-meandering" within the channel footprint, strive to keep some buffers in place. Where possible, encourage landowners to slope banks 3:1 to prevent erosion. It is also important to leave some in-stream woody debris in place to act as natural cover for fish. Control nutrient loading through development and implementation of nutrient management plans and proper manure management.

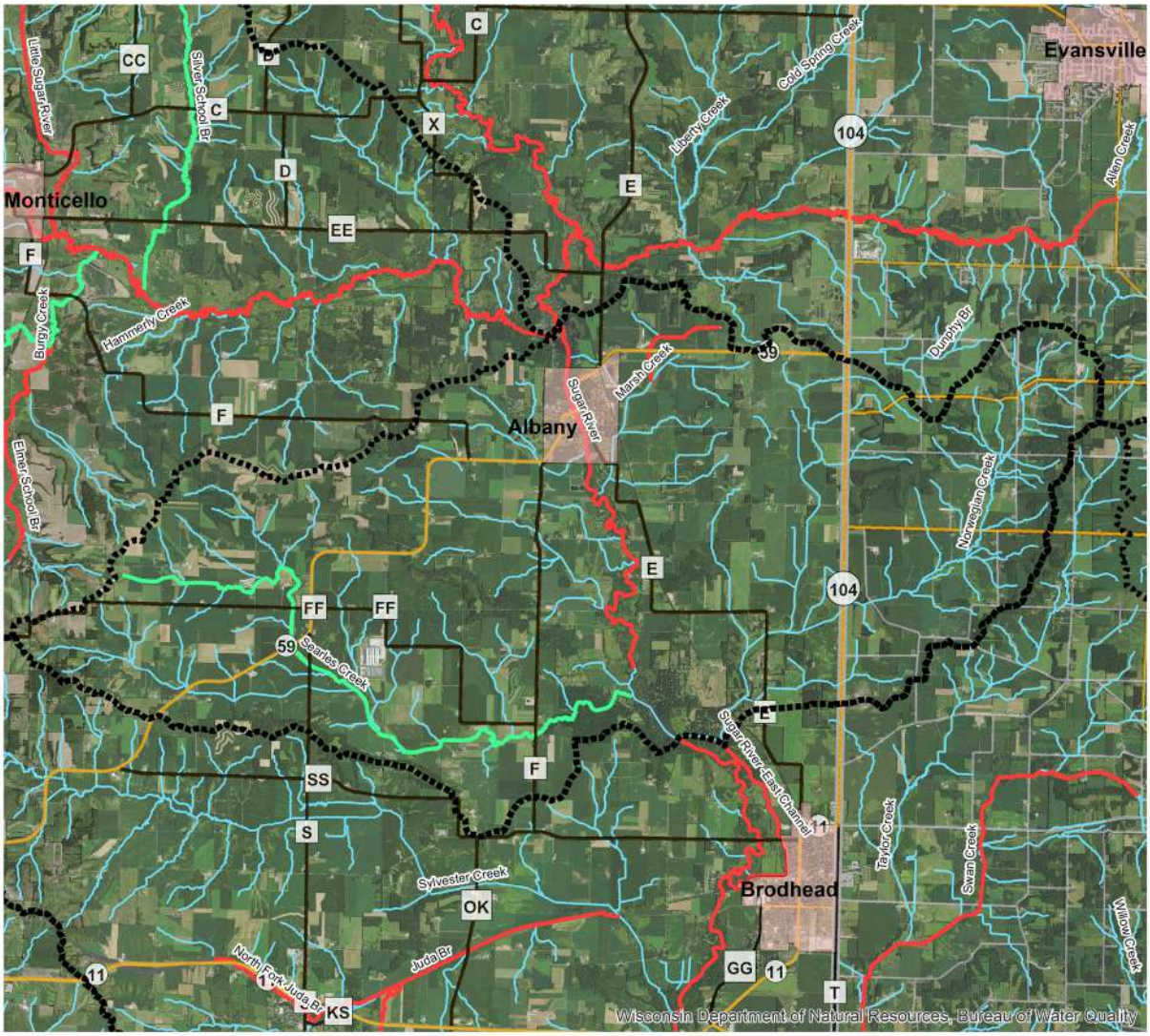
The DNR should work with watershed organizations such as the Lower Sugar River Watershed Association on outreach efforts with landowners in the watershed, environmental programs in the Juda and Brodhead school districts, and research opportunities for harvestable buffers to provide economic incentives for maintaining buffers along streams.

The DNR should review land use and nutrient management efforts in the OK Creek sub-watershed to determine if any improvements can be made to reduce phosphorus delivery to the stream.

Monitoring of phosphorus and nitrate concentrations in the streams of the Lower Sugar River should continue as funding and volunteer efforts allow.

Sugar River Mainstem Recommendations
Nonpoint source inputs are causing or contributing to reduced health of the stream and efforts to enact best management practices in the adjoining watersheds would be beneficial. The DNR should explore working with riparian landowners to stabilize eroding banks along the river to reduce sediment input and enhance fish habitat. Based on the species diversity upstream and downstream of the dams at Albany and Brodhead, it is likely the dams affect this diversity by limiting the upstream movement of certain species. The desire to mitigate the effects of dams on fish movement needs to be balanced with the need to prevent migration of exotic/nuisance species to other parts of the river. To that end, the DNR should continue periodic monitoring of sloughs and backwaters to monitor the status of the non-native western mosquitofish (Gambusia affinis), which were found downstream of the Brodhead dam in 2009.
The monitoring section of the Bureau of Water Quality should develop and incorporate a strategy to effectively and systematically assess large, non-wadable streams and rivers. This includes the use of the large river IBI (Lyons, et. al., 2001), the non-wadable macroinvertebrate IBI (Weigel and Dimick, 2011), use of long-term trend data at USGS gauging stations, the need to develop the diatom nutrient index to correlate phosphorus impacts, and the need to develop a habitat measurement for large, non-wadable river systems.
Overall, the IBI indicated the mainstem of the Sugar River has a healthy, valuable fishery, is not dominated by carp or other tolerant species, and offers a system that is unique to the highly agricultural landscape of southern Wisconsin. Quality of the Sugar River as represented by the fishery community is excellent. It confirms the status of the river as an ERW and deserving of protection.

Lower Middle Sugar River Watershed (SP12)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

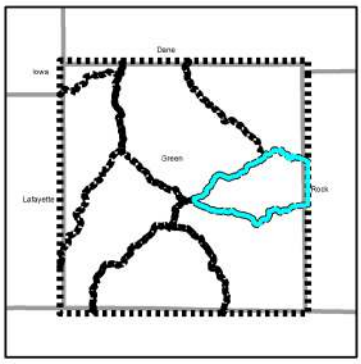
Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

2020 Aerial Photo

0 0.5 1 2
Miles

N
W E
S



Green County LWCD, April 2021

Lower Middle Sugar River (SP12)

The Lower Middle Sugar River Watershed is located in eastern Green County and a very small portion of Rock County. Agriculture is the predominant land use. One permitted wastewater treatment facility discharges to surface water in the watershed; the Village of Albany. A large wetland complex exists adjacent to the Sugar River in this watershed. Other large areas of wetlands have been drained and put into cultivation. The Sugar River in this watershed is an exceptional resource waters (ERW) under the state's antidegradation rules.

Marsh Creek

Originating from a spring, this small stream flows southwest and joins the Sugar River below Albany. The water is clear as the stream meanders between wet meadows in the upper portions, upstream of Bump Road and transitions to wooded areas downstream from there (WDNR, 1980; Amrhein pers. obs.) A stream improvement project completed some fencing and bank repair in an effort to increase the stream's trout potential was completed sometime prior to 1980 (WDNR, 1980). Today, an old sign indicating the area of improvement remains on the downstream side of County HWY E (Ibid). The lower 2 miles of this 3 mile stream are classified as a Class III trout fishery, but it is no longer stocked with trout. Trout have not been found in any of the studies conducted since 2002.

Marsh Creek is modelled to be a cool-warm transitional headwater (Lyons, 2008). The species collected in 2013 indicate a cool-warm to even warm system.

The fish IBI indicates "fair" quality of this stream. Species diversity was fairly low, around half a dozen species with tolerant fish making up about half of the total population. Habitat of this stream was "good" at Bump Road and "fair" downstream at CTH E.

The DNR should remove the Class III trout designation from Marsh Creek as it is no longer stocked with trout and none have been found in the surveys conducted over the past 12 years.

Norwegian Creek

With its headwaters in western Rock County, this stream flows into Green County and enters the Mill Race Arm of the Sugar River at Decatur Lake. Much of the stream has been straightened by ditching. The stream holds some sport fish near its mouth mainly due to the influence of Decatur Lake. It is also home to forage fish, including the least darter, a species on the state's special concern list. The stream is classified as an Exceptional Resource Water (ERW) from the mouth up to the Green/Rock county line. A narrow wetland buffer exists along the stream's lower reaches.

Interestingly, the natural communites' streams model predicts Norwegian Creek to be a cold water system for much of its length, from the headwaters downstream to just above CTH E. From there on down it is purported to be a cool-cold headwater. However, the fishery assemblage collected both historically and at the 3 sites in the 2013 survey resembles a cool-warm to warm regime. Tolerant species made up about half of the fish population except for the STH 104 site, which was only made up of 23% tolerants. The upper segments are ditched and flow through wet meadow converted to agriculture. The banks are grassed and stable in many areas. The middle and lower sections contain segments of wooded corridor. The bottom is comprised of gravel and the overall habitat scores are good. Not surprisingly, the lower station at Golf Course Road contained the most variety of species, including several game and panfish species. This is not surprising given its proximity to the Sugar River. The least darter was not found in any of the 2013 surveys. The DNR should consider that the natural community model which predicts a coldwater community is in error and should be changed to reflect actual conditions. The natural community designation for Norwegian Creek should be formally changed from cold and cool-cold headwaters to cool-warm headwaters upstream of STH 104 and warm mainstem downstream of STH 104 to the confluence with the Sugar River.

Searles Creek

This 9-mile, low gradient stream flows eastward and joins the Sugar River at the north end of Decatur Lake. The creek's watershed is a broad, flat-bottomed basin which is heavily tilled for crops. A great deal of the stream has been straightened to augment drainage from the fields. Some areas are buffered quite well by reed canary and incidentally because of the steepness of the banks, while other areas have little buffer. Removal of nuisance trees along the banks has been a common practice over the past 5 years even though this area is not part of the drainage district. The lower mile and a half of the stream runs through a forested wetland area just upstream from the confluence with Decatur Lake and provides habitat for wildlife. The stream consists of an abundant and relatively diverse population of warm and transitional non-game species.

When this survey was conducted in 2013, the stream was dry upstream of CTH FF and contained intermittent pools immediately below it but picked up volume considerably downstream at CTH S, presumably augmented by flow from a spring pond located just upstream of STH 59. Interestingly, the Surface Waters of Green County (WDNR, 1980) reports, "instream vegetation and aquatic invertebrates are scarce." In 2013, biologists noted an overabundance of macrophytes and filamentous algae, especially in lower gradient areas where sediment has accumulated. Habitat in the upper stations is marginally good, but gradually degrades as one proceeds downstream. Water temperatures in Searles Creek are cool to cold with instantaneous maximum water temperatures measured in 2013 at 24°C and the mean daily temperatures generally around 20°C.

The natural communities' model predicts Searles Creek to be a cool-cold headwater for all but the last ½ mile of its length. The draft verification methodology showed the stream to resemble a cool-cold headwater upstream of CTH S and a cool-warm headwater at Decatur Sylvester Road and Prairie Road. The species assemblage transitions to a cool-warm mainstem by the time one reaches CTH F.

Searles Creek is currently on the state's list of impaired waters because of habitat degradation caused by excessive sedimentation. Sediment, as defined by the percent fines in the qualitative habitat survey varied by site and may be related to gradient at each relative site. This survey showed that the stream contains good numbers of fish. However, contrary to the conventional thinking that more fish equates to a healthier system, the enhanced abundance of fish is actually a sign of nonpoint source pollution impact. While the fishery itself may not necessarily show impairment, it does indicate excessive eutrophication of these systems. Given that there are many areas of Searles Creek that are channelized, wide, shallow, and deeply entrenched, the stream should remain on the 303(d) list at this time.

Sugar River

A 9.8 mile stretch of the Sugar River runs through this watershed. As in other watershed, the Sugar River is classified as an Exceptional Resource Water. It contains a diversity of warm water sport and forage species including several species on the state's endangered list or watch list. Additionally, one state threatened and one state watch species of mussel are known to reside in this reach of stream.

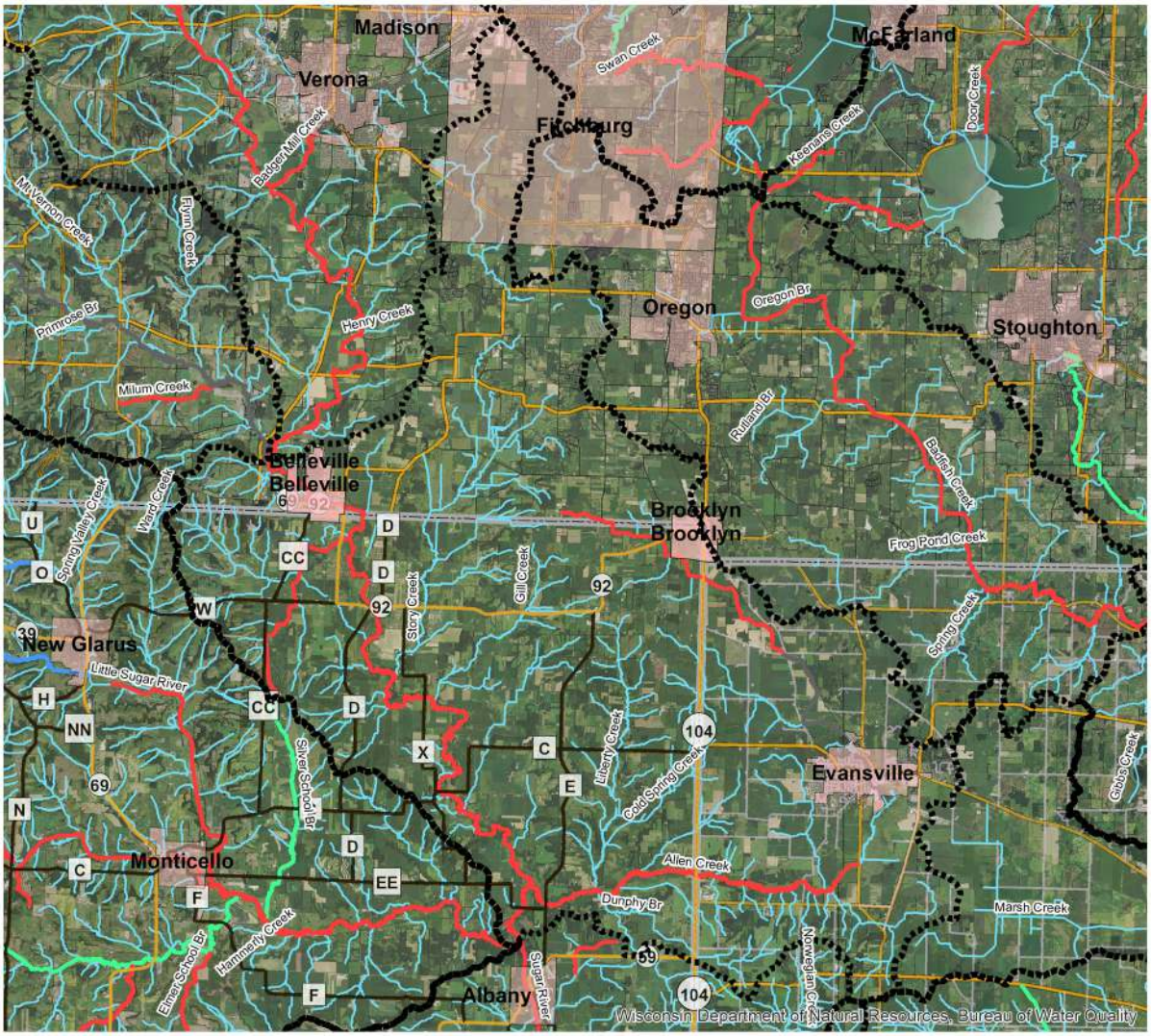
This water was assessed during the 2018 listing cycle; new total phosphorus sample data exceed 2018 WisCALM listing criteria for the Fish and Aquatic Life use, however, available biological data does not indicate impairment (i.e. no macroinvertebrate or fish Index of Biotic Integrity scored in the "poor" condition category.

<u>Recommendations</u>:

The DNR should conduct baseline monitoring on Searles Creek and Norwegian Creek to determine the status of the streams

Survey Marsh Creek to determine its potential as a cold water fishery.

Allen Creek & Middle Sugar River Watershed (SP13)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

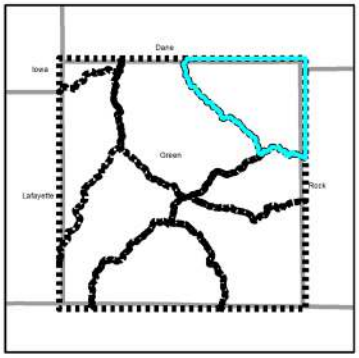
2020 Aerial Photo

Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

0 1 2 4 Miles

N W E S



Green County LWCD, April 2021

Allen Creek and Middle Sugar River (SP13)

The Allen Creek and Middle Sugar River Watershed are in northeast Green County, northwest Rock County and south central Dane County. The dominant land use in the watershed is agriculture, though some low intensity urban development exists in the upper reaches of the watershed. Municipal wastewater treatment plant discharges to surface water in the watershed come from Belleville, Brooklyn and Evansville.

Allen Creek

Allen Creek rises in southern Dane County, flows through northwest Rock County and northeast Green County before emptying into the Sugar River. About 4.5 miles of the stream above Lake Leota are classified Class II and Class III trout waters. Allen Creek below Evansville was recently added to the state's antidegradation list (NR 102) as an exceptional resource water (ERW), affording it a greater level of protection. The stream below Evansville has a very good, diverse warm water sport fishery.

Allen Creek [Mouth to Old HWY 92 (mile 0-10.57)] 2018 assessment results from the DNR show impairment due to levels of Total Phosphorus, however available Index of Biotic Integrity (IBI) data did not indicate impairment. Based on the updated information, this segment was proposed for the impaired waters list in 2018.

Allen Creek [Old HWY 92 to HWY 213 (mile 10.57-12.61)] 2020 assessment results show total phosphorus levels too high for healthy aquatic communities like plants, fish and bugs, according to 2020 WisCALM standards. Available temperature and biological data do not indicate impairment (i.e. no fish Index of Biotic Integrity (IBI) scored in the "poor" condition category). Based on the most updated information, this water was proposed for the impaired waters list in 2020.

Allen Creek [HWY 213 to Lake Leota dam (mile 12.6-14.99)]: This segment is in good condition for Aquatic Life and Fish Consumption uses.

Allen Creek [Lake Leota inlet to Brooklyn-Evansville Rd. (mile 15-20.21)]: 2020 assessment results show total phosphorus levels too high for healthy aquatic communities like plants, fish, and bugs, according to 2020 WisCALM standards. Fish and bug sample data were also in poor condition (i.e. at least one macroinvertebrate and fish Index of Biotic Integrity scored in the poor condition category). Based on the most updated information, total phosphorus was added to the previous listing of degraded biological habitat.

