Farmland Preservation Plan

Green Lake County

Adopted
Month, Date, Year

Green Lake County Farmland
Preservation Plan
Acknowledgements

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Mat Boerson	Organic Farmer	Town of Brooklyn
Keith Frederick	Town Official & Farmer	Town of Marquette
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GREEN LAKE COUNTY
FARMLAND PRESERVATION PLAN

TABLE OF CONTENTS

THE PLAN

TABLES & FIGURES

Tables 100-128 Located in Appendix A

Farmland Preservation and Agriculture Development Trends, Plans or Needs

Land Use

Agricultural Trends

Farmland Preservation Areas

MAPS

Maps 4A-4J Located in Appendix G

APPENDICES

Appendix A – Population, Economic & Housing Tables 100 through 128
Appendix B – Agriculture Works Hard for Green Lake County
Appendix C – Prime Agricultural Soils
Appendix D – "Contribution of Agriculture to the Wisconsin Economy (2022)"
Appendix E – DATCP Certification Order
Appendix F – Green Lake County Board of Supervisors Approval Resolution
Appendix G - Farmland Preservation Plan Maps by Town (Maps 4A- 4J)

1.0 Introduction

1.1 Wisconsin Working Lands Initiative

The Wisconsin Working Lands Initiative was developed to achieve preservation of areas significant for current and future agricultural use. This initiative was signed into law in 2009 (Chapter 91) and is comprised of the following three programs:

- Updated Farmland Preservation Program (FPP)
- Agricultural Enterprise Area (AEA) Program
- Purchase of Agricultural Conservation Easement (PACE) Program

The State of Wisconsin's Farmland Preservation Program is a way that farmers and local governments can preserve farmland, protect soil and water resources, and minimize land use conflicts. Participating landowners:

- can preserve their productive farmlands and natural resources by participating in locally adopted farmland preservation zoning ordinances or by signing farmland preservation agreements in locally petitioned Agricultural Enterprise Areas (AEAs). Local communities can layer the different participation options to best fit the needs of their community.
- who meet the state soil and water conservation standards are not only protecting their agricultural and natural resources but are also eligible to claim the farmland preservation tax credit.

The Agricultural Enterprise Area program is a tool that can help individuals and communities meet locally identified goals for preserving agricultural land and encouraging agricultural economic development. An AEA is an area of contiguous land primarily in agricultural use that has been designated by the DATCP in response to a locally developed petition. The designation of an AEA does not, by itself, control or limit land use within the designated area. This program is a voluntary program that provides tax credits to eligible participants and does not require a Farmland Preservation Zoning District.

In 2023 the State made a few updates to the Farmland Preservation Program. The minimum term for farmland preservation agreements was reduced from 15 years to 10 years for new agreements signed after December 8, 2023. There were also increases to the amounts of tax credits that eligible landowners may receive. These increases are as follows:

- $10 per acre for qualifying acres that are in a farmland preservation zoning district but are not subject to a farmland preservation agreement. Prior to 2024, this credit was $7.50 per acre.
- $10 per acre for qualifying acres that are subject to a farmland preservation agreement in an AEA but are not located in a farmland preservation zoning district. Prior to 2024, this credit was $5.00 per acre.

- $12.50 per acre for qualifying acres that are in a farmland preservation zoning district and are subject to a farmland preservation agreement in an AEA. Prior to 2024, this credit was $10 per acre.

In order to participate in the Working Lands Initiative, there are eligibility requirements that need to be met. The acres claimed in the program must be "qualified acres", meaning the acres must be located in a farmland preservation area identified in a certified county farmland preservation plan. Eligible land includes agricultural land or permanent undeveloped natural resource areas or open space land that is in an area certified for farmland preservation zoning, and/or located in a designated AEA and under a farmland preservation agreement. Claimants must have $6,000 in gross farm revenue in the past year or $18,000 in the past three years. Gross revenue produced by the renter on the landowner's farm can be used to meet this requirement. Rental receipts of farm acres do not count toward gross farm revenue. Claimants must also be able to certify that all property taxes owed from previous years have been paid and must comply with soil and water conservation standards and submit certification of compliance.

In order to comply with the soil and water conservation standards, the claimant would work with Land Conservation Department (LCD) staff to develop a conservation plan. The Conservation Plan Agreement is signed by both the claimant and renter if applicable. The conservation plan requires the claimant to meet all standards and prohibitions of NR 151, as well as develop a Nutrient Management Plan (NMP) for all cropland. The NMP is updated yearly and an NMP 590 checklist and annual certification is submitted to LCD to remain in compliance. LCD staff will need to complete farm site evaluation for conservation requirements at least once every four years. The claimant is to include the certificate of compliance with conservation standards with FC-A tax form and turn in annual certification for the applicable tax year.

1.2 Agricultural Development Policy

Green Lake County has a strong history of preserving agricultural land and natural resources in order to maintain a high quality of life and a strong economy. Due to the importance of agriculture within the local and regional economy, it is necessary to encourage farmland preservation, protect natural resources, and minimize conflicts between farm and nonfarm land uses. Agricultural related business and infrastructure that support agriculture will be encouraged in order to maintain a strong agricultural component of the County's economy.