Allen Creek [Brooklyn-Evansville Rd. to CTH T (mile 20.22-22.96)]: This segment has been listed as impaired since 2016 for total phosphorus.

Allen Creek [CTH T to headwaters (mile 22.96-26.98)]: This segment has been listed as impaired since 2016 for total phosphorus.

Gill Creek

Gill Creek has historically been thought of as a warm water forage stream with a potential to support a cold water fishery. Indeed, in surveys conducted over the past 10 years, brook trout as well as other cold water indicator species like brown trout, mottled sculpin and brook lamprey have been found in the stream. It is currently listed as an Exceptional Resource Water (ERW) because wild brook trout have been found in the stream. The DNR and the county should look into employing best management practices in the watershed to help enhance the stream.

Liberty Creek

Liberty Creek is classified as a Class II (1 mile) and Class III (3 miles) trout stream for four miles of its length. About 2.5 to 3 miles are within the Liberty Creek State Wildlife Area. A high quality wetland complex exists adjacent to the creek. Liberty Creek is considered an Exceptional Resource water (ERW). The least darter, a Wisconsin species of special concern, has been reported in this stream. It continues to support low numbers of brown trout, but good numbers of mottled sculpin, a coldwater indicator species. Some streambank work has been done downstream of Elmer Road.

Ross Crossing Creek

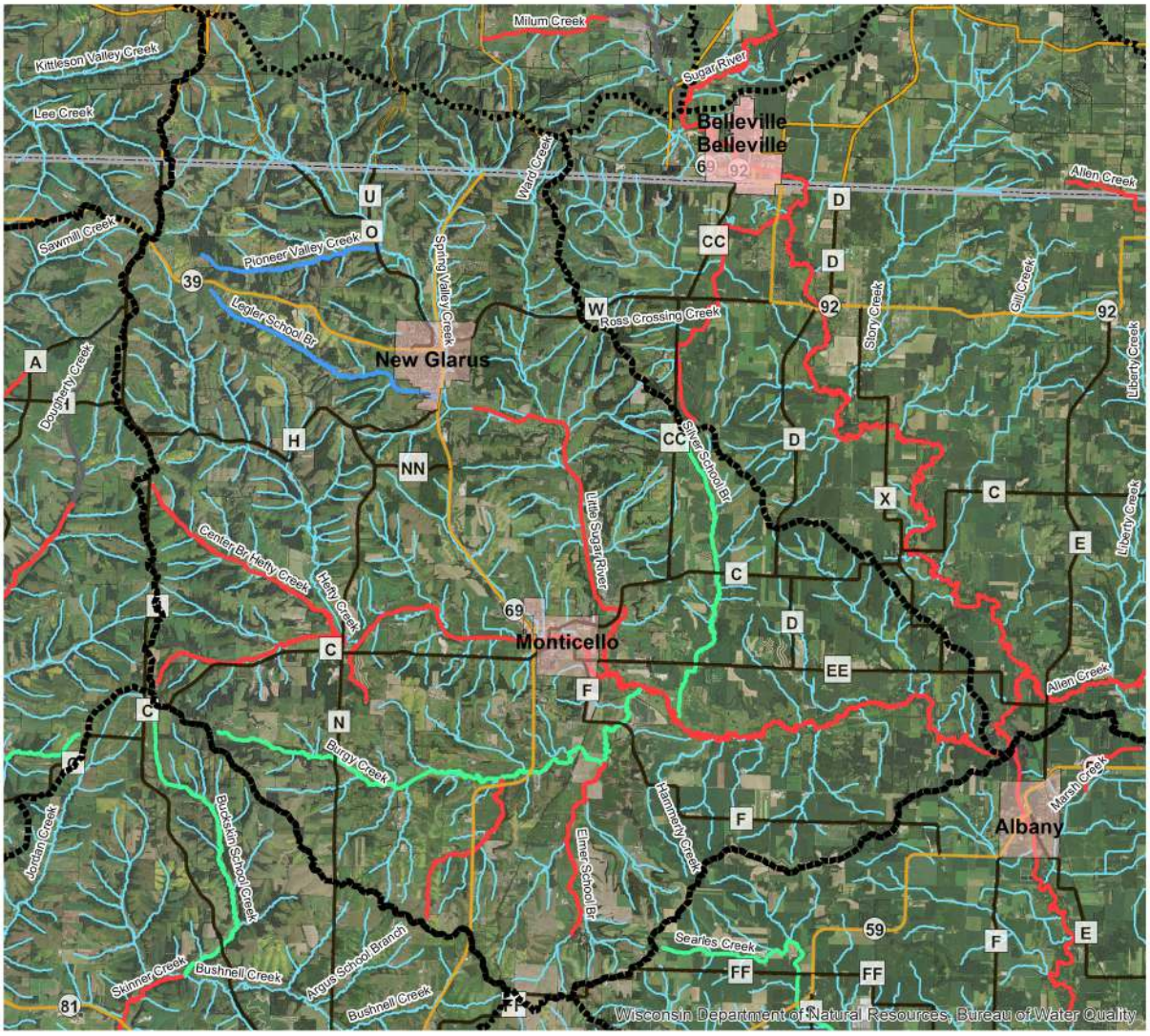
Ross Crossing Creek is a warm water forage fishery with the potential to become a cold water sport fishery. The Redfin Shiner, a fish on the Wisconsin watch list, has been found here. The stream was recently added to the state's antidegradation (NR 102) as an exceptional resource water (ERW), affording it a greater level of protection.

The 2018 assessments of Ross Crossing Creek by DNR showed impairment by phosphorus; new total phosphorus sample data exceeded the 2018 WisCALM listing criteria for the Fish and Aquatic Life use. However, no biological data (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scores) were available to assess biological impairment. Based on the most updated information, this water was proposed for the impaired waters list.

Albany Lake (Lake Winnetka)

This lake is an impoundment of the Sugar River at Albany. It has poor water quality, similar to other impoundments in the driftless area. This 102 acre lake has a drainage area of about 465 square miles. Sedimentation and turbidity impair uses of the lake. A best-case scenario for the Sugar River at Albany is that the dam be operated as "run of the river" dam, allowing much of the existing millpond to become a riverine wetland complex. The Albany State Wildlife Area borders the northwest corner of the lake.

Little Sugar River Watershed (SP14)



Watersheds
Municipalities

Highways
Other Road Class

RoadClass
State Hwy
County Hwy
County Boundaries
Rivers/streams

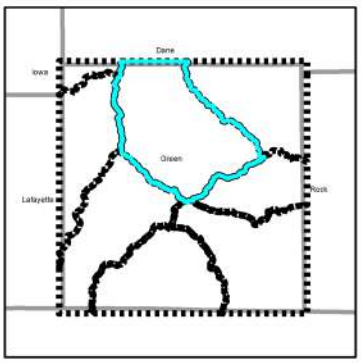
2020 Aerial Photo

Impaired River Waters Status
Other or Multiple TMDLs

Impaired Water Status
Proposed for List
303d Listed
Addition
TMDL Development
TMDL Approved
TMDL Implementation
Deletion
Delist
Water Delisted
EAP Project

0 0.75 1.5 3 Miles

N
W E
S



Green County LWCD, April 2021

Little Sugar River (SP14)

The Little Sugar River Watershed lays in north central Green County and a very small portion of southern Dane County. Agricultural land uses dominate, especially dairying, cash crops, and feeder operations. Two municipal wastewater treatment plants discharge to surface water in the watershed: New Glarus and Monticello. New Glarus is the beginning of the Sugar River State bicycle trail which parallels the Little Sugar River and Sugar River from New Glarus to Brodhead.

Burgy Creek

Burgy Creek is a 10 mile long tributary to the Little Sugar River. It is an Exceptional Resource Water (ERW) because redside dace (a state species of concern) were historically found in this stream, but is also on the state's list of impaired waters due to habitat loss from sedimentation (WDNR, 2003). The majority of species found in Burgy Creek, specifically an abundance of mottled sculpin, indicate that this is a cool-cold system, capable of supporting trout. In the 2011 survey, a total of 8 brown trout were found in the 4 sites surveyed. Upstream from Center Road, the stream had good habitat. Downstream from there, and despite habitat scores generally ranging from 40 to 45 or "fair", stream channel ditching, bank erosion and a high bedload of sediment have degraded the habitat of the stream. Water temperature monitoring should be conducted on this stream. Cool-cold index of biotic integrity (IBI) scores indicate a fair to excellent fish IBI. However, based on the contemporary assessment of the stream condition and lack of habitat, this stream has greater potential and it should continue to be listed as impaired. Future management could include grading and stabilizing banks, maintaining a good buffer, and placing root wads to enhance habitat for gamefish.

Elmer School Branch

Elmer School Branch is a 4 mile long tributary to Burgy Creek. The natural community model predicts this stream to be a cool-cold headwater and indeed, the species assemblage is made up of mottled sculpin, white sucker and brook stickleback. Instantaneous water temperatures taken in summer, 2011 were cold (13.5 – 15ºC). While the upper third of the stream has good habitat (albeit high sediment), the lower sections are marked by little buffer, eroding banks, and high bedload of sediment. The stream is deeply entrenched and habitat is limited. Additionally, there is a farm near the headwaters with leaking and/or overtopping manure pit issues. The DNR should work with the LWCD to remedy this chronic problem. The DNR also listed this stream as impaired in 2014 due to habitat degradation caused by sedimentation, which thereby limits the attainable use for this stream. The stream remains impaired for sediment as of 2020.

Hammerly Creek

Although USGS maps show Hammerly Creek to be a 3 mile long stream which starts upstream of Gilbertson Road, the principal water source for this stream is a large spring just south of CTH F. Historically, the creek was a natural brook trout stream with well defined banks, deep pools, and abundant riffles (WDNR, 2003). The spring was excavated and dammed to form a pond for a private fish hatchery which is no longer in operation. According to historical accounts, the habitat has been so degraded that trout fishing is supported only through stocking (Ibid). The current version of the Wisconsin Trout Streams (2011) still lists this lower mile as a Class III trout water; however, it has not been stocked in the past 15 years. Water temperatures below this spring are cold (12.6ºC). This limits the number of species capable of tolerating these cold temperatures. The 2011 survey found only 2 brook stickleback below CTH F. The lower ½ mile of stream runs through a large wetland area. A 2002 survey conducted at the bike trail, just

upstream of Hammerly Creek's confluence with the Little Sugar River found 7 species including mottled sculpin, Johnny and Iowa darters, white suckers and central mudminnows, but reported no trout. The DNR should conduct further monitoring of this lower section to determine its status as a trout water, to evaluate the stream for impaired waters status and determine a management strategy for this stream.

Hefty Creek

This main or north branch of Hefty Creek has its headwaters near the junction of CTH J and STH 39 and flows southeast and merges with South Branch and Center Branch Hefty Creeks to form the West Branch Little Sugar River. Most of the North Branch Hefty Creek is classified as a Class III trout stream and an ERW because the redside dace, a state species of concern, has historically been found in its waters. This is the only stream in the watershed where redside dace have been reported in recent surveys including 2000, 2002, and 2009. The upper portions are mostly gravel, rubble, and hardpan with some areas of sediment, while the lower areas are more muck. The state has purchased easements and worked with the LWCD to improve habitat in many areas along the middle sections of this stream. The stream is stocked annually with both adult and fingerling brown trout and limited numbers of rainbow trout.

Hefty Creek (Center Branch)

The Center Branch Hefty Creek is a five mile long tributary to North Branch Hefty Creek. Like North Branch, it is an ERW because redside dace were historically found there. It is modeled to be a cool-cold headwater and the 2011 survey found brown trout and mottled sculpin were the dominant species. The stream was surveyed at two sites. The upstream site at Hefty Road flowed through a wooded corridor. The stream had lots of silt and highly erodible banks and very little cover for fish. There is a perched culvert at Hefty Road that likely impedes the movement of smaller, less-mobile fish species. The lower site at CTH N had better habitat and more fish. This stream was added to the impaired waters 303(d) list in 2014 because of habitat degradation caused by high sediment, channelization, and hydraulic modification.

Hefty Creek (South Branch)

The South Branch Hefty Creek flows eastward along CTH C for three miles where it joins the main branch of Hefty Creek to form the West Branch Little Sugar River. Species common in cool-cold headwater streams such as mottled sculpin, white sucker, and brook stickleback made up the bulk of the fish assemblage. They were present in moderate numbers and made good use of the limited cover available. Both sites surveyed had lots of sand, silt or clay, no pools, riffles, and few bends. The stream could harbor some numbers of brown trout, but the coldwater IBIs were only fair to poor. The stream was added to the 303(d) impaired waters list in 2014 because degraded habitat limits its attainable use.

Hustad Valley Creek

Hustad Valley Creek is a 4 mile long tributary to the Little Sugar River. It has a high gradient and relatively well buffered corridor. Although there are a few pastured areas along the stream, much of its length is through wet meadow. As a result, it is one of the best looking streams in the watershed. Its small size, cold water temperature (17°C) and gravel bottom make it look like potential brook trout water. However, there is the question of whether there is enough over-winter cover to appeal to gamefish once the overhanging grasses have died back. It currently harbors mottled sculpin and creek chub.

Krieg Valley Creek

This small, high gradient stream is impacted by controllable and non-controllable factors. It is flow limited, but deeply entrenched and channelized to follow Pioneer Road. In the absence of other factors, the stream would probably hold limited numbers of non-game species, such as mottled sculpin and brook stickleback. No fish were found in the 2012 survey. While realizing the limited attainable use of this small system, the department should consider listing the stream as impaired due to poor habitat because of nonpoint source pollution and hydrologic modification.

Lake Montesian

This small man-made lake lies entirely in a park on the west side of Monticello. The 7-acre lake is fed by springs and an artesian well. An overflow outlets to the West Branch Little Sugar River. The community has applied for and received designation of Lake Montesian as a licensed fish farm and as such, the municipality is responsible for its management. The lake is constantly plagued with overgrowth of macrophytes because of the nutrient rich waters, but does provide anglers with a local fishing opportunity as the lake supports largemouth bass, panfish, and northern pike.

Legler School Branch

Legler School Branch is a spring fed stream in the Little Sugar Watershed. The stream is a tributary to the Little Sugar River, an ERW and Class II trout fishery. Legler School Branch was listed on the state's list of impaired waters due to degraded habitat caused by excessive sedimentation caused by nonpoint source pollution in 1998. Much of the stream runs through either pasture or wooded corridor. Brown trout and mottled sculpin are the predominant species in the stream and a good indicator of cold-cool water temperatures. In the wooded areas, the stream is generally wide and shallow, with little cover save for woody debris. The study conducted in 2011 compared sites adjacent to one another – one in a pastured wet meadow and the other in a wooded corridor. The site in the wet meadow, although pastured, had much better habitat and contained multiple year classes of brown trout. Despite all the perturbations, there were young-of-the-year trout found at both sites indicating there is some natural reproduction and showing the stream has great potential to be a functioning trout stream if improvements are made. The LWCD applied for and received grants from the state and Environmental Protection Agency (EPA) to enact best management practices in the subwatershed. This includes addressing runoff from barnyards and crop fields as well as stream corridor improvement by cutting nuisance trees, sloping and stabilizing banks. The project went from 2012 and continued until 2015. Monthly monitoring for water chemistry monitoring was conducted during the growing season (May to October) in 2012.

A follow up project completed monitoring on Legler School Branch and Pioneer Valley Creek in 2017. While wide variation in trout population and size structure was observed at various sites in both systems where riparian stream work was not done, it was consistently evident that the rehabilitation project was successful in increasing numbers of trout for those areas where the work was done. Riparian stream corridor improvement had the desired result of reducing streambank erosion and improving fish habitat. The fish IBIs are favorably in the fair to good category and the macroinvertebrate community is healthy and indicates good water quality. Habitat assessments for sites that were rehabilitated, as well as for those that were not, are consistently in the "good" range. Therefore, the DNR recommends that both Legler School Branch and Pioneer Valley Creek be removed from the state's 303(d) list of impaired waters during the 2022 assessment cycle.

Little Sugar River

The river that gives the watershed its name flows 28 miles from southern Dane County south into Green County through New Glarus, where it then turns southeast toward Monticello. It then turns east and joins the Sugar River just upstream of the Albany Millpond. Although the upper 12 miles of stream above CTH EE are cold-cool waters according to the natural community model, it is the upper 6 miles of stream above Valley View Road commonly referred to as "New Glarus Branch" that are considered Class II trout waters.

The DNR has been working with the LWCD to improve habitat in this section of river. Streambank shaping and stabilization and installation of habitat structures have improved numbers of brown trout in the upper river.

This upper portion of the river is dominated by brown trout, mottled sculpin, and white sucker. As one moves below New Glarus, the river increases considerably in size. While it still contains brown trout and mottled sculpin, other species begin to appear. Warmer water species such as northern pike, redhorse species, and even carp begin to appear.

There is a five-mile stretch of the Little Sugar River from CTH EE to Tin Can Road that was not assessed because it is too deep for wading, but has no boat access. Approximately 1200 acres of wetlands adjoin the lower portion of the river as part of the Albany State Wildlife Area, which provides valuable habitat for wildlife, buffers the stream and provides other important wetland functions. The river was surveyed from Tin Can Road down to the confluence with the Sugar River using a mini-boom shocker. Northern pike were the predominant game species, with smallmouth bass and flathead catfish also present. Silver and golden redhorse, quillback carpsucker, smallmouth buffalo and common carp were common. No cold or coolwater species were observed.

Certain sections of the Little Sugar River, particularly from New Glarus to Monticello are channelized. The bottom has been dredged, making the bottom a featureless U-shaped channel. The DNR worked with the LWCD and Green County Drainage District on a plan to cut nuisance trees along the river bank, but keep or enhance habitat in the stream. One option is to keep certain trees in the stream to serve as habitat for fish. Bank sloping and stabilization will help reduce sediment loading to the systems while allowing augmenting flow capacity during high water events. Another option would be to create small meanders within the channel by either letting tree falls remain in the stream, or by creating barbs to redirect flow from one side of a channel to the other and adding root wads or other instream structures to provide habitat for fish.

The Little Sugar River, from the mouth to Ward Creek, was placed on the impaired waters list for total phosphorus in 2012 by the DNR. 2016 and 2018 assessments showed continued impairment by phosphorus; however, available biological data did not indicate impairment

Little Sugar River – West Branch

The West Branch Little Sugar River forms from the junction of the North, Center, and South Branch Hefty Creeks and flows eastward almost 7 miles where it joins the Little Sugar River southeast of Monticello. It has been channelized for much of its length to enhance drainage of the wetlands and hydric soils through which it runs. As a result, this low gradient stream is deeply entrenched, has little habitat for fish, and contains a high amount of sediment. Its waters are cool enough to support populations of brown trout and mottled sculpin, as well as small populations of northern pike, but lack of habitat limits the numbers of game and nongame species of any kind. The stream has the size to support numbers of trout, but coldwater IBI scores are poor and trout densities are low compared to streams of similar size in the watershed. The West Branch Sugar River was listed as an impaired water in 2014 because of habitat degradation caused by hydrologic modification (channelization) and excessive sediment. As with other streams in this watershed of similar nature, it is unlikely that most landowners would choose to re-meander the miles of stream channels that have been straightened. One option would be to create small meanders within the channel by either letting tree falls remain in the stream, or by creating barbs

to redirect flow from one side of a channel to the other and adding root wads or other instream structures to provide habitat for fish.

Pioneer Valley Creek

This stream runs through a highly pastured and/or wooded corridor which results in a fairly poor quality stream with scarce bank cover and heavy erosion. The small watershed size limits the flow. Only small numbers of forage species are present in the stream. It was listed on the state's 303(d) list of impaired waters due to degraded habitat caused by excessive sedimentation caused by nonpoint source pollution in 1998. In conjunction with a project on Legler School Branch, the LWCD applied and received grants from the state and Environmental Protection Agency (EPA) to enact best management practices in the subwatershed. This includes addressing runoff from barnyards and crop fields as well as stream corridor improvement by cutting nuisance trees, sloping and stabilizing banks. The project was from 2012 through 2015. Subsequent sampling of the fishery of Pioneer Valley in 2012 showed the small stream to harbor fair numbers of brown trout and mottled sculpin (unpublished data). Water chemistry was conducted during the growing season of May to October in 2012.

A follow up project completed monitoring on Legler School Branch and Pioneer Valley Creek in 2017. While wide variation in trout population and size structure was observed at various sites in both systems where riparian stream work was not done, it was consistently evident that the rehabilitation project was successful in increasing numbers of trout for those areas where the work was done. Riparian stream corridor improvement had the desired result of reducing streambank erosion and improving fish habitat. The fish IBIs are favorably in the fair to good category and the macroinvertebrate community is healthy and indicates good water quality. Habitat assessments for sites that were rehabilitated, as well as for those that were not, are consistently in the "good" range. Therefore, the DNR recommends that both Legler School Branch and Pioneer Valley Creek be removed from the state's 303(d) list of impaired waters during the 2022 assessment cycle.

Silver School Branch

The species assemblage of this small tributary to the Little Sugar River indicates it is a cool-coldwater headwater as the natural community model suggests. Mottled sculpin and brook stickleback are found in the upper stretches of the stream. A few brown trout are found in the lower portions. It is currently on the 303(d) list because of habitat degradation caused by high sediment. This stream is also within a sediment TMDL area, approved by USEPA in 2005.

With that said, this water was assessed by DNR during the 2018 listing cycle; available biological data do not indicate impairment according to 2018 WisCALM listing criteria for the Fish and Aquatic Life use (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scored in the "poor" condition category). Indeed, the habitat scores were "fair" but fine sediment was prevalent throughout the channel. The lower section had lots of sand, was fairly shallow, and offered little cover for fish. Its small size limits the fish that Silver School Branch can hold, but it could be argued that with some habitat improvements, particularly downstream from CTH C, the stream could hold some trout. At this point, Silver School Branch should remain on the impaired waters list until further management decisions can be made.

Spring Valley Creek

Originating near the Dane County line, Spring Valley Creek runs southward along STH 69 and joins the Little Sugar River on the north side of New Glarus. Much of it was straightened to accommodate the highway, but it does have some small meanders within its riparian corridor. The stream flows through former agricultural land but the transition from agricultural to residential uses has allowed more stable banks and development of good herbaceous bank cover.

Its cold water (approximately 15ºC) allows for the presence of trout and mottled sculpin. Redside dace, a state species of concern, was historically found here and resulted in Spring Valley Creek being designated as an ERW. Much of the stream channel is narrow and deep with macrophytes, overhanging vegetation, and undercut banks providing cover. The key to maintaining this stream is to keep the riparian buffer, manage the woody vegetation to allow for sunlight penetration and stable, grassed banks, and to allow the bedload of sediment an opportunity for flush out.

Ward Creek

Ward Creek is a small stream that begins near the Green-Dane County line and flows south for 4 miles before entering the Little Sugar River east of New Glarus. It flows through an agricultural valley, but there is some buffering along the banks with grasses and shrubs. Much of the stream has been channelized. The lower 2 miles, from approximately CTH W to the mouth, are Class III trout water. It is also designated as an ERW because the redside dace, a state species of concern, was historically found there. Only trout and mottled sculpin were found in the surveys conducted at 2 sites in 2011. Ward Creek is stocked annually with yearling trout. However, a good percentage of the trout found at both sites were young-of-the-year, indicating that natural reproduction must be occurring. Water cress is abundant and that, along with overhanging vegetation and good depth, provides good habitat for trout. While the buffers along the stream are good, there is some bank erosion and moderate bedload of sediment. Certain sections of this stream would benefit from tree removal and sloping, shaping, seeding of the banks. Fisheries management may want to consider reclassification of Ward Creek to Class II because of the apparent good natural reproduction.

Recommendations:

Management of highly channelized systems to improve habitat will be difficult. One option would be to create small meanders within the channels by either letting tree falls remain in the streams, or by creating barbs to redirect flow from one side of a channel to the other and adding root wads or other instream structures to provide habitat for fish. On smaller systems, simply removing the box elder and other nuisance trees and stabilizing the banks in grasses, then maintaining the corridor would improve habitat and reduce sediment load from bank erosion. On larger, deeply entrenched streams, grading back to a 2 to 1 or greater slope and stabilizing the banks would reduce the hydraulic energy during higher flow events, allow good drainage, but mitigate erosion. The current fauna indicate that most of the systems of this watershed are cold-cool transitional systems, and while they contain moderate populations of non-game species, many of the named (larger) streams have the potential to harbor fair to good numbers of trout, the lack of habitat currently limits their potential.

The DNR should return to Legler School Branch and Pioneer Valley Creek as part of the fisheries trout stream rotation scheduled for 2021. Fisheries can then decide if these systems meet the criteria for classifications as trout water.

The natural communities of Legler School and Pioneer Valley should be confirmed as cold systems.

The designation for Krieg Valley Creek should be updated to reflect its status as a cold-transitional (cool-cold) headwater.

If they so desire, the LWCD should seek opportunities to work with more riparian landowners to improve habitat or protect the riparian corridor, especially for systems that have the potential to be quality cold water resources.

The village of New Glarus should identify opportunities and take measures to protect the Little Sugar River, and Spring Valley Creek such as enacting and enforcing a stormwater management ordinance, improved enforcement of construction site erosion control provision, and acquisition

of parkland and natural areas adjacent to the Little Sugar River and along drainageways leading to the river.
Residents in the Pioneer Valley sub-watershed should be encouraged to sign up for CREP.

Overall Recommendations for Waters in the County

The DNR should work with the county and watershed organizations such as the Lower Sugar River Watershed Association, Decatur Lake Management and Rehabilitation Association, and Farmers of the Sugar River on outreach efforts with landowners in the watershed, environmental programs throughout the county, and research opportunities for harvestable buffers, no till, cover crops, and other practices to provide economic incentives, minimize soil erosion, promote infiltration of water, and mitigate non-point source pollution.
Management of highly channelized systems to improve habitat will be difficult. One option would be to create small meanders within the channels by either letting tree falls remain in the stream, or by creating barbs to redirect flow from one side of a channel to the other and adding root wads or other instream structures to provide habitat for fish. On smaller systems, simply removing the box elder and other nuisance trees and stabilizing the banks in grasses, then maintaining the corridor would improve habitat and reduce sediment load from bank erosion. On larger, deeply entrenched streams, grading back to a 2 to 1 or greater slope and stabilizing the banks would reduce the hydraulic energy during higher flow events and allow good drainage, while mitigating erosion.
If they so desire, the LWCD should seek opportunities to work with more riparian landowners to improve habitat or protect the riparian corridor along streams throughout the county.
Past projects have shown to increase the value of streams. Streambank erosion has decreased and sediment has been removed from the stream bottom, creating holes for fish to congregate. The stream bottoms have gone from silt to now a sandy bottom. Landowners should look into EQIP and SWRM funding opportunities to help offset the cost of these projects.

Green County - Impaired Waters and DNR Priority Watersheds

Impaired Waters in Watershed (SP01)

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
Honey Creek	9.88	16.48	Total Phosphorus	Impairment Unknown	303d Listed
Honey Creek	9.88	16.48	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Richland Creek	21.61	35.11	Total Phosphorus	Impairment Unknown	303d Listed
Twin Grove Branch	0.00	5.96	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved
Honey Creek	0.62	9.88	Total Phosphorus	Impairment Unknown	303d Listed
Honey Creek	0.62	9.88	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed

Impaired Waters in Watershed (SP02)

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
Beckman Lake			E. coli	NA	Water Delisted - 2006
Pecatonica River	93.05	144.80	Total Phosphorus	Impairment Unknown	303d Listed
Argus School Branch	0.00	2.37	Sediment/Total Suspended Solids	NA	Water Delisted - 2014
Skinner Creek	0.00	14.00	Total Phosphorus	Impairment Unknown	303d Listed
Jordan Creek	0.00	6.00	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Buckskin School Creek	0.00	6.71	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved

Impaired Waters in Watershed (SP03)

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
Dougherty Creek	13.97	16.59	Total Phosphorus	Low DO, Degraded Biological Community	TMDL Approved
Dougherty Creek	13.97	16.59	Sediment/Total Suspended Solids	Low DO	TMDL Approved
Dougherty Creek	13.97	16.59	BOD	Low DO	TMDL Approved
Dougherty Creek	13.97	16.59	Unknown Pollutant	Elevated Water Temperature	303d Listed
Jockey Hollow Creek	0.00	3.10	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved
Braezels Branch	0.00	4.06	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved
Prairie Brook	0.00	3.11	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved
Erickson Creek	0.00	5.74	Total Phosphorus	Impairment Unknown	303d Listed
Dougherty Creek	0.00	13.98	Total Phosphorus	Degraded Biological Community	303d Listed

Impaired Waters in Watershed (SP11)

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
N. Fork Juda Branch	1.68	3.80	Total Phosphorus	Low DO, Degraded Biological Community	Pollutant Removed - 2020
N. Fork Juda Branch	1.68	3.80	BOD	Low DO, Degraded Biological Community	303d Listed
Sugar River East Channel	0.00	3.19	Total Phosphorus	Impairment Unknown	303d Listed
Decatur Lake			Total Phosphorus	Impairment Unknown	303d Listed
Riley School Branch	0.00	4.75	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Riley School Branch	0.00	4.75	Total Phosphorus	Degraded Biological Community	303d Listed
Spring Creek	0.00	10.31	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved
Ok Creek	0.00	6.82	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Ok Creek	0.00	6.82	Total Phosphorus	Degraded Biological Community	303d Listed
Juda Branch	0.00	4.43	Total Phosphorus	Impairment Unknown	303d Listed
Juda Branch	0.00	4.43	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
N. Fork Juda Branch	0.00	1.68	Total Phosphorus	Low DO, Degraded Biological Community	303d Listed
N. Fork Juda Branch	0.00	1.68	BOD	Low DO	303d Listed
Sugar River	10.99	31.88	Total Phosphorus	Impairment Unknown	303d Listed

Impaired Waters in Watershed (SP12)

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
Sugar River	33.20	38.45	Total Phosphorus	Impairment Unknown	303d Listed
Sugar River East Channel	0.00	3.19	Total Phosphorus	Impairment Unknown	303d Listed
Decatur Lake			Total Phosphorus	Impairment Unknown	303d Listed
Searles Creek	0.00	10.33	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved
Sugar River	38.45	56.14	Total Phosphorus	Impairment Unknown	303d Listed
Unnamed Stream	0.00	1.51	Total Phosphorus	Impairment Unknown	303d Listed

Impaired Waters in Watershed (SP13)

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
Allen Creek	22.96	26.98	Total Phosphorus	Degraded Biological Community	303d Listed
Upper Sugar River	56.14	82.33	Total Phosphorus	Impairment Unknown	303d Listed
Allen Creek	0.00	10.57	Total Phosphorus	Impairment Unknown	303d Listed
Ross Crossing Creek	0.00	5.20	Total Phosphorus	Impairment Unknown	303d Listed
Sugar River	38.45	56.14	Total Phosphorus	Impairment Unknown	303d Listed

Impaired Waters in Watershed (SP14)

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
Unnamed Trib to Burgy Cr	0.00	3.82	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Little Sugar River	0.00	19.76	Total Phosphorus	Impairment Unknown	303d Listed
Elmer School Branch	0.00	4.00	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed

Local Name (Click for Map)	Start Mile	End Mile	Pollutant	Impairment	303 Status
Silver School Branch	0.00	6.14	Sediment/Total Suspended Solids	Degraded Habitat	TMDL Approved
Burgy Creek	0.00	10.99	Sediment/Total Suspended Solids	Elevated Water Temperature	TMDL Approved
Little Sugar River, West Branch	0.00	6.87	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Hefty Creek, South Branch	0.00	4.04	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Hefty Creek, Center Branch	0.00	5.24	Sediment/Total Suspended Solids	Degraded Habitat	303d Listed
Legler School Branch	0.01	5.50	Sediment/Total Suspended Solids	NA	Delist
Pioneer Valley Creek	0.00	4.16	Sediment/Total Suspended Solids	NA	Delist

Source: WDNR Impaired Waters Search tool - https://dnr.wi.gov/water/impairedSearch.aspx?status=TMDL_Approved

WORKGROUP PRIORITIES

Six priorities were set by the local workgroup. Those were:

1. Nutrient management
2. Groundwater protection
3. Soil health
4. Producer led watersheds
5. CRP/CREP
6. Education

The six priorities will be explained in more detail. Topics that could be discussed on each are such things as:

- Past practices done by the Land and Water Conservation Department that work well to reduce agricultural nonpoint source pollution sources.
- New ideas to be working on.
- Programs that should/could be utilized to address each priority.
- Goals.
- Information and education strategy.
- Other agencies and/or groups to help achieve goals.

This plan's priorities and goals will be evaluated annually and progress tracked through annual accomplishment reports.

1. Nutrient Management

Nutrient management needs to be a high priority for everyone. It is not only for the value added to the land, but that if nutrients are over applied and soil erosion on cropland is not minimized they may pollute our streams, lakes, and groundwater. The office must educate farmers on the usefulness and cost savings of a nutrient management plan.

1. Manure storage ordinance. Green County has and enforces a manure storage ordinance, originally adopted in May 1997 and revised in 2019.

2. Barnyard runoff. Over the past years, numerous barnyard runoff control systems have been installed with cost-sharing through federal and state funds. These projects are expensive, time consuming, and do not change the main problem that originally existed before installation of the project – management. Some of these barnyards have been abandoned and are now either sitting empty or have a horse or goat on them. However, some are being used and used well. These were well worth the money invested and they significantly reduce pollution. One thing must be remembered – these farmers are good managers.

3. The Animal Waste Advisory Committee recommended that everyone in Green County follow the four NR 151 animal waste prohibitions. These are as follows:

a. Livestock operations may have no overflow of manure storage structures.

b. Livestock operations may not have unconfined manure piles in a water quality management area. A water quality management area is described as either:

    1. + Within 1000 feet of the ordinary high-water mark of navigable waters that consist of a stream or river.

    2. + A site that is susceptible to groundwater contamination.

    3. + Has the potential to be a direct conduit to groundwater.

c. Livestock operations may have no direct runoff from a feedlot or stored manure into the waters of the state.

d. Livestock operations may not allow unlimited access by livestock to waters of the state in a location where high concentrations of animals prevent the maintenance of adequate sod cover.

4. Address Winter Spreading of Manure. The department doesn't feel that an ordinance is appropriate at this time. We will try to educate the daily haul farmers about the risks they pose by spreading next to streams and during run off events. These farmers are a focus to enroll in our Nutrient Management Farmer Education classes and the current 590 standard.

5. Livestock Siting Ordinance. Green County adopted this ordinance by the county board in November 2006 and revised in 2014. This ordinance regulates farms with 500 or more animal units or farms that expand by 20% or more. We have had four farms that have gone through the process and received a permit. It is in the best interest of all large farms to get a livestock siting permit, as it is a good insurance policy for them in the future in that neighbors can't complain regarding odor issues that may arise.

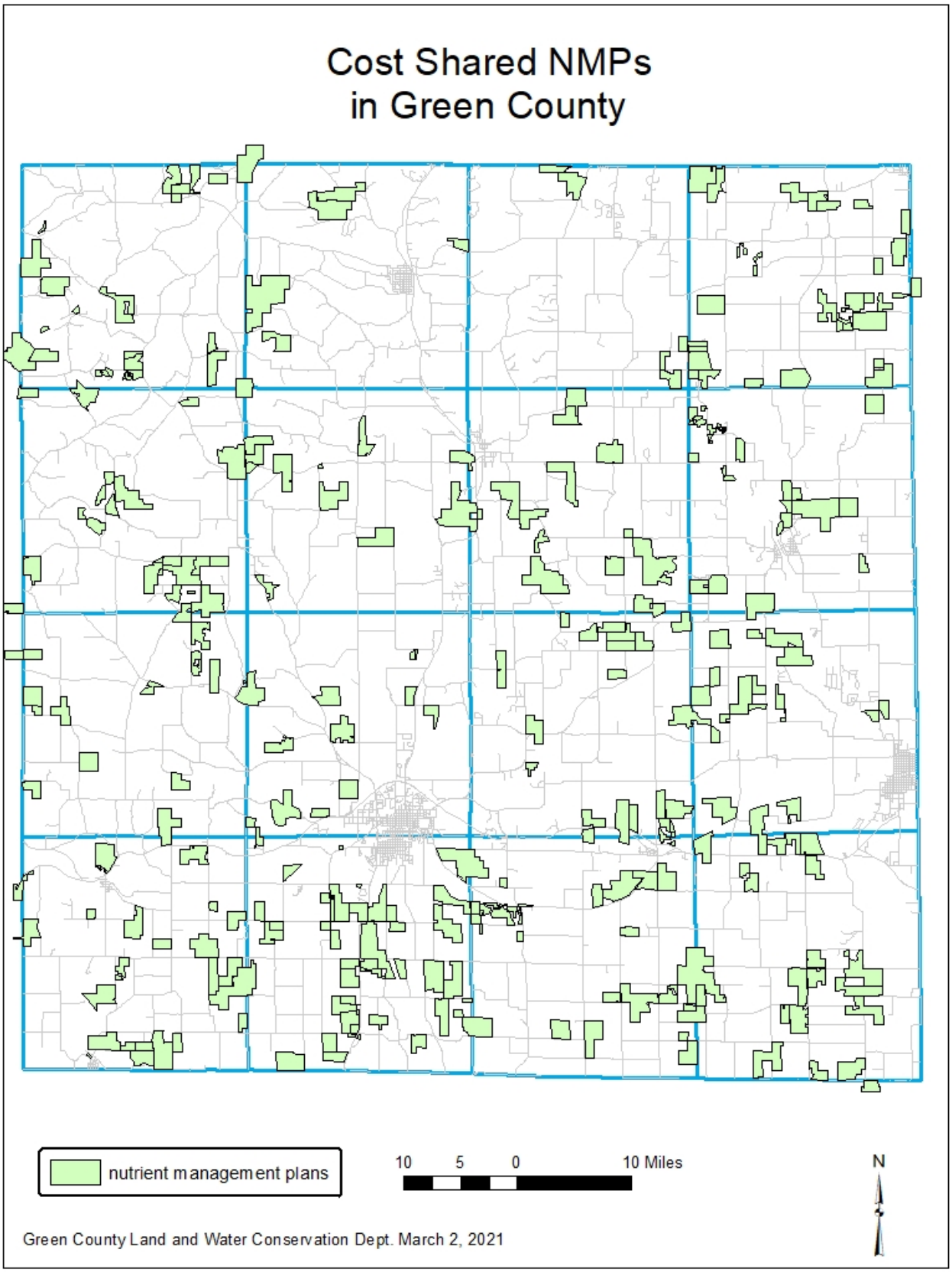
6. Manure Storage Inventory Inspections. The LWCD office will inspect all manure storages built and used in Green County to check the integrity of the structure. They will be checked on a five-year cycle.