1.3 Regional Location

Green Lake County is located in East Central Wisconsin. More specifically, Green Lake County is bordered by Waushara County to the north, Marquette County to the west, Dodge and Columbia Counties to the south and Winnebago and Fond du Lac Counties to the east. Green Lake is a relatively small county. At 355 square miles in size, it ranks 65th out of the 72 Wisconsin Counties. Map 1 shows the regional location of the County and associated governmental units. Green Lake County is home to 10 towns, two (2) villages and four (4) cities. The County is also home to Green Lake, more commonly known as "Big Green Lake". This lake is centrally located in the County and is respectively known as the deepest lake in the State of Wisconsin. The protection of Big Green Lake's water quality is paramount to agriculture preservation efforts.

1.4 Planning Process

This plan was prepared in accordance with the Farmland Preservation Chapter of the Wisconsin Statutes (Chapter 91). It establishes public policy in support of farmland preservation, agricultural development and the encouragement of a healthy agricultural economy. The legislation requires a county to develop and adopt a Farmland Preservation Plan in order for landowners in the County to be eligible for the farmland

preservation programs offered by the state.

The Farmland Preservation Program has been in existence since 1977 and in force in Green Lake County since 1984. Green Lake County developed the original Farmland Preservation Plan in 1983. Then, in 2015, the Farmland Preservation Plan was first updated and certified through December 31, 2025. This update will be the second update and will be certified through 2036. The goal of the program is to aid local governments in farmland preservation and agricultural development through planning and the provision of tax credits to those who participate.

This plan is part of a continuing effort by Green Lake County to participate in the State's Farmland Preservation Program in order to encourage a progressive yet sustainable agricultural economy. It is the intent of this plan to guide county decision-makers to make the best decisions for the benefit of the agricultural economy in Green Lake County.

This plan represents much research, study, and effort on the part of the Green Lake County Planning & Zoning Staff, UW Extension, the Green Lake County Land Use Planning & Zoning Committee and the Green Lake County Board.

A project schedule and cost estimate was prepared by Green Lake County Planning & Zoning Staff in order to complete the planning process. After making a grant application to the Department of Trade, Agriculture and Consumer Protection (DATCP), Green Lake County was awarded a grant of $30,000.00 to help offset the cost of producing the new Farmland Preservation Plan.

The *Green Lake County Farmland Preservation Plan* process was designed to meet the requirements of Chapter 91.10 of the Wisconsin State Statutes (Wis. Stats.).

Goals, objectives and recommendations stated in this plan reflect the deliberations among Green Lake County Planning & Zoning Staff, UW Extension, and the Green Lake County Land Use Planning & Zoning Committee. Comments and opinions expressed by the people within the County were reviewed at various stages of the planning process. References made to specific state, county, and other governmental programs do not imply endorsement but are presented for background and reference only.