7. Carbon sequestration credits and greenhouse gas conversations have begun and might be a player in the future. Several cities have and are looking at phosphorus trading with area farmers. This is an opportunity for municipalities and producers to work together for improving water quality.

8. We need to educate farmers of the value SNAP Plus provides to their operation. SNAP Plus helps them make better soil conservation decisions regarding crop rotations and tillage. It also helps them account for nutrients that the crop needs and what will be provided in the manure, fertilizers and existing supply in the soil to minimize nutrient losses from the system. One avenue might be to showcase some of

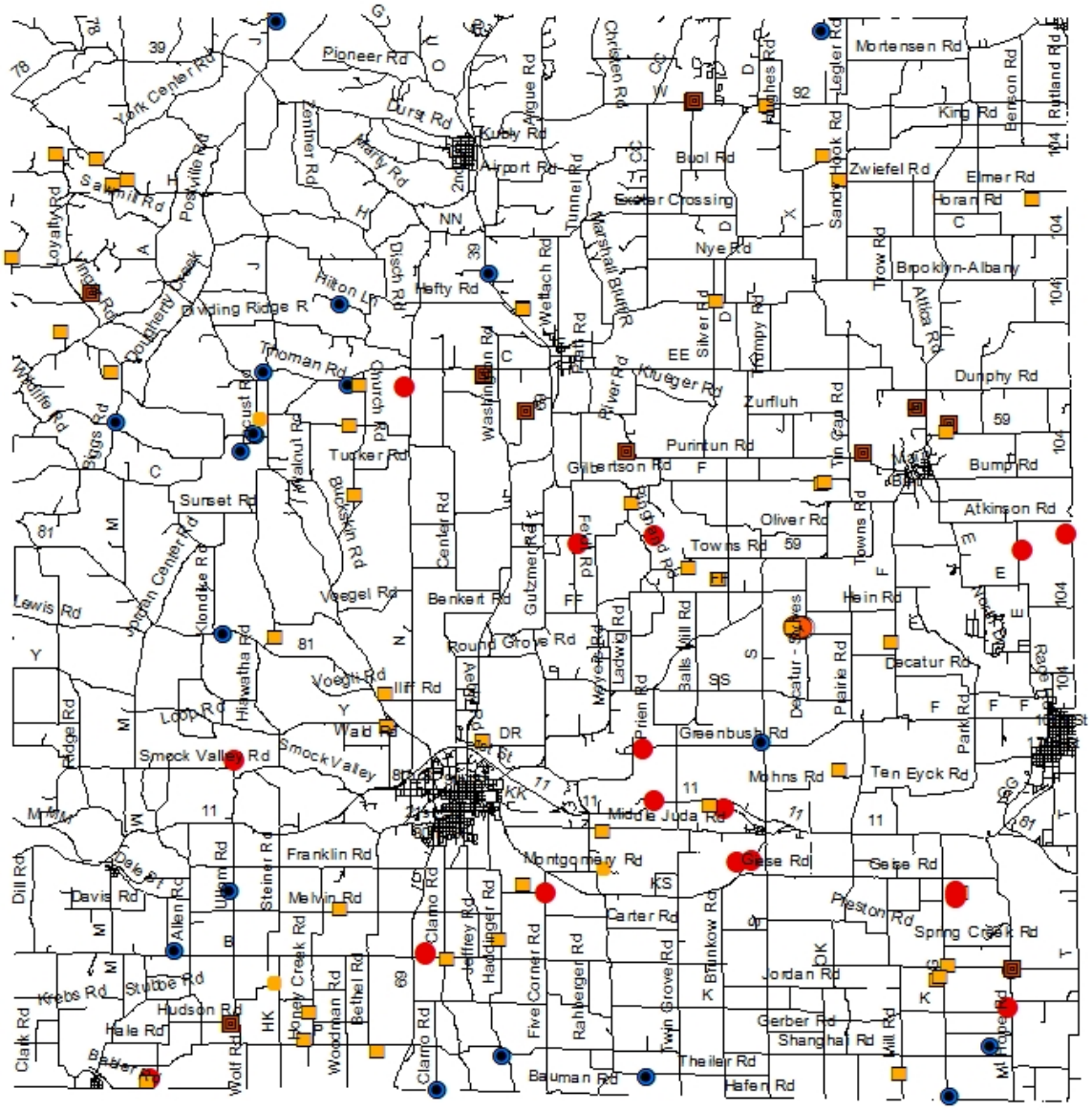
the apps that have been developed to make NM planning easier, since many farmers are using smart phones and tech savvy, this might be a way to help them learn and use SNAP Plus.

9. The percent adoption of NMPs in the county is below average probably because we lack and have a dwindling number of Farmland Preservation Program participants. The county has not adopted ag zoning and doesn't seem interested in pursuing it. The county has FPP agreements in place with landowners that were signed before 2009- that are honored until their expiration date. We plan to explore the interest, opportunities and possibilities of creating an Ag Enterprise Area (AEA) within the county this summer with public informational meetings. An AEA is a way for farmers to participate in the state program and receive tax credits.


Cost Shared NMPs
in Green County
nutrient management plans
10 5 0 10 Miles
N
Green County Land and Water Conservation Dept. March 2, 2021

Green County
Manure Storage Structures

With 30 days storage or more



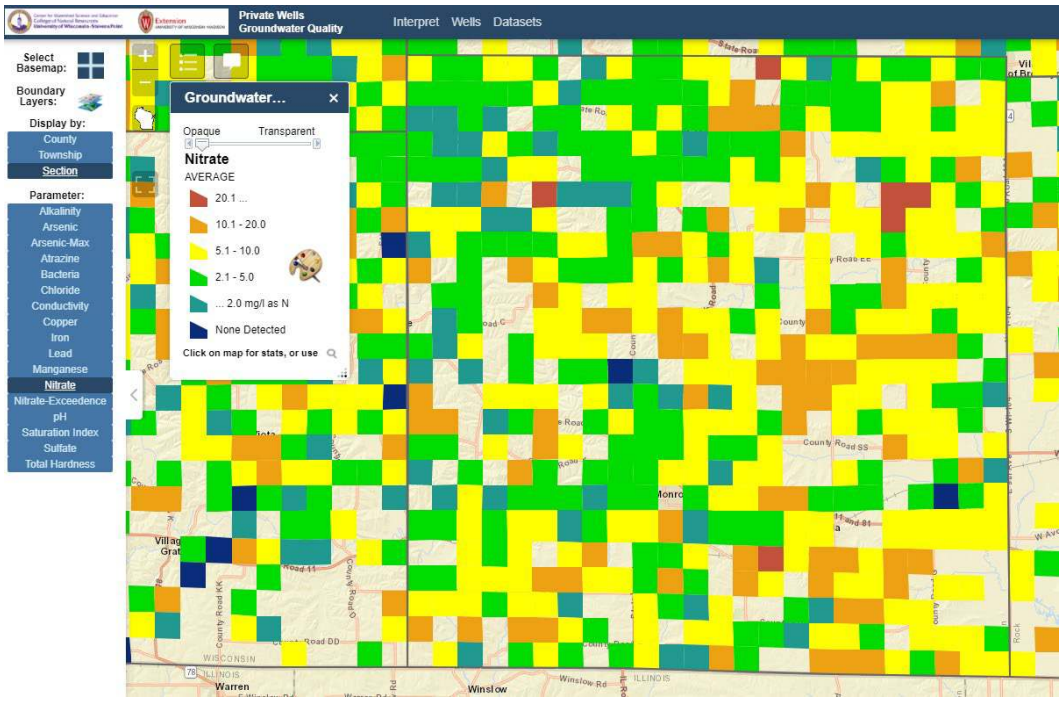
Green County Land & Water Conservation Dept., March 3, 2021

2. *Groundwater Protection*

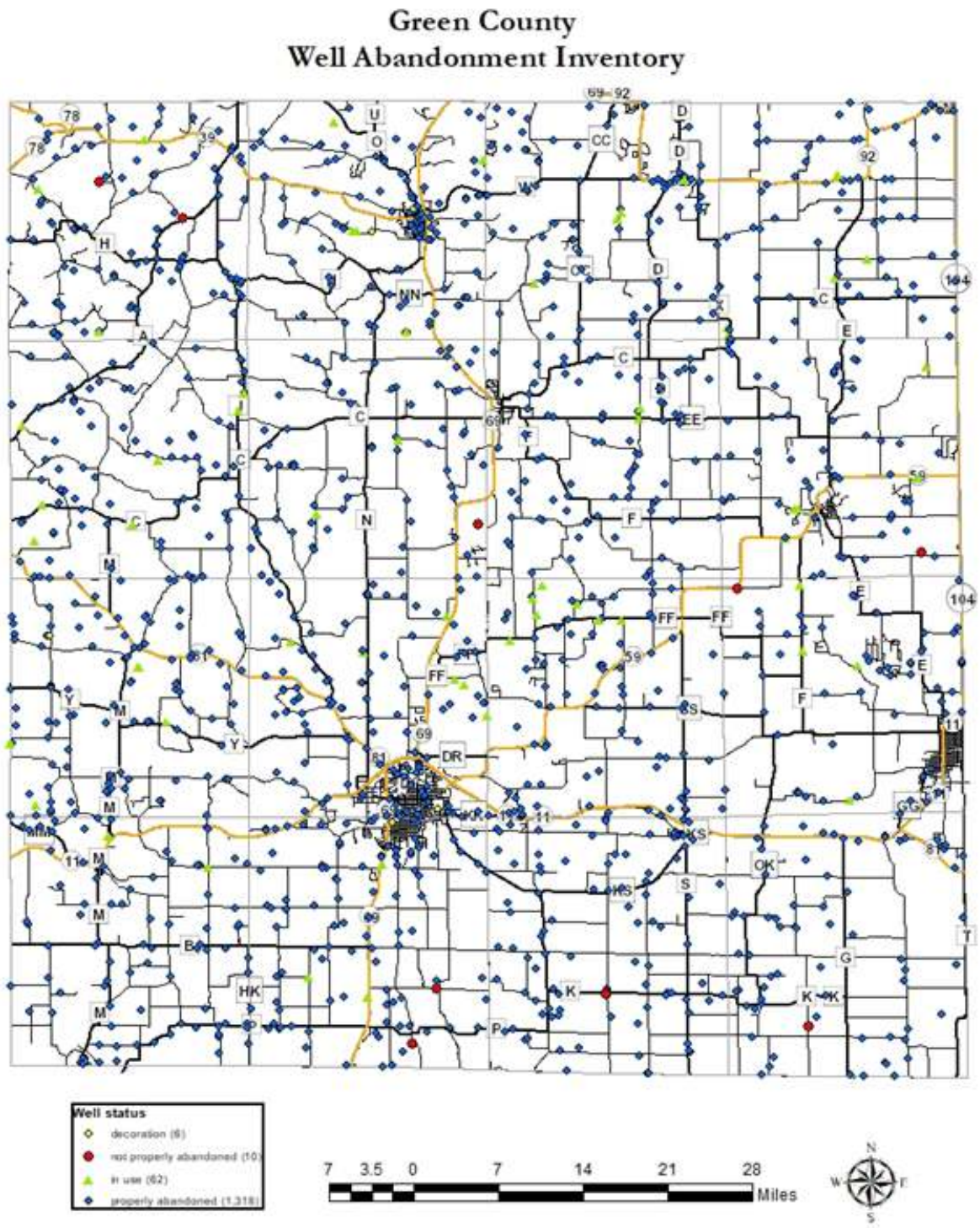
Green County has some of the most prolific groundwater resources in Wisconsin. Permeable geologic formations that provide and store groundwater are called “aquifers”. In Green County, the limestone and sandstone aquifers are thousands of feet thick. This can provide exceptional resilience to drought for public water supply, industrial and livestock use, and irrigated agriculture. The groundwater aquifer in Green County can be thought of as a large, subsurface reservoir naturally full of water.

The County’s groundwater resources can be the basis for a strong local economy. With sufficient planning for the location and depths of wells, the groundwater supply can support high water-use industries, such as food and beverage production and processing, irrigated agriculture, and livestock operations.

Green County hosts some of the most vulnerable groundwater resources in Wisconsin. In areas where bedrock formations are close to the land surface, overlain by just a few feet of soil, fertilizers, manure and other contaminants applied at the land surface readily pollute groundwater. Groundwater contamination in Green County has been verified with drinking water well data provided UW Stevens Point. According to Madeline Gotkowitz, Hydrogeologist of Wisconsin Geological and Natural History, in a report to the Livestock Facility Study Group in 2017, 70% of 2,662 well water samples collected in the county exceed naturally occurring nitrate concentrations (exceed 2 parts per million, ppm). Sixteen percent of the samples exceed the federal and state health-based nitrate standard, 10 ppm. Groundwater with high nitrate is often associated with other contaminants, such as bacteria or breakdown products of herbicides. In addition to the health risk posed to those who drink this water, poor groundwater quality has implications for County property values; a safe drinking water supply is part of the value of a home. Below is a snapshot of nitrate levels by section in the county from the UW-Stevens Point WI Well Water Viewer.

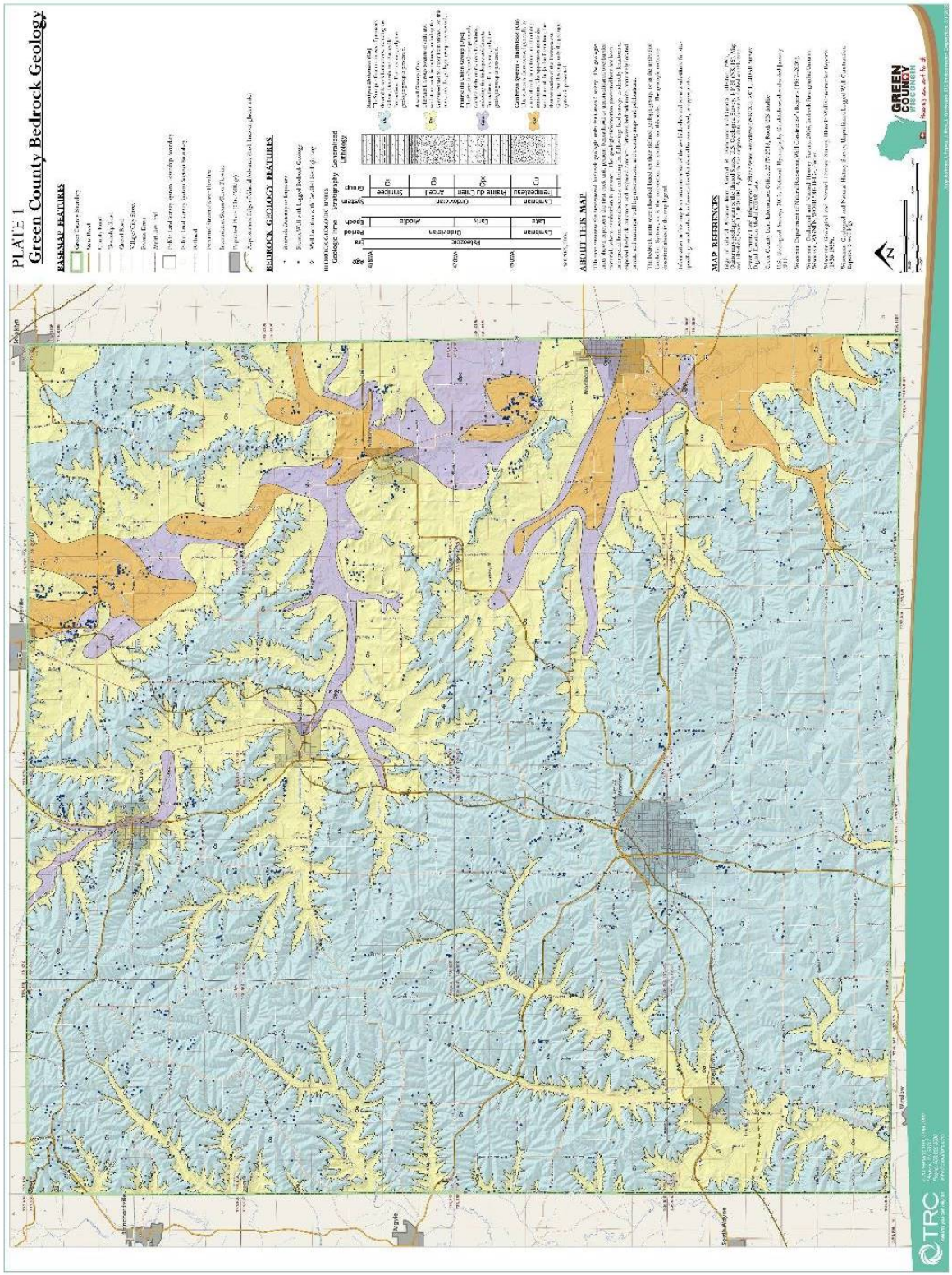


Green County adopted a Private Water Systems Ordinance in 2003. Cost-sharing money for well abandonment is available through LWRM and EQIP to properly abandon wells. The office is keeping a database on all wells that are either properly abandoned or should be properly abandoned. We have a record of 1,318 wells properly abandoned since 1953.



In September of 2008, the Green County Board of Supervisors adopted an amendment to the Private Water Systems Ordinance. This ensures that newly drilled wells are properly located and drilled. All new wells drilled in the county must apply for the permit.

In 2016, Green County hired TRC Environmental to do a groundwater resources and susceptibility study for the entire county. They used well construction reports, maps of springs and seeps, surface waters, bedrock outcrop survey, recharge model, and a groundwater susceptibility model to come up with the following five maps.



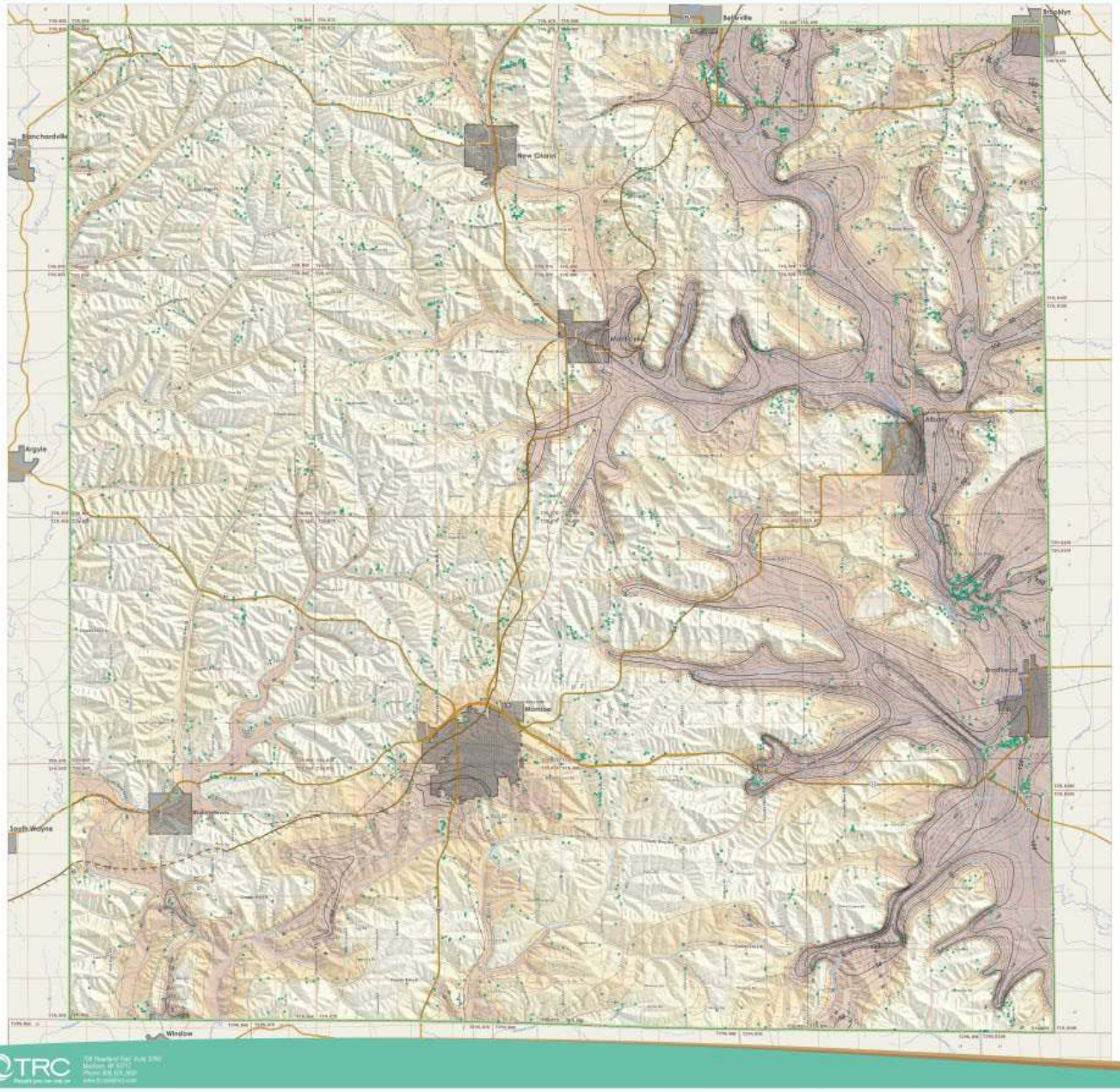


PLATE 2
Green County Depth to Bedrock

BASEMAP FEATURES

- Green County Boundary
- State Road
- County Road
- Township Road
- Gravel Road
- Village/City Street
- Private Drive
- Multi-use Trail
- Public Land Survey System Township Boundary
- Public Land Survey System Section Boundary
- Railroad
- Perennial Stream/River Flowline
- Intermittent Stream/River Flowline
- Populated Place (City/Village)
- Approximate Edge of Glacial Advance (hash lines on glacier side)

DEPTH TO BEDROCK FEATURES

- Bedrock Outcrop or Exposure
- Private Well Location with Depth to Bedrock

Depth to Bedrock / Overburden Thickness

- Depth to Bedrock / Overburden Thickness Contour (50' Interval)
- Depth to Bedrock / Overburden Thickness Contour (10' Interval)
- Shallow Bedrock: < 5' Thickness
- Deep Bedrock: > 10' Thickness

ABOUT THIS MAP

This map presents the interpreted depth from the ground surface to the first occurrence of bedrock beneath the soil or unconsolidated overburden. The information presented here has been interpreted from several sources, including the following: bedrock exposures identified during field surveys, well construction logs, and digital soil survey information.

Data were converted into a point format and interpolated in Geographic Information System software. Contours from the interpolated depth to bedrock surface were then reviewed and modified by geologists to better fit the conceptual understanding of the overburden thickness and bedrock topography.

Information in this map is an interpretation of the available data and is not a substitute for site-specific ground and subsurface studies that should be conducted, as appropriate.

MAP REFERENCES

Edge of Glacial Advance: from: Gerald M. Richmond and David S. Fullerton, 1983, Quaternary geologic atlas of the United States, U.S. Geological Survey, 1:1M (NK-16), Map and GIS data, Scale: 1:1,000,000. A gap in the original data is shown as dashed on this map.

Green County Land Information Office/Ayres Associates (WRGOC), 2011, LiDAR Survey Digital Elevation Model (DEM) data.

GREEN COUNTY LAND INFORMATION OFFICE, 2011/2015, Roads GIS (SHAPE).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for Green County, Wisconsin. 6/2011. Available online. Accessed 2017.

U.S. Geological Survey, 2013, National Hydrography Geodatabase, downloaded January 2018.

Wisconsin Department of Natural Resources, Well Contractor's Reports (1987–2004).

Wisconsin Geological and Natural History Survey, Historic Well Construction Reports (1930–1989).

Wisconsin Geological and Natural History Survey, Unpublished Logged Well Construction Reports, 4 well logs.

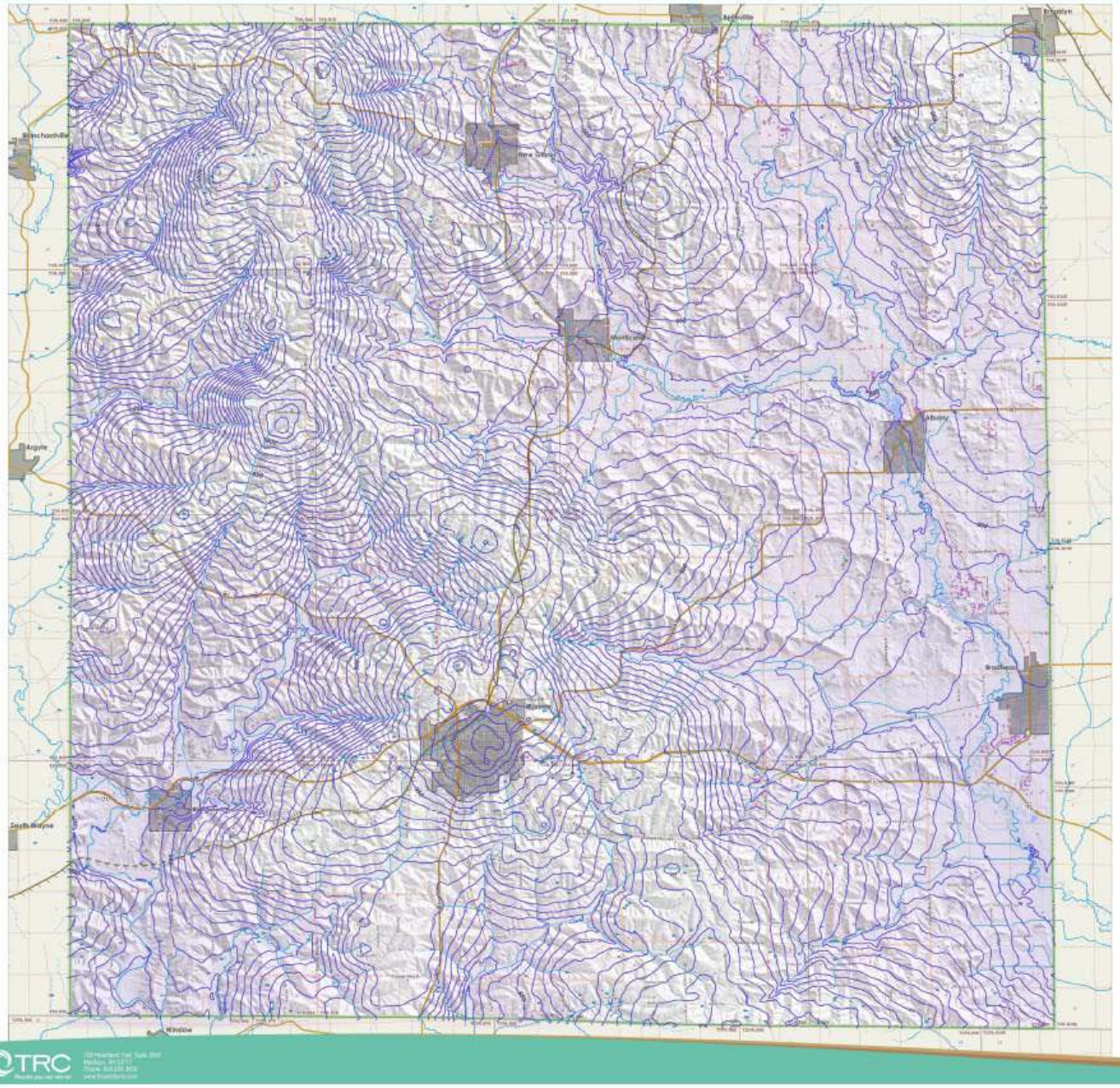


PLATE 3
Green County Water Table Map

BASEMAP FEATURES

- Green County Boundary
- State Road
- County Road
- Township Road
- Gravel Road
- Village/City Street
- Private Drive
- Multi-use Trail
- Public Land Survey System Township Boundary
- Public Land Survey System Section Boundary
- Railroad
- Populated Place (City/Village)
- Approximate Edge of Glacial Advance (hash lines on glacier side)

WATER TABLE FEATURES

- Water Table Elevation Contour (10' Interval, NAVD88)
- Private Well Location with Recorded Static Depth to Water

Surface Water Features

- Perennial Stream/River Flowline
- Intermittent Stream/River Flowline
- Spring Location

ABOUT THIS MAP

This map presents an interpreted water table for Green County. This represents the elevation of the first groundwater occurrence below the land surface. The information presented here has been interpreted from several sources. Surface waters derived from the National Hydrography Dataset were used as expressions of groundwater and assigned elevation based on the Green County LiDAR topographic surface. Springs were similarly used as expressions of groundwater and assigned ground surface elevation. Where well construction logs included pumping test information, locations were assigned the ground surface elevation and a water table elevation was calculated based on the static depth to water reported on the logs.

The elevation information from these sources was converted into a point format and analyzed in Geographic Information Systems (GIS) software. Geostatistical tools in GIS were used to compare each data point for variability between itself and surrounding data, and then calculated a predicted value for each point location. This comparison was used to adjust the dataset for a more consistent model.

Information in this map is an interpreted model of several datasets from different sources, resolutions, accuracy, and time periods. This map is intended to represent a typical model of the Green County water table surface and may not be accurate at a site-specific level depending on the season of the year or antecedent precipitation or snow melt. This map is not a substitute for site-specific groundwater studies that should be conducted, as appropriate.

MAP REFERENCES

Edge of Glacial Advance from: Gerald M. Richmond and David S. Fullerton, 1983, Quaternary geologic atlas of the United States, U.S. Geological Survey, I-1420 (NK-16), Map and GIS data, Scale: 1:1,000,000. A gap in the original data is shown as dashed on this map.

Green County, 2017, Well permit and abandonment data.

Green County Land Information Office/Town Assessors (WROC), 2011, LiDAR Survey (Digital Elevation Model (DEM)) 2008.

Green County Land Information Office, 2017/2018, Roads GIS data.

U.S. Geological Survey, 2014, National Hydrography Geodatabase, downloaded January 2018.

Wisconsin Department of Natural Resources, Well Constructor's Reports (1987–2006).

N

GREEN COUNTY WISCONSIN

there's an art to it.

TRC

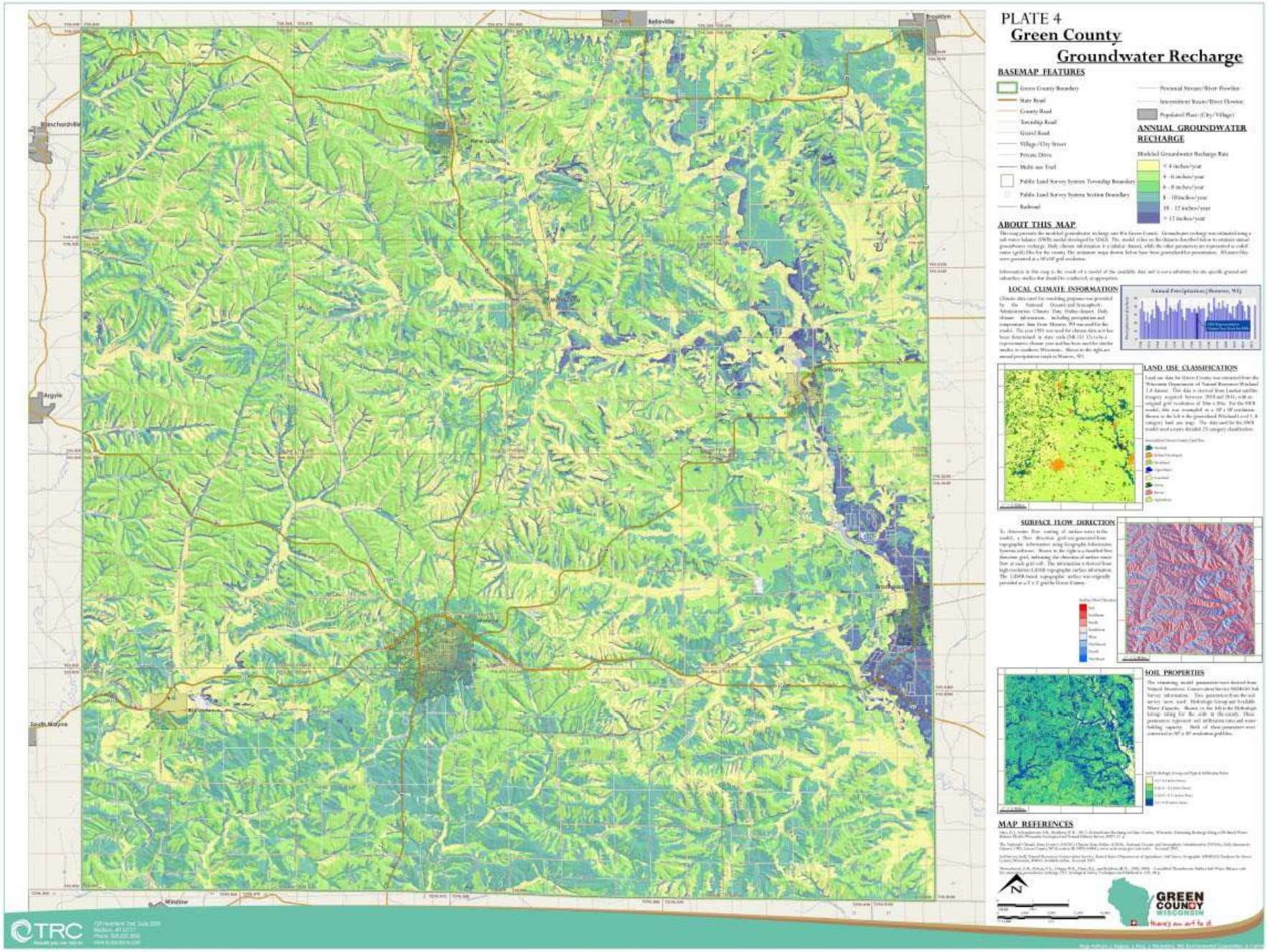


PLATE 4
Green County
Groundwater Recharge
BASEMAP FEATURES
Green County Boundary
State Road
County Road
Township Road
Gravel Road
Village/City Street
Private Drive
Multi-use Trail
Public Land Survey System Township Boundary
Public Land Survey System Section Boundary
Railroad
Perennial Stream/River Flowline
Intermittent Stream/River Flowline
Populated Place (City/Village)
ANNUAL GROUNDWATER RECHARGE
Modeled Groundwater Recharge Rate
< 4 inches/year
4 - 6 inches/year
6 - 8 inches/year
8 - 10 inches/year
10 - 12 inches/year
> 12 inches/year
ABOUT THIS MAP
LOCAL CLIMATE INFORMATION
Annual Precipitation (Monroe, WI)
LAND USE CLASSIFICATION
SURFACE FLOW DIRECTION
SOIL PROPERTIES
MAP REFERENCES
GREEN COUNTY WISCONSIN
TRC
Belleville
Brooklyn
Blanchardville
New Glarus
Monticello
Albany
Argyle
Monroe
South Wayne
Brodhead
Winslow

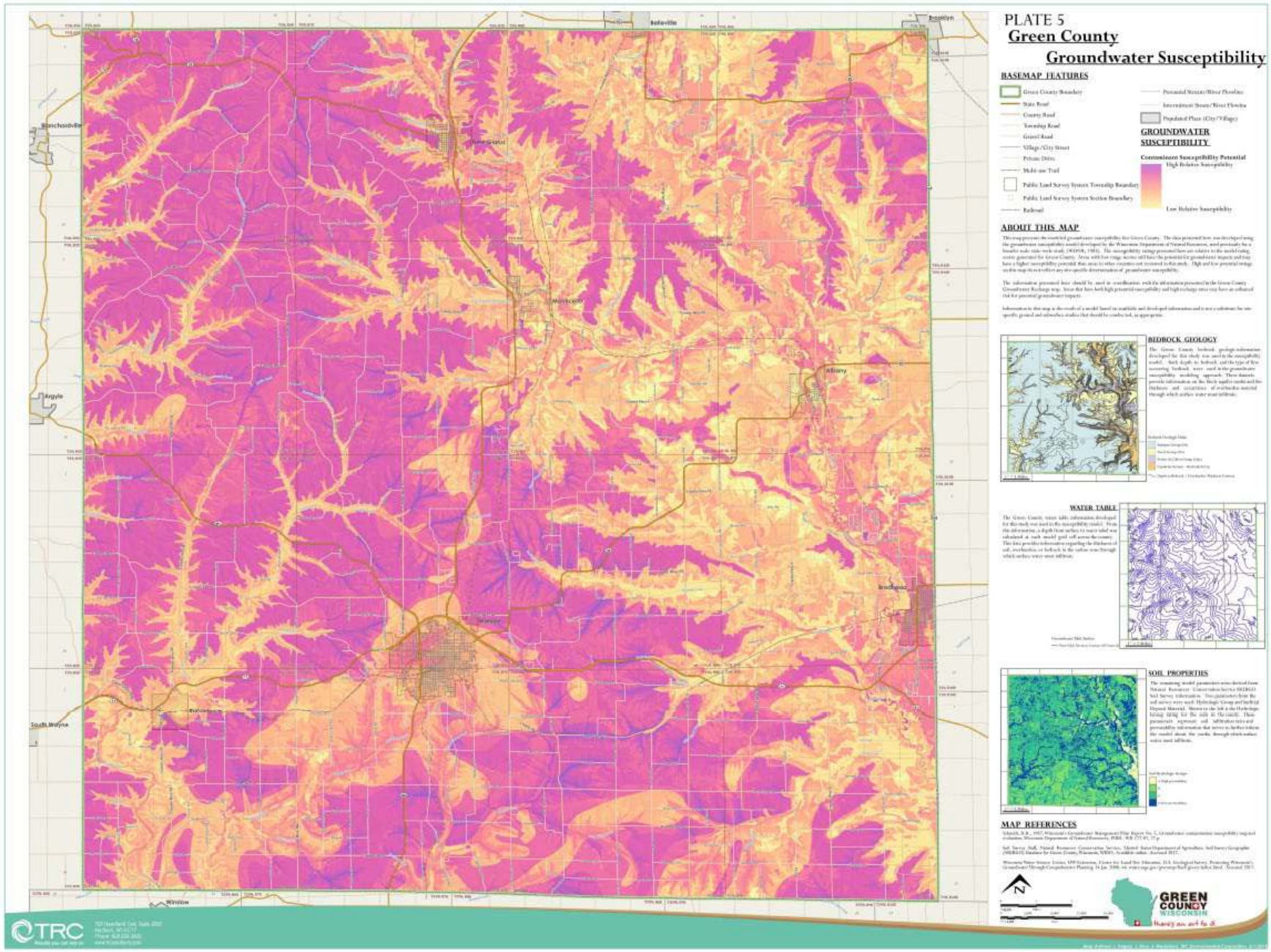


PLATE 5
Green County
Groundwater Susceptibility
BASEMAP FEATURES
Green County Boundary
State Road
County Road
Township Road
Gravel Road
Village/City Street
Private Drive
Multi-use Trail
Public Land Survey System Township Boundary
Public Land Survey System Section Boundary
Railroad
Perennial Stream/River Flowline
Intermittent Stream/River Flowline
Populated Place (City/Village)
GROUNDWATER SUSCEPTIBILITY
Contaminant Susceptibility Potential
High Relative Susceptibility
Low Relative Susceptibility
ABOUT THIS MAP
BEDROCK GEOLOGY
WATER TABLE
SOIL PROPERTIES
MAP REFERENCES
Belleville
Brooklyn
Monticello
Albany
Argyle
South Wayne
Monroe
Brodhead
Browntown
Monticello
TRC
GREEN COUNTY WISCONSIN

5 Year UWEX Groundwater Quality Trend Project

Green County is starting a five-year groundwater quality trend data project with UWEX. It is one of the first counties in Wisconsin (and nationally) to use the process it is using. This is an exciting opportunity to learn more about groundwater in Green County. This multiyear process is specifically designed to get good data in order to better understand water quality in Green County.