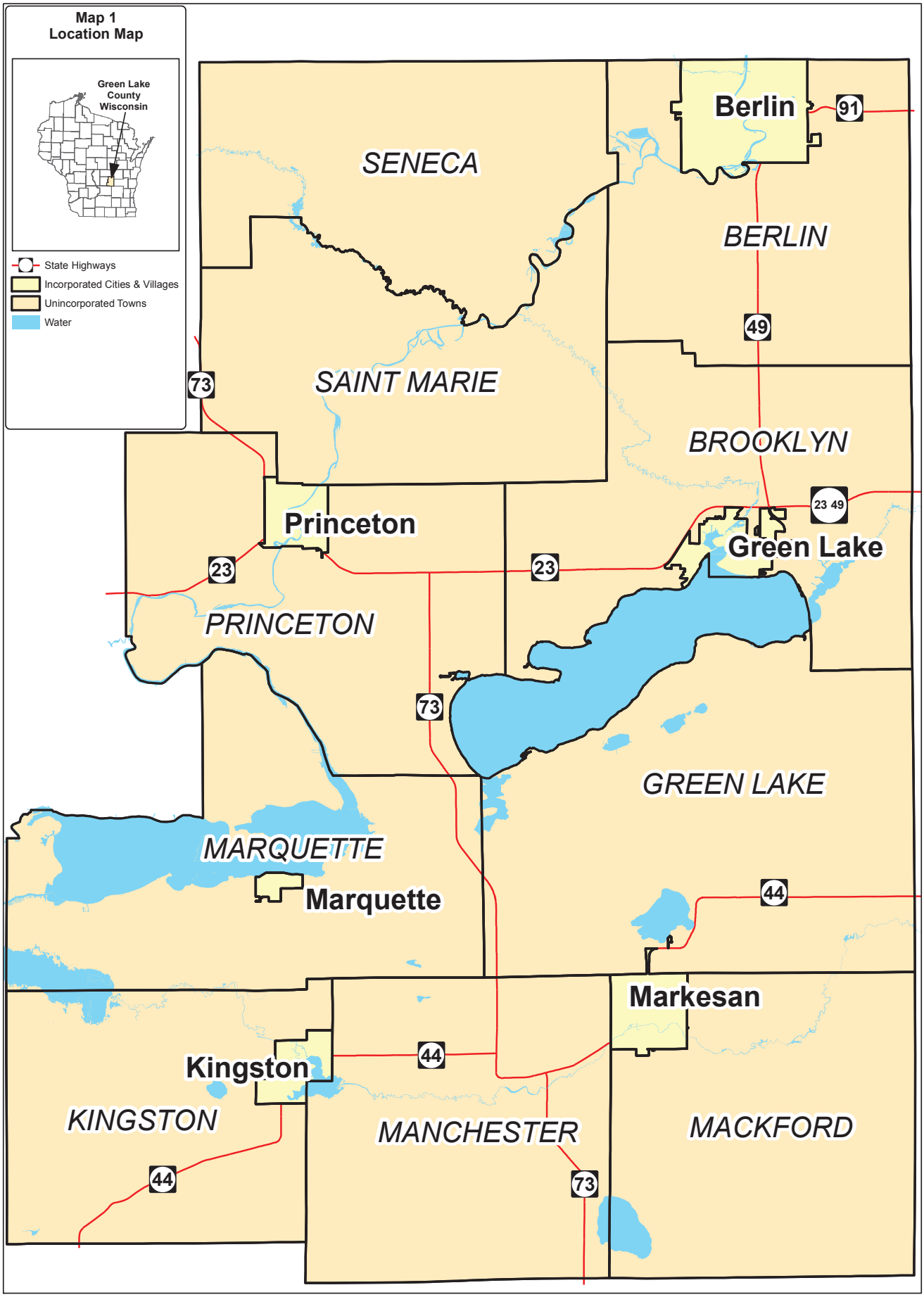
1.5 Public Participation Efforts

The farmland preservation planning process included four (4) publicly noticed Farmland Preservation Subcommittee meetings (with public comment), six (6) meetings with the Green Lake County Land Use Planning & Zoning Committee, and a public hearing with the Green Lake County Board. In addition, special meetings were held with individual towns to obtain input on the Farmland Preservation Plan. The project also included a public hearing held by the Land Use Planning & Zoning Committee to introduce the farmland preservation planning effort to the public.

The following core efforts were identified to foster public participation throughout the Farmland Preservation Planning process:

- All meetings properly noticed and open to the public.
- Notices sent to local media outlets identifying the time and location of public informational meetings and public hearings.
- Information about meetings, the Farmland Preservation Plan, and related materials were made available at the Green Lake County Government Center in the City of Green Lake for review by local residents and interested persons.
- Information about meetings, the Farmland Preservation Plan, and related materials were made available on the Green Lake County website for review by interested persons.
- Input from town officials was sought to create the farmland preservation plan maps.

In addition, an address to forward written comments was provided in all meeting notices. The Green Lake County Planning & Zoning Staff responded to written comments.


Map 1
Location Map
Green Lake
County
Wisconsin
State Highways
Incorporated Cities & Villages
Unincorporated Towns
Water
Berlin
91
SENECA
BERLIN
49
73
SAINT MARIE
BROOKLYN
23 49
Princeton
Green Lake
23
23
PRINCETON
73
GREEN LAKE
MARQUETTE
Marquette
44
Markesan
Kingston
44
KINGSTON
MANCHESTER
MACKFORD
44
73

2.0 Farmland Preservation and Agricultural Development Trends, Plans, or Needs

1.1 Population

Growth for a county is primarily tracked by the population within that county. Population can also serve as a baseline to determine a county's trends and needs. County needs can consist of community, recreational, housing, utility, and educational. Table 100 illustrates the population trends for Green Lake County over the last five decades, as well as surrounding counties and the State of Wisconsin. Please note that referenced Tables 100-128 are located in Appendix A. Population trends can be further broke down by race and ethnicity as well as median age. This information can be found in Tables 101 and 102.

Green Lake County had a population of 19,018 persons in 2020. This was a 0.17% decrease from 19,051 of the previous decade. A decrease of 0.3% was experienced from 2000 to 2010. An increase of 2.4% was experienced from 1990 to 2000 showing growth throughout the 1990s with a trend of decline in population in the 2000s. Green Lake County follows trends of a number of northern counties in Wisconsin where a slight decrease is seen. Wisconsin's rate of growth in the 1990s was 1.6 percent higher than that of Green Lake County. Wisconsin's rate of growth increased by 3.6%, which differs from the previous stated decrease in Green Lake County. Even with this declining rate of growth for Green Lake County it is still important to monitor development pressure on agricultural lands within rural areas. Guidance can help alleviate conflicts between residential and agricultural uses.

Population Estimates

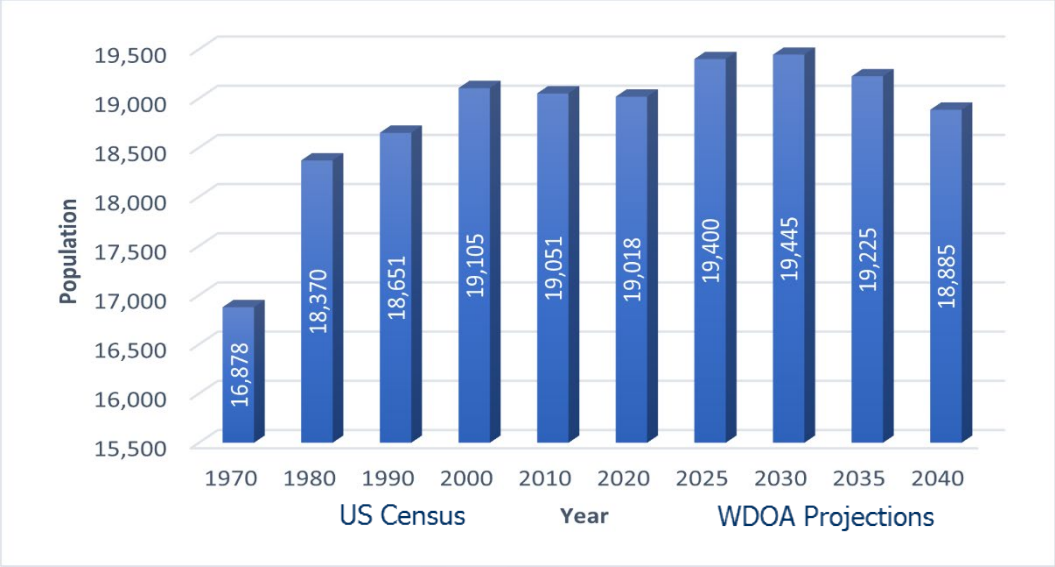
Population estimates are updated every year for all municipalities within Wisconsin by the Wisconsin Department of Administration Demographic Services Center and should be utilized as the primary source of population information during non-census years. The 2023 population estimate for Green Lake County was 18,990, a 0.15% decrease from 2020. Many surrounding counties experienced a population decrease similarly to Green Lake County except for Winnebago County that experienced a small increase from 2020 to 2023. The neighboring counties that had decreases, decreased between 0.28% to 1.03%. Wisconsin overall had an increase of 0.98% from 2020 to 2023. Estimates predicted in 2023 continued the trend of decrease from the previous decade for a lot of counties. For those counties that did have growth, the increase was not substantial. Green Lake County experienced a 0.17% decrease in the ten-year period from 2010 to 2020. With the current estimated decrease in population growth, it is anticipated that there will be less pressure placed on agricultural lands during this downturn in growth especially in Green Lake County. However, historical population estimates indicate that there will be a cycle of increased growth. This increased growth is projected to be seen in the entire state even when some counties are projected to have a decrease. In order to prevent an increased pressure on the agricultural industry, methods should be considered to direct population growth toward urban areas, consisting of cities and villages.

Population Projections

Projected populations from the Wisconsin Department of Administration Demographic Services Center for Green Lake County can be found in Table 103. Projections show a slight increase until ultimately an approximate 0.7% decrease by 2040 based on current population numbers. The Wisconsin Department of Administration predicts Green Lake County will have a population of 19,445 persons in 2030, an increase of

427 persons. However, the Wisconsin Department of Administration predicts a population of 18,885 person in 2040, a decrease of 133 persons from 2020 population numbers (See Figure 2-1). Based on predictions for surrounding counties Green Lake lags behind the predicted growths for the adjacent counties over the next 20 years. Waushara County is predicted to have the greatest percentage of growth over this time period. The average household size for Green Lake County in 2020 was 2.34, with a predicted size of 2.20 persons in 2040. Based on the average household size decrease and a slight decrease in population there may a need for additional dwelling units to house the smaller household size within the county. These new housing units, depending on their location and rate of density, will potentially have an effect on the amount agricultural land remaining in the County.

Figure 2-1
Green Lake County Population Historic and Projected



Source: US Census, Wisconsin Department of Administration

1.2 Economic Growth

Economic growth can be measured by a variety of ways including unemployment rates, household income, labor force, average wages, poverty status, employment trends, or principal employers. These trends can be found in Tables 106-113. Green Lake County residents have seen an increase in income over the last decade, a slightly lower increase than the State of Wisconsin. Green Lake County falls slightly above the 2% unemployment rate, they also have a higher amount of persons below poverty status than the State. A drop in the State's unemployment rate is viewed as a sign of a recovering economy. Employment for the County is greatly dominated by services and manufacturing. However, agricultural-related business is an important facet within the County as it generates thousands of jobs and millions of dollars in eco-nomic activity. Additional information regarding Green Lake County Agriculture can be found in Appendix B, "Agriculture Works hard for Green Lake County".

Agriculture is a cornerstone for Green Lake County, and is quite diverse in the agricultural products and practices. Green Lake County offers organic dairy and vegetables, rotational grazing, conventional dairies of all sizes, and a variety of vegetable crops. Agriculture accounts for $553 million in economic activity. Agricultural business is a significant anchor for the County pays $9.9 million in taxes annually. As

agriculture is a vital component in Green Lake County's economy, economic development trends and policies will have to help maintain agriculture as a major component of the economy.