Tracking groundwater quality trend data will help local officials and Green County residents make data-driven decisions when managing groundwater quality. Currently, little information exists that allows for an understanding of how groundwater quality has changed over time in Green County. Establishing a network of private well owners to perform annual testing over an extended period of time will help inform residents and local leaders whether groundwater quality is getting better, worse, or staying the same.

Confidence in this trend data enables isolating areas where nitrate, chloride, and alkalinity are increasing or decreasing.

Nitrate

Nitrate is an important test for private well owners. Levels greater than 10 mg/L nitrate-nitrogen should not be consumed by infants, women who are or trying to become pregnant.

Nitrate is a chemical commonly found in agricultural and lawn fertilizer. It is also produced when organic rich materials such as manure, bio-solids, septic system effluent, etc decompose. Nitrate is a very soluble form of nitrogen and can easily leach past the root zone of plants into groundwater. Levels of nitrate in groundwater are generally less than 1 mg/L in natural or areas of little human influence. Elevated levels generally occur in areas of agricultural activity or areas of dense rural development (i.e. small lot sizes with septic systems, lawn fertilizers, etc). Soils and geology make certain areas more prone to nitrate losses to groundwater. For these reasons, nitrate is a good test to perform if trying to understand the impacts of land use on groundwater quality as well as trends over time.

Chloride

Like nitrate, chloride is a useful tool for understanding the impacts of land use. Major sources of chloride to groundwater include fertilizer, road salting and septic system drainfields. Potash is used to add potassium to soil. The most common form of potash is potassium chloride; the chloride is susceptible to leaching. Road salt (usually sodium chloride) helps in deicing roads, but is then washed off roads into ditches or other pervious areas where it soaks into the soil and can eventually leach to groundwater. Septic system drain fields dispose of wastewater which contains chloride from human waste and water softener salt.

Alkalinity

Alkalinity is a measure of water's ability to neutralize acid. It is generated by the dissolution of carbonate minerals common to Wisconsin. Groundwater alkalinity measurements are relatively stable from one year to the next. Testing for alkalinity would help in understanding if a particular sampling event was influenced by rainfall or snow melt because alkalinity should be relatively consistent under normal conditions.

Well Selection and Recruitment

A total of 778 wells were selected as part of the initial recruitment This assumed a response rate

of approximately 35%. Wells were selected using a variety of datasets that included the Wisconsin Parcel Data Layer, Well Construction Records, Center for Watershed Science and Education Well Water Data, and others.

For the initial recruitment list, an attempt was made to locate at least one well owner per section with a Wisconsin Unique Well Number and could be matched to a landowner from the parcel data layer. All things being equal, preference was given to those landowners that participated in previous Extension well testing efforts. Most wells on the list have well depth, well casing, and water table information. Of the landowners that were contacted, 114 submitted a previous sample through Extension programming.

Recruitment materials consisted of a recruitment letter describing why the landowner was being contacted along with additional information about the project. Landowners were asked to respond using a pre-paid postcard. Recruitment materials were mailed in early November 2019.

Recruitment Response/Participants

A total of 388 landowners indicated their willingness to participate in the well monitoring program. This is a success rate of 49.8%, higher than the initial estimate of 35%. Anticipating a drop in participation over the 5 year period, the Center for Watershed Science and Education plans to sample all 388 wells the first year in hopes that there is still a minimum of 240 well samples by the end of the final year of the project.

Each individual participating homeowner got their specific results back in April 2020. Kevin Masarik with the UW-Stevens Point Center for Watershed Science and Education, held a virtual educational session for participating homeowners in June 2020

Because 2020 is the first year with this multiyear program, the 2020 tests will help in getting an understanding of where things are currently at when it comes to nitrates in groundwater in Green County.

Goals we will work to accomplish in the next 10 years:

1. Continue to cost-share the proper abandonment of unused wells and cisterns.
2. Educate landowners through radio programs, news articles, and presentations at the Green County Leaders Program on the importance of testing their well water and to properly abandon any unused well they may have on their property in order to protect our groundwater supply.
3. Promote a well sampling program. Most landowners do not realize they should test their well every one to two years. 16% of Green County wells have over 10 mg/l of nitrate nitrogen, which exceeds the state and federal limits for drinking water.
4. Continue to issue permits for new wells to be drilled. This ensures that new wells are drilled in accordance with state law setbacks and that any old wells on the property are properly abandoned.
5. Promote nutrient and pesticide management to reduce the amount of groundwater contamination.
6. Educate developers and citizens on the importance of protecting recharge areas.

3. Soil Health/Cover Crops

Soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. We can't have soil health if we have excessive erosion. Cover crops tie in nicely to soil health because they provide three of the five principles to attain good soil health- keeping the soil covered, having a living root feeding the soil microbes and adding diversity to the system. The remaining two principals of soil health are to disturb the soil as little as possible and adding animals to the system.

Farmers in the county have been working to steadily reduce soil loss on cropland as indicated by transect surveys of the county in the last several years. The 2016 survey showed that 70 percent of the points met the tolerable soil loss and by 2019, 75 percent of cropland was meeting the "tolerable soil loss". The office has decided to cease running the transect survey, as it becomes increasingly difficult and more of a guess if a year is missed such as last year due to COVID 19. Farmers in Green County are gradually adopting use of cover crops and increasing residue amounts in various ways like no-tilling and leaving all crop material in the field to protect the soil which helps alleviate erosion. There is still work to do to make planting cover crops of some kind after corn silage be the social norm, besides encouraging farmers to fit covers in their rotations in other places.

Green County sponsored the first demonstration plot at the county farm for cover crops in fall of 2014. Various plots throughout the county have been planted and showcased through field days promoted by the department. Now many farmers across the county have learned how to successfully incorporate cover crops into their rotations and made them a priority. There are a multitude of reasons why cover crops are beneficial. Cover crops can help suppress weeds, add organic material and nutrients to the system, improve water infiltration into the soil, protect the soil from erosion, lessen soil compaction, keep soil biology functioning, and recover nutrients from the lower soil profile. Not all benefits of cover crops are realized the first year they are used, many are complimentary to increasing soil health. When soil health is good, the soil is functioning properly- allowing water to infiltrate, providing biology a good habitat which in turn- they convert organic matter to nutrients and deliver to the plants to grow.

Crop insurance has been a hurdle in preventing farmers from widely adopting cover crops. Crop insurance is purchased by farmers, and subsidized by the federal government, to protect against either the loss of their crops due to natural disasters, like hail, drought, and floods, or the loss of revenue due to declines in the prices of agricultural commodities. The government has a say in the rules (through Risk Management Authority) on how crop insurance will recognize "Good Farming Practices". RMA has gradually been updating its stance on cover crop usage and termination guidelines. Current guidance for GFPs are cover crops are a voluntary practice that is allowed if they are terminated according to NRCS's Cover Crop Guidelines. The change in these rules has helped farmers try cover crops more realizing they wouldn't put their insurance in jeopardy. Farmers that have good soil health are more resilient to the fluctuations of extremes in weather on their crops and soil- in some states, farmers receive discounts for using soil health practices. FSA is recognizing the practice of cover crops. In 2010 and 2015 there wasn't a reporting category for cover crop. For the 2020 crop year, Green County had 3,176 acres reported to FSA that were planted to cover crops.

Past efforts to promote cover crops have been through field days and special cost sharing opportunities. Spring Creek Watershed in Southeastern Green County received special funding through NRCS's National Water Quality Initiative starting in 2016. About 3,000 acres of cover crops were funded for multiple years through this special funding which has ceased. Most of the dairies that participated have continued using cover crops without the cost sharing. Only a few of the cash crop acres have continued the practice without the payments. NRCS has also used EQIP for financial assistance to farmers to try cover crops in all areas of the county. Most recently Farmers of the Sugar River, a producer- led watershed group, has been a catalyst for networking and sharing information on cover crops. They also provide farmers an incentive payment to plant cover crops among other soil enhancing practices in the Middle and Lower Sugar River Watersheds.

Our future goals for cover crops and improving soil health include

1. continue to host field days and demonstration plots throughout the county
2. establish best practices (white paper) for farmers that haven't adopted the practice yet- tips on how to be successful with cover crops in the county
3. work to show and teach farmers that cover crops are worth the investment regardless of cost sharing, but still work to find cost sharing to help adopt new practices
4. make teacher contacts and start educating middle school, high school, and Blackhawk Tech biology/ environmental science/ agriculture classes in the county about soil health, regenerative agriculture, and standards farmers are to be following.
5. assist landowners in implementing best management practices on the land throughout the basin to reduce non-point source pollution from soil erosion and stormwater runoff. Help landowners research and apply for grants such as the federal Environmental Quality Improvement Project (EQIP), Producer-Led Watershed Protection Program Grants or the county Soil and Water Resource Management (SWRM) programs to secure funding to encourage the installation of these practices.
6. Implement NR 151 performance standards to minimize sediment delivery to surface waters.

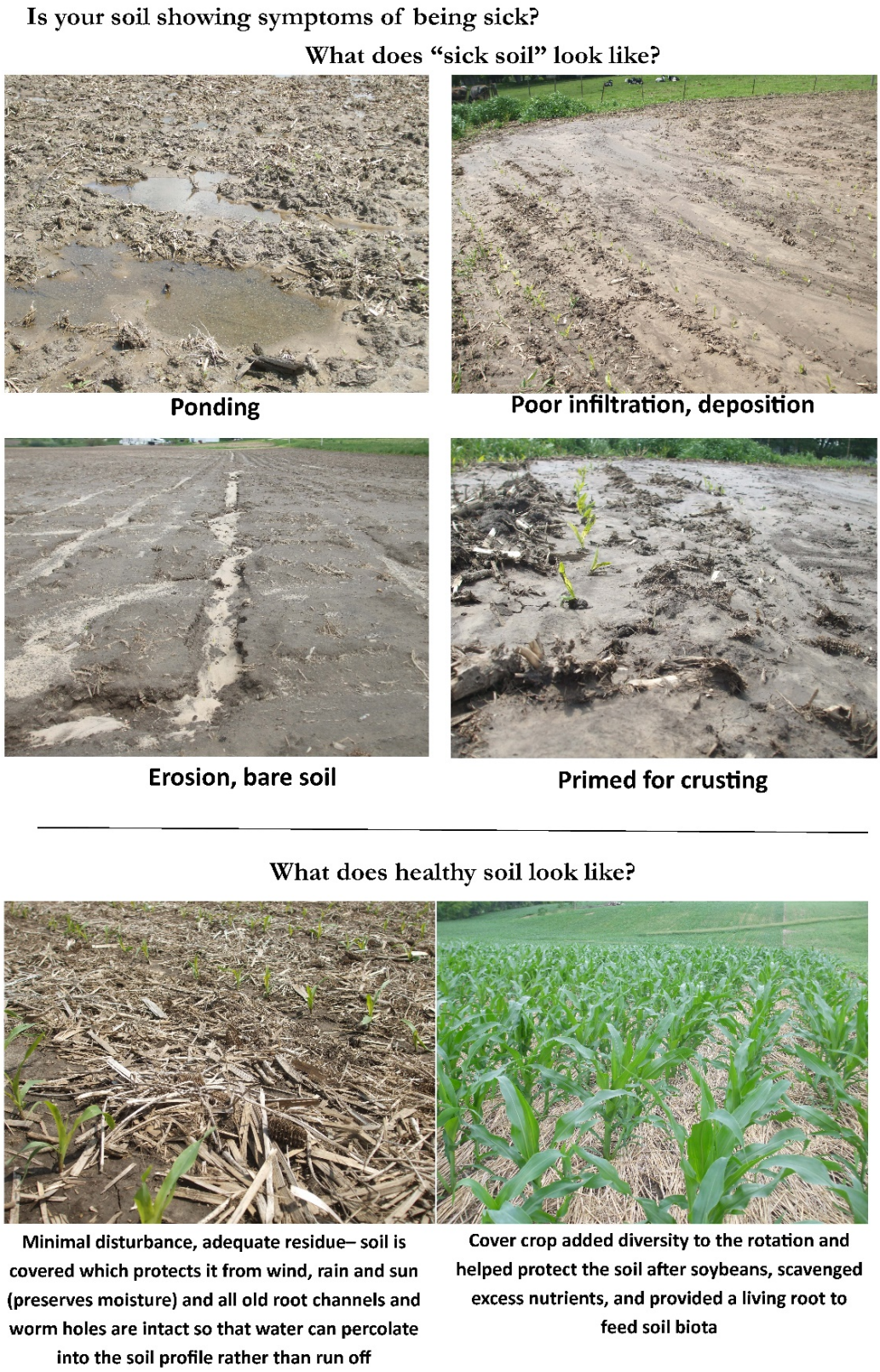


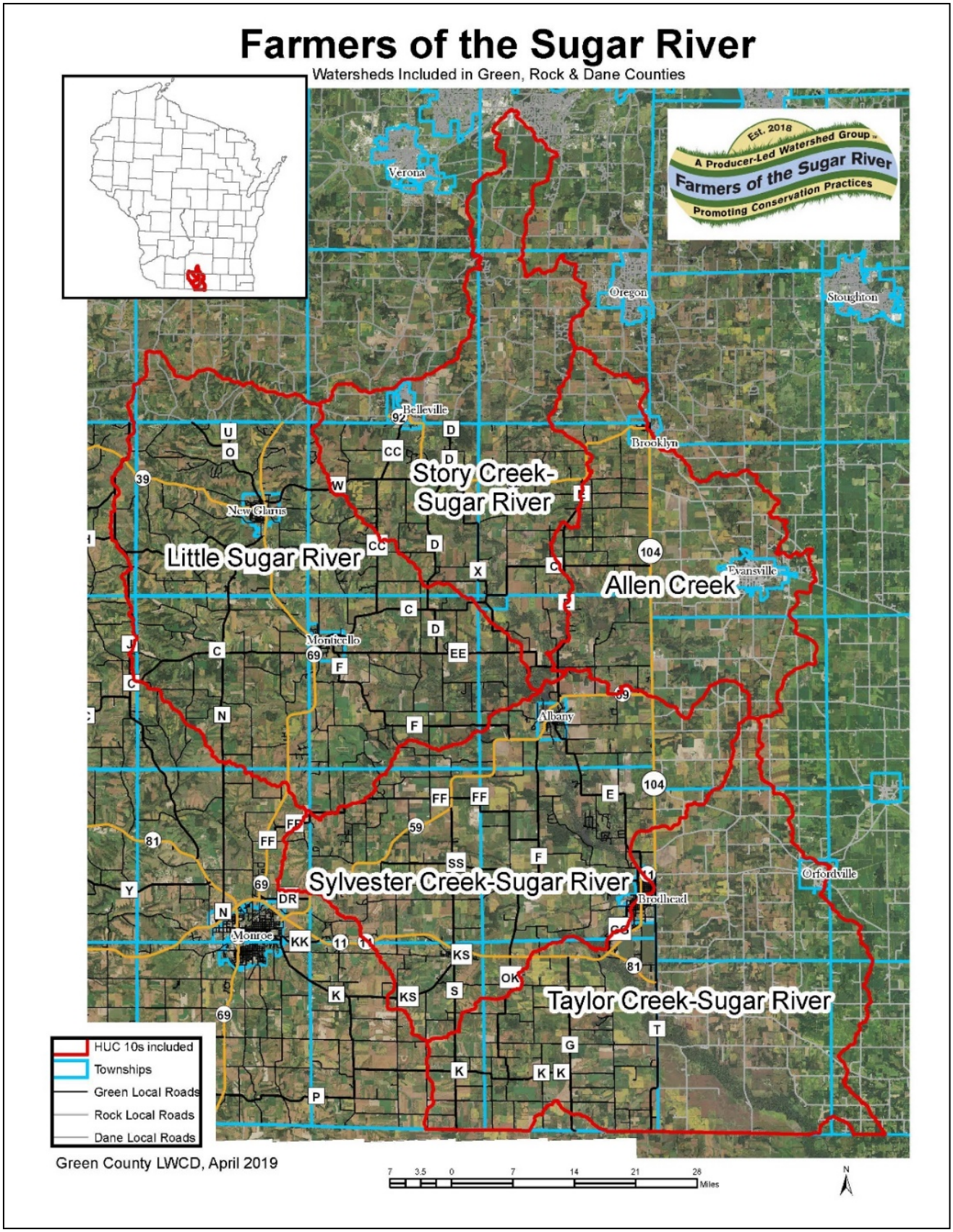
Figure 1: We created a visual for producers to understand some soil health concepts.