1.3 Housing

Housing trends and analysis information can be found in Tables 118-128. Information within these tables is provided on age of housing, housing values, types of housing, occupancy, household size, and affordability.

There can be discrepancies between the rate of increase in population and the rate of increase in housing, as trends have shown a decrease in the average number of persons residing in a household. In 2022, the population of Green Lake was 19,018, with an average of 2.37 people per household. The population projection for 2040 is 18,509 with an average of 2.2 people per household. Because of the decline in persons per household, there typically is a greater increase in the number of households compared to the increase in the population, which is projected to decrease by 2040. According to population projections and average persons per household for 2040, there will be a need for 48 new households between 2025 and 2040. The location of these new households has the potential to have an effect on the amount of agricultural land available in the County.

Existing Housing Units

Table 124 outlines the types and number of households for the County. There has been an increase of 1.3% total households from 2010 to 2022, with a decrease in population of 0.2% from 2010 to 2022. Green Lake County's increase in the number of households was less than Wisconsin by 4.7%. These statistics follow the trend of the need of more homes being used to house fewer people, thus having the housing growing at a faster rate than the population in the County.

Tables 125 and 126 outline the trend in the decrease of persons per household from 2010 to 2022. There has been a progressive decline in the average persons per household from 2.59 persons per household in 1990, 2.48 persons in 2000 and 2.41 persons in 2010, and 2.37 persons in 2022. Wisconsin has seen a similar decline with 2.68 persons per household in 1990, 2.57 persons in 2000, and 2.49 persons in 2010, and 2.42 persons in 2022.

Housing Forecasts

Household forecasts are essential in preparing a farmland preservation plan for a county, as they aid in determining the amount of land that will be required to accommodate future residential needs. As with all projections, these projections are based on past statistics and current trends. Housing projections are obtained from the Wisconsin Department of Administration Demographics Service Center. According to trends, the total number of households for Green Lake County is projected to be 8,408 by 2040. This would be an increase of approximately 48 households from 2025 and a total of 489 units for a 30-year period since 2010. The density and location of these new housing units will dictate the impact to agricultural resources within Green Lake County. The more densely these additional housing units are planned, the less impact there will be to the agricultural land in the County. Villages and cities will play an important role in accommodating new housing growth while reducing land fragmentation in towns.

1.4 Transportation

Existing Road System

Green Lake County contains a networked system of highways that makes commerce to and from Minneapolis/St. Paul, La Crosse, Dubuque, Madison, Wausau, the Fox Cities and all points beyond, accessible to agricultural markets. State Highway 23 is the most heavily used road in the County averaging up to 7400 vehicles per day on eastern portions. This highway provides the primary east/west route through the County. State Highways 49 and 73 are the major north/south routes through the County. All state and county trunk highways provide vital service to the agricultural industry. In total, there are 703 miles of roadways within the County owned as follows: State Highway-70 miles, County Highway-229 miles and local roads-404 miles.

The Green Lake County Highway Commission is responsible for the year-round maintenance of County Trunk Highways and State Highways. The Highway Commissioner directs the department employees. Operations of the department are quartered in two locations: the main facility is located in the City of Green Lake with the second facility located in the Town of Manchester. Presently, the County is envisioning a new highway facility to replace the current main facility in the City of Green Lake. A location has not been chosen as of yet.

Local roads are maintained by the local unit of government. Recent challenges have surfaced over the size of agricultural equipment using the roadways and the potential damage the farm equipment and their representative weights can cause to the roadways. To address this growing concern while meeting the needs of agricultural industry, Wis. Act 377 (commonly referred to as the Implement of Husbandry IOH law) was signed in April, 2014.

The new act defined various types of equipment plus height, length, width and weight criteria. The law further establishes a “No Fee” permit system approach in which units of government are given options on how they can administer the no fee program. Although it is still early in establishing the administrative functions of the program, it appears many local units of government (especially towns) are working closely with the county highway departments in administering the selected details of the program. This cooperation and coordination appears the most administratively efficient approach while being fair to agricultural equipment owners and operators.

Presently, the Towns of Berlin, Kingston, Mackford, Seneca and St. Marie have opted in to the IOH program. The Town of Princeton has not opted in but abides by Act 377. The Towns of Brooklyn, Green Lake, Marquette and Manchester are presently total opt outs.

In June of 2023, under Act 13, the Agricultural Road Improvement Program (ARIP) was established as part of the 2023-2025 biennium budget. This program is aimed at improving highways functionally classified as local roads, or minor collectors, or culverts, that provide access to agricultural lands of facilities used to produce agricultural goods, including forest products. To date, no Green Lake County municipality has received an award, but this could be a useful tool to keep these roads open all year as opposed to posting them with weight restrictions.

Additional Modes of Transport

Rail Transportation

There are 12 freight carriers in Wisconsin, two of which operate within Green Lake County. The Union Pacific and the Wisconsin & Southern Railroad Co. operate service in central Wisconsin and connect to national points, east and west. The adjacent County of Fond du Lac, specifically the Village of North Fond du Lac, is home to the largest rail switching yard in the State of Wisconsin. Rail carriers in Wisconsin operate over 3,400 miles of track and carry over 160 million tons annually. Rail will continue to be a major means of moving bulk agricultural products to markets and providing essential fuel and fertilizer supplies to farmers.

Air Transportation

Of Wisconsin's eight commercial airports, five are within 90 minutes of Green Lake County. International flight service is available at General Mitchell International Airport in Milwaukee and at Austin Straubel International Airport in Green Bay. National and international access is available from several airports within an hour's drive, and a two and a half-hour jaunt to Chicago (with its three international airports) affords you the opportunity to fly directly to your global destination. There are also 3 Private Airports within Green Lake County.

Ports

Four of Wisconsin's eight ports are located within two hours of Green Lake County, three within ninety minutes. These modern port facilities serve as multi-modal distribution centers-linking cargo vessels with land-based transportation of both highways and rail.

Transportation Plans and Projects

Maintaining a sound transportation infrastructure is vital to supporting agriculture and the State's overall economy. The following road projects are planned for Green Lake County.

State Highway Projects

According to The Wisconsin Department of Transportation (WisDOT) Six Year Highway Improvement Plan, Green Lake County has scheduled projects as follows:

2025

Resurface Roadway:

WIS 44	7.4 Miles	Grand River Bridge to Fond du Lac County Line

2027

Resurface Roadway:

Hwy 23	4.7 Miles	County A to the Fond du Lac County Line

County Highway Projects

In a county heavily influenced by agricultural activity, all county trunk highways play an important role in the movement of agricultural products and services. These roads must be maintained to a level of service adequate to meet road standards. The following county highway projects are proposed by the Green Lake County Highway Department over the next several years for improvements:

2025		**Project Limits**	**Location**
CTH A	4 Miles	CTH I – CTH AW (cold in place)	Town of Mackford
CTH GG	1.82 Miles	CTH M – CTH HH (reconstruct)	Town of Manchester
CTH H	2.64 Miles	Puckaway – CTH B/KK (reconstruct)	Village of Marquette
2026			
CTH N	2.34 Miles	CTH K – CTH B (reconstruct)	Town of Green Lake
CTH O	1.75 Miles	CTH K – CTH B (pulverize, pave)	Town of Green Lake
CTH A	1 Mile	CTH V – CTH AA (reconstruct)	Town of Berlin

CTH H	2.34 Miles	STH 44 – CTH B (reconstruct)	Town of Kingston
2027			
CTH JJ	1.2 Miles	CTH Q – County Line (reconstruct)	Town of Green Lake
CTH D	3 Miles	CTH F – White River Bridge (reconstruct)	Town of St. Marie
2028			
CTH D	3.4 Miles	CTH F 0 White River Bridge (reconstruct)	Town of St. Marie
2029			
CTH S	1.14 Miles	CTH A – City of Markesan	Town of Mackford
CTH BB	1.1 Miles	STH 73 – CTH B	Town of Marquette
CTH TT	1.5 Miles	STH 23 – CTH T (reconstruct)	Town of Princeton
2030			
CTH K	1.55 Miles	CTH A – CTH N	Town of Green Lake

1.5 Utilities and Energy

Existing Utilities and Energy Sources

Electricity

There are three electricity providers within the County that serve residential and commercial users. In general, residents and commerce located in the western portions of the County are served by Adams-Columbia Electric Cooperative. Eastern electric users are served by Alliant Energy. There is one municipal and electric service cooperative around the City of Princeton, Princeton Municipal Water and Electric Utility, within Green Lake County.

Natural Gas

There are two natural gas companies that serve users in Green Lake County. The primary provider is Wisconsin Gas (We Energies). This utility serves the western and central portions of the County. Service to the eastern portion of the County (the towns of Brooklyn, St. Marie, Berlin and City of Berlin) is provided by Alliant Energy. The Town of Seneca, is not served by either of these two companies.

Wind & Solar

Presently there are no middle to large scale wind or solar installations in Green Lake County. It is speculated that the best locations for these installations are on quality farmlands and the local land owners are not willing to allow these installations a footing on their highly productive lands. If the solar and wind companies could tailor their installations to unproductive farmlands, solar and wind energy installation could make an impact in the county.

In April of 2023, the Green Lake County Board adopted a resolution requesting the State of Wisconsin revise "Renewable Energy Contract Regulations". The resolution is not anti-renewable energy. Rather the County Board through their resolution aimed to protect the County's landowners from signing contracts that are not in their best interest. Additionally, with local control of where these installations can be sited, Green Lake County can participate in the siting process and at the same time help to preserve the rural character of the County.

Chapter 196.491(3)(i) Wis.Stats. prohibits a county (or other local jurisdiction) from regulating solar or wind power generating installations with a power generation capacity of over 100 megawatts. Smaller installations may be regulated. However, Chapter 66.0401(1m) restricts a county from placing a restriction, either directly or in effect, on the installation or use of a wind energy or solar energy system unless the restriction satisfies one of the following conditions:

(a) Serves to preserve or protect the public health or safety

(b) Does not significantly increase the cost of the system or significantly decrease its efficiency.