4. Producer-led watersheds

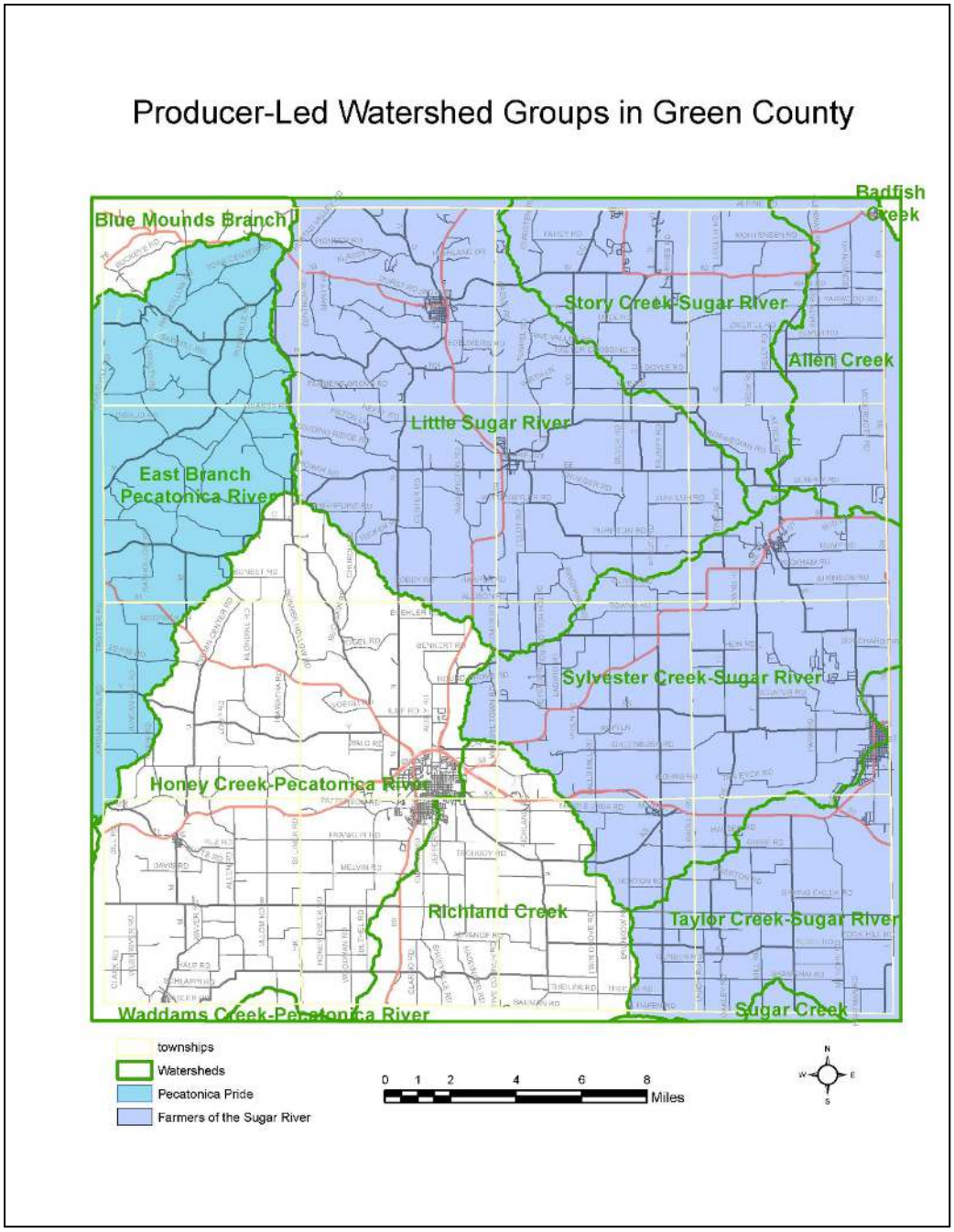
DATCP created a grant program in 2016 to support forming and the work of local producer-led watershed groups through the Producer Led Watershed Protection Program. These groups are locally formed, so they can decide what they see as resource concerns and how they want to approach education, networking, and outreach. There could be an opportunity for these groups to show consumers why the farmers actions impact everyone and a chance to engage in youth education. To create a bigger impact, large farm operations would be invited to participate in these watershed groups. DNR would like to see producer-led watershed groups cover only a HUC 12 to be able to track changes and water quality improvements easier.

A group of farmers came together in 2017 to complete a grant application to DATCP as the Farmers of the Sugar River. The group is comprised of crop and livestock farmers throughout 5 HUC 10s in the county- Little Sugar Watershed, Story Creek- Sugar River, Allen Creek, Sylvester Creek- Sugar River and Taylor Creek- Sugar River. In 2018, the group was awarded $11,550 through the program. A good deal of time was spent forming a mission statement and producing a logo for the group. Their mission statement is: "a producer-led watershed group that shares and learns from other farmers to be profitable, protect and increase soil functions, and improve water quality in the watershed. We strive to teach other local farmers how to make conservation systems work on their farms to be part of the solution for cleaner waters and sustainable farms." A grant for $25,000 was awarded in 2019. In 2020, a $35,000 grant was received. They also secured a $14,700 grant for 2021. The Green County Land and Water Conservation Department has served as the group's fiscal agent and collaborator since their inception.

The Green County LWCD plan to run the EVAAL (Erosion Vulnerability Assessment for Agricultural Lands) program on the 5 HUC 10 watersheds covered by Farmers of the Sugar River by fall of 2021 to help prioritize problem erosion areas. By running this program, the hope is to be able to visually see the areas of the watershed that are most vulnerable to erosion. This will give the farmers in the watershed and the department clues as to where to focus energy and attention.


Farmers of the Sugar River
Watersheds Included in Green, Rock & Dane Counties
Est. 2018
A Producer-Led Watershed Group
Farmers of the Sugar River
Promoting Conservation Practices
Verona
Oregon
Stoughton
Belleville
Brooklyn
Story Creek-Sugar River
New Glarus
Little Sugar River
Allen Creek
Evansville
Monticello
Albany
Sylvester Creek-Sugar River
Orfordville
Brodhead
Monroe
Taylor Creek-Sugar River
HUC 10s included
Townships
Green Local Roads
Rock Local Roads
Dane Local Roads
Green County LWCD, April 2019
Miles
N

Another watershed group, Pecatonica Pride, originally represented one HUC 12 (a sub watershed of the Lower East Pecatonica) just west of the county that had some watershed area that drained from the county. In 2017, they received a $20,000 grant. Pecatonica Pride was awarded $30,500 in 2018 and $20,250 in 2019. They have since expanded their geographic focus to include the HUC 10 of the Lower East Branch Pecatonica River in their watershed group. Pecatonica Pride has worked with several fiscal agents and collaborators in the last couple of years. Most recently the group worked with the Lafayette County Land and Water Conservation Department.



The map above shows the areas of the county that are included in a producer-led group.

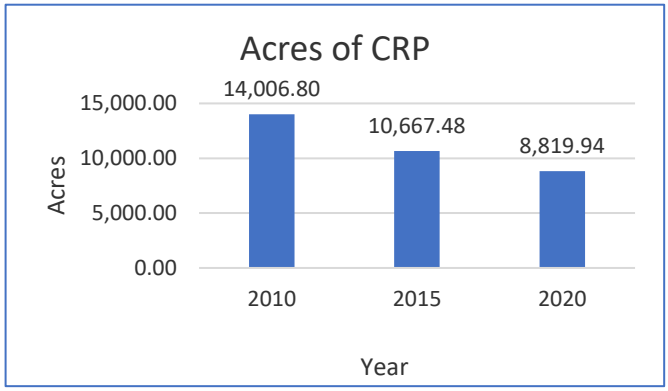
There is interest in the Richland and possibly Honey Creek watersheds to create a group. The LWCD will host a meeting of innovative farmers and leaders it the watersheds to explain the possibilities of forming a new group. Planning and organizing a group will likely be in mid 2021 in order to organize and apply for a 2022 grant. The LWCD will need to evaluate if it can fully support and sustain another producer-led group.

5. CRP/CREP

The department has a contribution agreement with NRCS. Land and Water will do work on the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancement Program (CREP) and will be re-imbursed for their time by NRCS. CRP is a very popular program for Green County landowners especially those with steep, low yielding ground that isn't profitable to farm. CREP is popular with landowners who have land that is too wet to farm or that want to straighten out the edges of their fields along the meanders of streams while adding in the protective buffer. These types of buffers greatly improve cover for wildlife.

In the next 10 years:

1. The department will work with NRCS and FSA to make contracts and maps as accurate as possible
2. The department will help schedule the no-till drill (owned by Pheasants Forever) to help participants in the program get their seed planted
3. The department will perform status reviews to ensure that participants are following program rules.
4. The department will survey and mark field boundaries.
5. The department will design any portion of the contract which needs a design (stream crossings, scrapes, ditch plug, etc.)
6. The department will give guidance to participants on options and how contracts should be implemented
7. The department will continue to run a tree sale program which will allow citizens to buy trees to plant and increase habitat for birds and other wildlife. In the past 5 years the department has sold and average of over 8000 trees per year. Trees sold include a mix of hard wood, soft wood, evergreen, and a variety of shrubs. Tree planter and sprayer rental are coordinated with the DNR forester along with forestry management plans and planting recommendations. The LWCD owns two tree planters that landowners may rent for a nominal fee. The LWCD also owns a dozen tree spuds that are loaned out for the hand planting of trees and shrubs. A tank sprayer and a backpack sprayer are available for grass and weed control when establishing tree and wildlife plantings.
8. Along with using grass buffers to protect the stream, the department will also be promoting streambank improvement work through cost sharing of riprap and sloping and seeding of banks. Implementing these practices not only stabilizes banks to improve water quality, but also improves the fishery, which will increase tourism.



6. Education

The department has secured a website to help with education of the public and farmers and it provides a platform to disseminate information. The website is https://greencountylwcd.com It is updated as often as possible with agendas, minutes and other meeting information. It also has a page dedicated to Farmers of the Sugar River producer-led group which most information is applicable to any farmer.

Our goals for the next ten years include:

1. The department will continue to have a weekly radio program. Current topics and events will be covered.
2. Press releases and news articles will be done to cover timely conservation issues and upcoming events.
3. The department's website will continue to be updated and promoted.
4. The department will continue to hold Youth Conservation Days. One being in the spring and the other in the fall.
5. The department will continue to make educational videos to put on the website and YouTube page.
6. The department in conjunction with Moose Lodge and UW-EX, and NRCS will continue to hold an annual land judging contest. And every three years, the department will continue to host the Southwest land judging contest.
7. A staff member, county board member, and a UW-Extension conducted presentations on groundwater awareness. Fourth and fifth grades at Monroe schools, Monticello, New Glarus, Argyle, Juda, Albany, and Brodhead. All schools in Green County are offered to participate in this program. Students learn where their water comes from, how to protect it, and how to conserve it.
8. There is an annual poster contest for youth to participate in. The top poster in each category will be sent to the Southern Area Association for judging in the area event.

NR 151 Performance Standards

Wisconsin's rules to control polluted runoff from farms, as well as other sources, went into effect October 1, 2002. The State legislature passed the rules to help protect Wisconsin's lakes streams and groundwater.

DNR Administrative Rule NR 151 sets performance standards and prohibitions for farms. It also set urban performance standards to control construction site erosion, manage runoff from streets and roads and manage fertilizer use on large turf areas.

DATCP Administrative Rule ATCP 50 identifies conservation practices that farmers must follow to meet performance standards in NR 151. ATCP 50 also sets out the requirements for nutrient management plans.

What does this mean to Green County and our Land and Water Conservation Department? The LWCD has long been recognized as the primary agency to bring these water quality performance standards into the field. The LWCD will have the primary responsibility for the implementation of the agricultural runoff standards. The major transition found in NR 151 is that it truly moves the majority of non-point source (NPS) water quality work in Wisconsin from a mostly voluntary program to a program based largely on landowner participation to reduce agricultural nonpoint sources of pollution through the option of regulation.

It is much easier and more palatable to work with landowners in a voluntary approach. However, NR 151 lays the foundation for minimal expectations in regards to land use and management practices within the agricultural landscape. Many of the issues we have identified and worked through in the past are now part of this rule which sets out the opportunity for regulation if minimum levels of implementation are not reached.

One tool that Green County has to ensure farmers meet the NR 151 performance standards is the Farmland Preservation Program. Green County does not have exclusive agricultural zoning, so long-term contracts are the only option to participate. At it's peak, there were over 300 contracts throughout the county. We currently have 28 contracts. Our office does a status review on each contract every four years.

A component of the plan requirements for the approval of this plan is the inclusion of a local strategy for the implementation of NR 151. The following are the ag performance standards in NR 151:

For farmers who grow agricultural crops:

1. Must meet tolerable soil loss ("T") on all cropped fields
2. Follow a nutrient management plan designed to limit entry of nutrients into state waters (ground water and surface water). NPM plan must be in place by Jan. 1, 2005 for high priority waters (303d, outstanding/exceptional) and Jan. 1, 2008 for all others
3. Maintain a tillage and cropping setback of 5 feet at minimum along streams
4. Adhere to a Phosphorus Index of 6 or less over the accounting period and not exceed 12 in any single year.

For farmers who raise, feed or house livestock:

1. Prevent direct runoff from feedlots or stored manure into state waters
2. Limit livestock access to state waters to avoid high concentrations of animals and maintain adequate or self-sustaining sod cover along waterways
3. Follow a nutrient management plan for manure application

For farmers who have or plan to build, a manure storage structure:

1. Maintain structures to prevent overflow (no overflow)
2. Repair or upgrade any failing or leaking structures that pose an imminent health threat or that violate groundwater standards
3. Close abandoned manure storage structures according to accepted standards
4. Meet technical standards for newly constructed or substantially altered structures

For farmers with land in a Water Quality Management Area (300 feet from a stream, 1000 feet from a lake, or in areas susceptible to groundwater contamination):

1. Do not stack manure in unconfined piles
2. Divert clean water away from feedlots, manure storage areas and barnyards located within this area

Nutrient Management Plans for Livestock and Crop Farmers:

1. Plans can be developed by a certified agronomist or prepared by the farmer through a DATCP-approved training course
2. Plans must rely on soil nutrient test from a DATCP-certified laboratory
3. Comply with current NRCS Nutrient Management Standard 590
4. Follow the recommendations for nutrient applications in the Soil Test Recommendations for Field, Vegetable and Fruit Crops, UWEX publication A2809.

Best Management Practices (BMPs)

There are a multitude of conservation practices a person can install to protect water quality and minimize soil erosion. Many of the following are cost-sharable and would be required in order to be in full compliance with NR151 livestock or cropland performance standards:

- Access road or cattle crossing
- Animal trails and walkways
- Contour farming
- Cover crop and green manure crop
- Diversions
- Field windbreaks
- Filter strips
- Grade stabilization structure
- Heavy use area protection
- Livestock fencing
- Livestock watering facility
- Manure storage system
- Manure storage closure
- Milking center waste control systems
- Nutrient management
- Pesticide management
- Prescribed grazing
    - Management plan
    - Temporary fencing
    - Permanent fencing
    - Seeding permanent pasture
- Relocating or abandoning animal feeding operations
- Residue management
- Riparian buffers
    - Installation
    - Maintenance
- Roofs
- Roof runoff systems
- Sediment basins
- Sinkhole treatment
- Streambank and shoreline protection
- Stripcropping
- Subsurface drains
- Terrace systems
- Underground outlet
- Waste transfer system
- Water and sediment control basins
- Waterway systems
- Well decommissioning
- Wetland restoration

Local Implementation

The Green County Land and Water Conservation office will take the lead role in the implementation of NR 151. We will be working in close cooperation with the Department of Natural Resources (DNR) and other agencies towards a practical implementation process that serves all involved. Regulatory and enforcement activities described under this section will be completed utilizing the following; NR 151, ATCP 50, Green County Manure Storage Ordinance, Green County Private Water Ordinance, and Green Counties Soil and Water Conservation Standards for the Farmland Preservation Program.

It should be noted that the implementation of each component of the Green County Land and Water Conservation Department's strategy to implement the NR 151 Performance standards is dependent on receiving adequate funds to cover both staff resources and cost sharing resources. It is anticipated that DNR and DATCP will be the major financial resources we will look for partnership in this process.

The goals of the Green County Land and Water Resource Management Plan will be accomplished through coordination with local, state, and federal agencies and private organizations. Green County attempts to make the best use of all resources in addressing conservation issues. We have 28 Farmland Preservation Agreements that will have a review every four years until their natural

expiration. Our FP plan is due for renewal next year (2022). We will explore our choices and the wishes of county landowners. We work with walk-ins on voluntary implementation.

Program issues and ideas are discussed frequently with staff from all agencies. Following are resources used for conservation efforts in Green County:

USDA Programs –

1. Environmental Quality Incentives Program (EQIP). Provides cost-sharing for a variety of conservation practices to address erosion and nutrient management issues.
2. Conservation Stewardship Program (CSP). Provides incentives to those who have already installed soil conservation and water quality practices.
3. Conservation Reserve Program (CRP). Provides incentives to set aside land for conservation purposes.
4. Conservation Reserve Enhancement Program (CREP). A multi-agency effort (DATCP, FSA, NRCS, and Green County) that provides incentives to create buffers along streams and waterways.
5. Wetlands Reserve Program (WRP). Provides cost-sharing to restore wetlands previously altered for agricultural use.

DNR Programs –

1. Targeted Resource Management Program (TRM). Provides grants for a variety of conservation practices to address water quality problems and achieve compliance with NR151 performance standards.
2. Managed Forest Law (MFL). Provides a tax incentive in exchange for long term sound forest management.
3. Notice of Intent/Discharge (NOD) Grant program provides cost sharing to livestock producers to comply with NR151 standards that have been issued a Notice of Discharge or an Intent to issue a Notice of Discharge.

DATCP Programs –

1. Soil and Water Resource Management (SWRM). This program provides grants to counties to hire staff and to cost-share the installation of conservation practices on private land.
2. Farmland Preservation Program- program offers tax credits to landowners in exchange for following soil and water conservation standards.
3. Producer-Led Watershed Protection Program. Grants are available to producer-led groups for funding activities and cropland improvement practices.

The County's commitment to extend services beyond that core levy commitment will be dependent based upon its ability to secure funds through outside grant sources and its capacity to secure funds through other non-levy revenue, including reimbursement through local service fees or municipal, State, or Federal service contracts. Priorities for plan implementation and associated service levels will be set based upon the availability of this combination of revenue sources.

At present, the demand for program services exceeds the capacity of current allocations. It is anticipated that the level of state staff funding support, administered to the county through DATCP and DNR grant programs will remain the same or slightly increase. It is also anticipated that new sources of revenue staff funding may be available through federal service contracts.

Local Process Components

Definition of a Priority Farm

Green County defines a priority farm as land lying within a 303 (d) watershed or within a Water Quality Management Area (WQMA) and having one or more issues of non-compliance with the Performance Standards found in DNR Administrative Code NR 151. The priority farms will be identifiable through the use of GIS. We will use the DNR stream layer and Green County tax parcel layer to create a buffer of parcels within 300 feet of 303 (d) streams and their tributaries. Then we will query soils that meet criteria for being susceptible to groundwater contamination in a WQMA. If a private and municipal well layer is available, we would buffer those wells to find parcels that also meet conditions for groundwater contamination susceptibility. If needed and if time and staff allow, a private well GPS layer could be created. By identifying these priority farms and parcels, we'll be able to more efficiently address cropland soil erosion and phosphorus loss and degraded surface and groundwater quality areas. In addition to these farms within close proximity to streams, farms with complaints- especially chronic complaints and farms with failed manure storages will also be priority farms to address.

Information and Educational Activities

The LWCD realizes the implementation of the NR151 Ag Performance Standards will require a large amount of educating landowners within Green County. The LWCD will distribute information and educational material from various sources such as DNR, DATCP, NRCS, FSA, and LWCD to affected landowners. We will use a series of direct mailings, newsletters, radio programs, workshops, and on-site visits as our avenue for information distribution.

Our educational materials will be designed to accomplish the following:

1. Educate landowners about Wisconsin's NR151 agricultural performance standards and prohibitions, county ordinances, applicable conservation practices and funding opportunities;
2. Promote voluntary implementation of conservation practices necessary to meet NR151 standards and prohibitions;
3. Inform landowners of requirements and compliance procedures and the role the LWCD will have within those procedures;
4. Make landowners aware of expectations for compliance and consequences for NR151 non-compliance.

Monitoring and Evaluation

The evaluation and long-term monitoring of this plan will include several approaches. Many of this plan's six priorities, goals, and objectives will be measured by Green County LWCD staff annually. Evaluation of conservation practices implemented such as the acres of grassed waterways installed or the number of wells properly abandoned are activities that can be measured and used in evaluation of the effectiveness of this plan. The annual report submitted to DATCP will serve as our primary monitoring mechanism. These tangible measurements and their

successes and or failures will be discussed and reviewed fully with the LCC, DATCP and DNR staff.

The use of nonpoint source inventories will also be used to monitor and evaluate our plan priorities and to establish future plan objectives and goals.

Monitoring the effectiveness of information and educational goals and objectives within this plan will prove to be challenging. The ability to make direct connections with these types of initiatives will need to be accepted through increased measurements in other areas of program responsibility. Although the value of information and education is often overlooked and tough to measure, the LWCD believes good connections can be made to other measurable program goals and objectives.

Financial Considerations Within NR 151

Many farmers voluntarily install numerous conservation practices on their farms to help improve water quality, wildlife habitat, and to prevent soil erosion. Cost share dollars may be used with landowners looking to voluntarily implement Best Management Practices (BMPs) on their lands. Green County will offer voluntary cost sharing as funds are available.

The agricultural performance standards and prohibitions found in NR 151 require 70% cost sharing be offered to change an existing cropland practice or livestock facility to bring them into compliance with the standards and prohibitions. NR151 implementation procedures allow Green County to increase to 90% cost sharing if economic hardship is proven.

The cost sharing requirements for compliance applies to sites found not to be in compliance prior to October 1, 2002. Farmers who are in compliance on or after that date do not have a right to cost sharing if they later fall out of compliance. Farmers who establish new facilities may be eligible for cost sharing, but cost sharing is not required for compliance. Those farms covered under a WPDES permit are not eligible for state cost sharing to meet performance standards and prohibitions required under their permits.

On Site Farm Visits

On site farm visits will be the next step in the process of utilizing our GIS layer and tracking system as mentioned above. Priority Farms that fall within the Water Quality Management Area will be reviewed through a systematic onsite review process. This onsite review process will begin with an informational mailing. The informational mailing will include materials related to the process, performance standards and prohibitions and anticipated results. The process will also include one on one visit with landowners to go over and discuss the utilization of our NR 151 inventory and evaluation form.

The number, frequency and location of the on-site farm visits will strongly hinge on the current and future level of staff funding and cost sharing resources that will be available to the LWCD and potentially affected landowners.

On site visits will conclude with the determination and documentation as to the extent of current compliance with each of the NR151 performance standards and prohibitions. Where non-compliant, determine costs, eligibility for cost sharing and discuss timelines.

Note: Cost share requirements are based upon whether or not the evaluated cropland or livestock facility is new or existing and whether or not corrective measures entail eligible costs. See NR 151.09(4)(b-c) and 151.095(5)(b-c).

Documentation and NR 151 status report:

Following completion of the on-site evaluation (see Appendix A), Green County LWCD staff will prepare and issue an NR 151 status report to affected owners of the evaluated parcels. The status report will include at a minimum the following information:

1. Current status of compliance of each parcel with each of the performance standards and prohibitions
2. Identify corrective measure options, identify BMPs to achieve compliance, and rough cost estimates to comply with each of the performance and prohibitions for which a parcel is not in compliance.
3. Status of eligibility for public cost sharing
4. Grant funding sources and technical assistance available from Federal, State and Local government and third-party service providers.
5. An explanation of conditions that apply if public cost share funds are used.
6. A timeline for completing corrective measures, if necessary.
7. Signature lines indicating landowner agreement or disagreement with report findings.
8. Process and procedures to contest evaluation results to LWCC

Note: A cover letter signed by the LWCD describing the ramifications and assumptions related to the status report will be attached.

Maintaining Public Records and Landowner Notification

The NR151 compliance records and related information related to specific parcels will remain public record. In an effort to ensure that subsequent landowners are made aware of (and have access to) NR 151 compliance on their property we will continue to work on a long-term notification process.

Technical Assistance & Cost Sharing To Install BMPs (Conservation Practices)

Voluntary Participation (Cooperative):

1. Receive request for cost-share and/or technical assistance from landowner.
2. Confirm cost-share grant eligibility and availability of cost-share and technical assistance.
3. Develop and issue cost-share contract listing BMP's to be installed or implemented, estimated costs, project schedule and notification requirements under NR 151.09(5-6) and/or 151.095(6-7).

Non-voluntary component (Non-Cooperative)

In the event that a landowner chooses not to install corrective measures either with or without cost sharing, the landowner will be issued notification per NR 151.09(5-6) and/or 151.095(6-7).

The notification will include the following information:

1. If eligible costs are involved, this notification shall include an offer of cost sharing.
2. If no eligible costs are involved, then notification will not include offer of cost sharing and will explain justification why cost sharing does not apply.
3. A description of the performance standard and prohibition being addressed.
4. The compliance status determination of which best management practice or other corrective measures are needed and which, if any, are eligible for cost sharing.
5. An offer to provide or coordinate technical assistance.
6. A compliance period for meeting the performance standard or prohibition
7. An explanation of possible consequences if the owner or operator fails to comply with provisions of the notice.
8. An explanation of local appeals procedures.

If cost sharing is involved, the LWCD will draft a program specific cost share agreement including a schedule for installing or implementing BMP's. Potential practices and cost share rates can be found in ATCP 50.

The LWCD or NRCS will provide technical assistance and oversight for all conservation practices as staff time allows. These technical services include:

1. Provide conservation plan assistance
2. Provide engineering design assistance
3. Review engineering designs provided by other parties
4. Provide construction oversight
5. Evaluate and certify installation of conservation practices

Re-evaluate Parcel for Compliance

After corrective measures are applied, staff will conduct evaluation to determine if parcel is now in compliance with relevant NR 151 performance standard(s) or prohibition(s).

If site is compliant, update "NR 151 Status Report" and issue "Letter of NR 151 Compliance."

Note: A letter of NR 151 compliance serves as official notification that the site has been determined to now be in compliance with applicable performance standards and prohibitions. This letter would also include an appeals process if a landowner wishes to contest the findings.

If still not compliant, seek non-regulatory remedies or initiate enforcement action.

Enforcement Action

If a landowner refuses to respond appropriately to official notice of non-compliance or is in breach of a cost share contract, the LWCD will prepare and issue a "Notice of NR 151 Violation" letter. This Notice will be pursuant to processes outlined and authorities obtained in the Green County Manure Storage Ordinance.

Note: Enforcement begins with this letter. It will be pursued in circumstances where:

(1) A breach of contractual agreement has occurred including failure to install, implement or maintain BMP's and
(2) Non-regulatory attempts to resolve the situation have failed

Process for Appeal of Non-Compliance Decision

Landowners wishing to appeal a notice of NR 151 Non-Compliance may do so to the Green County LWCC. This process is spelled out in detail within the Green County Manure Storage Ordinance. Details related to the appeal process will be forwarded to all landowners receiving a notice of non-compliance.

Where Does Implementation Start and How Do We Set Inter-Departmental Priorities?

The implementation process related to the performance standards and prohibitions found in NR 151 can and will be a daunting and very time-consuming task. So it's realistic to evaluate and set priorities within Green County for NR151 implementation.

The LWCD is capable of utilizing GIS and on-site visits to begin the inventory of selected watersheds within Green County. It is likely that we will utilize information gathered through those inventories to continue our NR151 priority farm and parcel implementation process described above. Watershed wide NR151 implementation will likely be limited by available staff and cost sharing resources that become available.

Our approach has been to fix farms that have complaints lodged against them or have been reported to the DNR. Currently we have only the staff capacity to respond to complaints and working with these landowners to guide them into compliance with NR151. DNR provides some funding to help these landowners achieve compliance.

Response to Public Complaints Alleging Noncompliance

The LWCD will respond to complaints by investigating allegations with a file review and on-site visit. If the review demonstrates significant violation of NR151 Agricultural Performance Standards, the LWCD will proceed with a strategy for compliance. This process will include the NR 151 compliance procedures described above.

Note: Follow-up, on-site visits and access to cost share funding will all be dependent on current availability of local and state financial resources. Inadequate staff time and lack of adequate cost sharing resources could result in reduced capacity for enforcement.

First five-year work plan

For the ten-year Green County Land and Water Resource Management Plan

Priority 1: Nutrient Management Planning

Objectives	Actions	Who	When	Anticipated Annual Outcome
Increase acreage managed by a nutrient management plan and support soil sampling	Encourage voluntary adoption and use with available cost- share sources to write a plan, educate farmers so they can write their own Nutrient Management Plan, lend soil probes and mail samples	LWCD	2021-2026	1,000 acres of nutrient management plans
Prevent manure run-off incidents/ accidents	Continue to educate farmers on winter spreading BMPs and response to runoff events	LWCD, DNR	2021-2026	No manure "spills" or runoff incidents
Livestock Siting Ordinance	Review plans submitted	LWCD, Zoning, UWEX	2021-2026	Make CAFOs aware of the rules
Enforce the Green County Manure Storage Ordinance	Respond to complaints and new structures	LWCD, NRCS, Zoning	2021-2026	1 storage structure built to NRCS specs
Manure Facility inspection	Inspect structures previously installed every 5 years	LWCD	2021-2026	Check for structural integrity, awareness of maintenance. Abandon 1 storage structure per year.

Estimated annual LWCD staff costs for priority 1: $15,000
Estimated annual costs other than staff = $120,000

Priority 2: Groundwater Protection

Objectives	Actions	Who	When	Anticipated Annual Outcome
Encourage proper well abandonment of unused wells and cisterns	Use cost- share funds to assist landowners with the expense of	LWCD	2021-2026	25 properly abandoned wells

	having the wells professionally filled			
Educate landowners of the importance of testing their water and the importance of protecting groundwater	Write news articles and radio programs to educate the public. Participate in school events.	LWCD UWEX	2021-2026	4 radio programs dedicated to groundwater education 1 news article per year
Promote a well sampling program to establish baseline conditions	Provide information in order to sample wells	LWCD UWEX	2020-2025	388 landowners have their water sampled
Continue to track well abandonment with GIS program	Periodically update the map and database	LWCD Local well drillers	2021-2026	Map of wells to monitor and those properly filled
Continue to issue permits for new wells to be drilled	Monitor that old wells are properly abandoned and new wells are properly placed. Will maintain a GIS database of new wells.	LWCD, DNR, Local well drillers	2021-2026	Track new well placement and collect construction logs

Estimated annual LWCD staff costs for priority 3: $40,000
Estimated annual costs other than staff = $50,000

Priority 3: Soil Health

Objectives	Actions	Who	When	Anticipated Annual Outcome
Control erosion to "T"	Write conservation plans to "T"	LWCD NRCS	2021-2026	1,000 acres of cropland conservation plans
Maintenance and construction of grassed waterways, use of contour strips and contour farming	Write conservation plans using contour farming and strip cropping. Make cost-share available for maintenance and construction of grassed waterways.	NRCS, LWCD, DATCP	2021-2026	40 acres strips laid out 10 acres of new waterway constructed
Promote no till and cover crops as tools to increase soil health	Host field days and promote the benefits of good soil health	NRCS, LWCD	2021-2026	2 field days on cover crops
One on one contacts	Meet with landowners to discuss environmental issues, methods to solve and possible cost- share opportunities.	LWCD, NRCS	2021-2026	10 landowners will be contacted

Streambank protection, fencing of streams and stream crossings.	Educate on county and state cost-sharing programs, install BMPs	LWCD, DNR, NRCS, DATCP	2021-2026	2 crossings 10,000' of streambank protection

Estimated annual LWCD staff costs for priority 4: $45,000
Estimated annual costs other than staff = $500,000

Priority 4: Producer-led watersheds

Objectives	Actions	Who	When	Anticipated Annual Outcome
Continue to support Farmers of the Sugar River	Collaborate and provide fiscal management for the group	LWCD, DATCP, local farmers	2021-2026	A thriving functioning producer-led group that increases members
Evaluate and consider support to start a new watershed group in an area not covered by one.	Host meeting for watershed farmers to educate on what a producer-led group is and what it could become	LWCD, DATCP, local farmers	2021-2026	A group will form to be a supportive network for each other
Apply for grants to be able to pay incentives to farmers	Apply for PLWP grant and others as available	LWCD, DATCP, local farmers	2021-2026	Receive annual grant

Estimated annual LWCD staff costs for priority 7: $5,000
Estimated annual costs other than staff = $30,000

Priority 5: CRP/CREP

Objectives	Actions	Who	When	Anticipated Annual Outcome
Continue supporting and encouraging participation in CRP & CREP	Disperse educational material, conduct radio programs, perform status reviews, review plans, coordinate drill for native seeding, survey and	LWCD, NRCS, FSA, DATCP Pheasants Forever	2021-2026	40 contracts of new or reenrolled CRP & CREP

	mark field boundaries, design practices for projects under contract			
Continue tree sale program to provide a variety of trees and shrubs	Host tree sale and distribution in spring for planting. Coordinate the rental of two tree planters	LWCD	2021-2026	Sell 8,000 trees & shrubs

Estimated annual LWCD staff costs for priority 6: $30,000
Estimated annual costs other than staff = $400,000

Priority 6: Education

Objectives	Actions	Who	When	Anticipated Annual Outcome
Educate new landowners of the programs and cost share opportunities with agencies in the office	Put together a new landowner packet that would be available to new rural landowners	LWCD, NRCS, FSA, UWEX, DNR, Zoning	2021-2026	1 new landowner packet
Educational contests, programs and newspaper articles, press releases	Conduct weekly radio programs, land judging & poster contests, recognition of conservation achievements and special observances, write newspaper articles	LWCD, NRCS	2021-2026	weekly radio programs 1 annual land judging contest 1 Southwest land judging contest 1 poster contest
Update the department's website with timely information	Keep up-to-date information and resources valid on the website	LWCD	2021-2026	At least monthly updates
Continue groundwater awareness week presentations	Coordinate with school districts and presenters to give presentations to area youth	LWCD, UWEX, County Board Supervisor	2021-2026	5 presentations
Continue to coordinate and sponsor Youth Conservation Days	Plan and deliver youth programming for in person learning and create videos to teach certain subjects	LWCD, NRCS, DNR, FSA, Green County Conservation League, City of	2021-2026	Host 2 events a year

		Monroe, Lower Sugar River Watershed Association, Upper Sugar River Watershed Association, Prairie Enthusiasts, Pheasants Forever, local school districts		
Educate the public about the impact of invasive species and how to control	Write news articles and radio programs, coordinate USRWA for Phragmites control	DNR, LWCD, USRWA	2021-2026	Eradication of known sites
Administer the Wildlife Damage Abatement Program	Handle paperwork necessary for reimbursements, radio programs to educate the public	USDA-Wildlife Services, LWCD, DNR	2021-2026	2 people are able to submit claims for reimbursement, ag tags are issued for deer hunting

Estimated annual LWCD staff costs for priority 5: $30,000
Estimated annual costs other than staff = $25,000

Total estimated annual LWCD staff costs for all priorities: $165,000
Total estimated annual costs for other staff for all priorities: $ 1,125,000

Blank

Appendix A

Green County Land and Water Conservation Department
NR 151 Compliance Evaluation

Landowner:	Parcel Numbers:	
Conservation Compliance Standard (Shaded boxes indicate non-compliance)	Yes	No
Sheet, Rill, Gully, and Wind Erosion *NR151.02 cropland shall be cropped to tolerable soil loss*		
Cropland soil erosion meets tolerable soil loss and all concentrated flow channels are addressed.		
Tillage Setback *NR151.03*		
Are there adequate tillage setbacks (minimum of 5 ft) from top of bank of surface water?		
Nutrient Management *NR151.07(3) Manure, commercial fertilizer and other nutrients shall be applied in conformance with a nutrient management plan.*		
Is there a nutrient management plan on all cropland that meets the NRCS 590 Standard?		
Phosphorus Index *NR151.04*		
Phosphorus Index of 6 or less?		
Are all pastures included in NMP?		
All Manure Storage Facilities Must Be Compliant With The Following *NR151.05(2) New or altered manure storage facilities shall be designed and constructed to USDA NRCS standards* *NR151.05(3) Closure of a sub-standard manure storage facility shall occur when the facility has not been used in 24 months* *NR151.05(4) Existing manure storage facilities that pose an imminent threat shall be upgraded, replaced, or abandoned*		
If the manure storage facility was constructed after 10/2002 it must meet NRCS Standards.		
If an existing storage structure has been substantially altered it must meet NRCS Standards.		
If an existing storage structure has not had manure added or removed for a period of 24 months it must be properly abandoned.		
If a manure storage structure poses an imminent threat to public health, fish and aquatic life, or is causing a violation of groundwater standards it must be properly abandoned.		
Process Wastewater Handling *NR151.055 No significant discharge of process wastewater to waters of the state.*		
Is there significant discharge of process wastewater to waters of the state.		
Clean Water Diversion *NR151.06 Runoff shall be diverted away from contacting feedlots, manure storage areas and barnyard areas within water quality management areas*		
Has runoff been diverted from contacting feedlot manure storage areas and barnyard areas within water quality management areas (WQMA)?		
Manure Management Prohibitions *NR151.08 No overflow of manure storage facilities* *No unconfined manure piles in WQMA's* *No unlimited access to waters of the state which prevent the maintenance of adequate cover*		
Is there any overflow of manure storage structures?		
Are there any unconfined manure sacks in a WQMA?		
Is there direct runoff from a feedlot or stored manure into waters of the state?		
Is there unlimited access by livestock to waters of the state where high concentrations of animals prevent the maintenance of adequate sod or self-sustaining vegetative cover?		

Notes:

Final Compliance Status: ☐ **Compliant** ☐ **Non-Compliant**

Completed by LWCD Staff:	Date:

Date: _____

Definitions used in NR 151 Evaluation

Adequate Sod or Self-sustaining Vegetative Cover – the maintenance of sufficient vegetation types and densities such that the physical integrity of the streambank or lakeshore is preserved. Self-sustaining vegetative cover includes grasses, forbs, sedges and duff layers of fallen leaves and woody debris.

Direct Runoff – a discharge of a significant amount of pollutants to water of the state resulting from any of the following practices:

1. runoff from a manure storage facility
2. runoff from an animal lot that can be predicted to reach surface water of the state through a defined or channelized flow path or man-made conveyance
3. discharge of leachate from a manure pile
4. seepage from a manure storage facility
5. construction of a manure storage facility in permeable soils or over fractured bedrock without a liner designed in accordance with NR 154.04 (3)

Unconfined Manure Pile – a quantity of manure that is at least 175 ft^3 in volume and which covers the ground surface to a depth of at least 2 inches and is not confined within a manure storage facility, livestock housing facility or barnyard runoff control facility or covered or contained in a manner that prevents storm water access and direct runoff to surface water or leaching of pollutants to groundwater.

Water Quality Management Area (WQMA) – the area within 1,000 feet from the ordinary high water mark of navigable waters of a lake, pond or flowage; the area within 300 feet from the ordinary high water mark of navigable waters of a river or stream; a site that is susceptible to groundwater contamination or that has the potential to be a direct conduit for contamination to reach groundwater. A site susceptible to groundwater contamination means the following:

1. an area within 250 ft. of a private well
2. an area within 1000 ft. of a municipal well
3. an area within 300 ft. upslope or 100 ft downslope of karst features
4. a channel with a cross-sectional area equal to or greater than 3 ft^2 that flows to a karst feature
5. an area where the soil depth to groundwater or bedrock is less than 2 feet.
6. an area where the soil above groundwater or bedrock does not exhibit one of the following:
    - at least a 2-foot soil layer with 40% fines or greater
    - at least a 3-foot soil layer with 20% fines or greater
    - at least a 5-foot soil layer with 10% fines or greater

Waters of the State – defined in s.283.01 (20) Stats.

- all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, water courses, drainage systems and other surface water or groundwater, natural or artificial, public or private within the state or under its jurisdiction, *except those waters which are entirely confined and retained completely upon the property of a person.*