(c) Allows for an alternative system of comparable cost and efficiency.

Larger (100MW or more) are exclusively authorized by the Wisconsin Public Service Commission (PSC). The PSC has broad authority over county governments as it related to wind and solar. A county may be in total opposition to a proposed solar farm, but if the PSC authorizes the project, the project can go forward. Chapter 196.491(3)(d)(6) Wis. Stats. requires the PSC to determine whether a wind or solar project unreasonably interferes with the orderly land use and development plans for the area. Green Lake County may be able to influence wind and solar developers and the PSC if a solar and wind overlay map (with rationale) were to be adopted as part of its comprehensive plan.

1.6 Communications

Cellular telephone service is available throughout the County as well as emergency 911 services. Strength of the signal will vary depending on tower locations and topography. A variety of publicly and privately owned cell towers are located throughout the county to provide cellular and broadband services. As of 2021, there were an estimated 30 FCC registered towers located throughout the county, with that number increasing yearly. There are four available types of broadband technology being utilized in the county, cable, DSL, wireless, and fiber. Reliable internet service has become a necessity with increasing numbers utilizing broadband to work from home. virtual learning, and access to health services.

1.7 Business Development

Business development can benefit a community in a variety of ways including, enhancing quality of life through increasing wages and better worker training, create new jobs, encourage sustainable development, and allow a community to be more competitive for attracting residents and labor force.

Labor Force

Green Lake County's labor force has experienced a 7.1% decrease from 2010 to 2022, whereas Wisconsin has experienced a 2.1% increase in the labor force. However, unemployment rates in 2022 for both Green Lake County and Wisconsin are relatively aligned at 2.0% and 1.8% respectively. Of those employed in the labor force in 2022, 53.2% of the residents both reside and work within the County and 46.1% commute outside of the County. For those residing and working in Green Lake County their per capita income in 2022 was $35,222, less than Wisconsin's per capita income of $40,188.

Economic Base

The foundation of the economic base for Green Lake County is education and health services at 22.3% of total employment within the County followed closely by trade, transportation, and utilities with 21.4%, and manufacturing at 17.9%. Likewise, the State of Wisconsin's top three industries consisted of education and health services, employing 22.1% of the workforce, trade, transportation and utilities at 19.4%, and manufacturing at 16.5% as displayed in Table 113. Education and health services, as well as trade,

transportation, and utilities, and manufacturing are the basic employment areas for the County.

In regards to employment of residents by their type of industry, Green Lake County in 2022 had a higher percentage of total employed in the agriculture, forestry, fishing, and mining at 5.3% than the state which had a total of 2.2%. Green Lake County experienced a decrease of 23.3% in those employed in agriculture, forestry, fishing, and mining, whereas Wisconsin experienced an overall loss of 6.2% from 2010 to 2022.

Dairy farms are a key County industry. On-farm milk production generates $33.6 million in sales and Green Lake County farms accounts for approximately 1,445 jobs county wide. At a county level each dairy cow generates $6,765 in on-farm sales to producers. Dairy is Green Lake County's top commodity in sales, followed by grains, cattle and calves, vegetables, and poultry and eggs.

It is likely that much of the agricultural commodities produced in Green Lake County are utilized in adjacent counties, such as Fond du Lac and Columbia County.

According to 2022 data obtained from the UW Cooperative Extension Office, Green Lake County agriculture:

- Provides 1,864 jobs throughout the County (21% of the County total of 8,987)
- Pumps $143 million into the economy (raw product commodities, farm gate sales)
- Pays $7.4 million in taxes
  - Property tax $2.0 million
  - Income tax $0.8 million

    Note: The $7.4 million does not include all property taxes paid to support local schools. If it did the number would be much higher.

Outside of agriculture, the three largest private employers in Green Lake County are Berlin Memorial Hospital, Green Lake Conference Center and the Heidel House Resort & Spa.

Business Development Trends and Outlook

The promotion of business and economic development falls under the responsibility of the Green Lake County Economic Development Corporation (GLCEDC). This Corporation's mission is to: "Promote, Attract, Stimulate, Rehabilitate and Revitalize Commerce, Industry, and Manufacturing in Green Lake County". The GLCEDC was established in 1990 as a non-profit separate corporation to apply for and administer grants and loans for the purpose of economic development in Green Lake County. The primary purpose of the Corporation is to promote industrial, tourism and other economic development in the County that will create jobs.

The GLCEDC has not performed any specific studies on the outlook or future trends of the County's agricultural economy, but the County was included in a regional assessment that was led by the neighboring Fond du Lac County Economic Development Corporation. There is a strong agricultural connection between Western Fond du Lac and Eastern Green Lake Counties so the study's results are very relevant to the future of Green Lake County agriculture businesses.

According to the Fond du Lac County Economic Development Corporation, the region's pursuit of a diverse economy starts with expanding existing business and attracting new business. Targeting specific industry sectors to expand or start fresh in the region will always be an ongoing effort.

To create a balanced industry mix, seven targeted industry clusters were selected. These industries were as follows (in no priority order):

1. Advanced Manufacturing: Machinery & Metal
2. Advanced Material Manufacturing
3. Agribusiness, Food Processing & Technology
4. Biomedical/Biotechnical (Life Sciences)
5. Energy (Fossil and Renewable)
6. Printing and Publishing
7. Transportation & Logistics

Within the seven industries, an in-depth study revealed market opportunities for existing businesses to expand or for new businesses to locate in Fond du Lac County or within the 7-county region (Fond du Lac, Calumet, Dodge, Green Lake, Sheboygan, Washington and Winnebago counties).

The in-depth study identified the following unmet needs associated with agriculture:

- **Crop and animal production**
- **Ag chemicals (pesticides) and fertilizer**
- **Fluid milk manufacturing (manufacturing processed milk products or fluid milk dairy substitutes)**
- **Wholesale trade agents and brokers**
- **Alternative energy to replace petroleum and natural gas imports**
- **Dry, condensed and evaporated dairy products**
- **Soybean processing**
- **Plastic bottle manufacturing**
- **Flavoring syrup and concentrate manufacturing**
- **Commercial banking**

These identified opportunities suggest a void in local services (Fond du Lac County) spawned by the existing agricultural economy. However, some of these needs can be addressed regionally by other adjacent counties (Green Lake for example). Nonetheless, the study reveals the "spinoff" economic effects agricultural activity can generate to the local and regional economy.

Identified strengths of the region, which includes Green Lake County, include the following:

- The region has very strong support in: crop and animal production; veterinary services; farm supplies and equipment; food processing and transportation equipment; transportation (trucking and rail); warehousing; and printing and packaging (paper, cardboard, metal, plastic).
- The region and state have very strong education, research, and support organizations for the industry cluster such as: Moraine Park Technical College; University of Wisconsin and UW-Extension; Wisconsin Department of Commerce; Wisconsin Department of Agriculture; Trade, and Consumer Protection.
- The region is centrally located with excellent highway access to major markets in Green Bay, Madison, Milwaukee, Chicago and Minneapolis.

1.8 Community Facilities and Services

Existing Services

Local features such as parks, schools, and protective services help define a community's character. In Green Lake County, many of the smaller incorporated communities provide necessary support services for the outlying agricultural towns. These services require substantial investment supported by local tax bases or user fees. Industry and business which are supportive to agriculture rely heavily on fundamental services like public water and sewer to operate their businesses.

Sanitary Sewer and Public Water Facilities

Sanitary sewer and public water facilities are provided by the individual village and city (incorporated) communities as well as the Green Lake Sanitary District. These systems accommodate concentrated development which makes the system cost effective. System infrastructure needs such as municipal wells, wastewater treatment plants and service lines are monitored by their respective municipal departments with water quality oversight provided by the Wisconsin Department of Natural Resources.

Private Onsite Wastewater Treatment System (POWTS) Facilities

POWTS facilities, more commonly known as septic systems are primarily located within unincorporated areas of the County that do not have accessibility to public sanitary sewer. POWTS systems, which are installed by licensed master plumbers, are required to abide by the POWTS Maintenance Program administered by Green Lake County Land Use Planning and Zoning Department. An Inspection is required every three years except for special circumstances. Notices are sent to the property owner at the appropriate inspection interval.

Future Needs

Wisconsin's comprehensive planning legislation requires that the Utilities and Community Facilities element of the comprehensive plan include an approximate timetable that forecasts the need to expand or rehabilitate existing utilities or to create new utilities. Each community in Green Lake County that developed a comprehensive plan identified major public facility projects for implementation. The recommendations are

based on system condition, performance and the need for expansion due to population and industrial growth.

Collaboration between towns, villages and cities is very important in providing necessary support infrastructure to the agricultural business industry. Not only do the incorporated villages and cities provide many of the food processing and services industries but they provide housing opportunities for much of the labor required to fill job opportunities within these industries.

1.9 Waste Management

Green Lake County does not provide services in regards to residential and commercial solid waste or recycling pick up. Solid waste and recycling is primarily provided by private companies hired by municipalities to provide the service. The type of service typically consists of curbside collection. The County does participate in the Clean Sweep Program that allows for Green Lake County citizens to have a way to dispose of hazardous materials. Cities, villages, and towns typically organize their own municipal waste pick up and disposal using commercial haulers. The Valley Trail licensed landfill currently operates in the Town of Berlin and is managed by Waste Management.

There are 16 responsible units for recycling within the County. Each city, village or town indicated is responsible for complying with recycling regulations.

1.10 Municipal Expansion

Green Lake County is home to 16 municipalities (4 cities, 2 villages, and 10 towns). Incorporated community expansion is going to be an issue for towns in Green Lake County, as cities and villages can expand into town territory. Municipal expansion occurs through annexation and often results in the loss of agricultural land. Cooperative boundary agreements between a town and a city or village present an alternative to annexation.

Cooperative Boundary Agreements

Cooperative boundary agreements can reduce some of the conflict regarding boundary issues, including annexation, that often arise between towns and their incorporated neighbors (cities and villages). The Legislature has provided express enabling authority for these agreements. The communities involved in such agreements undertake cooperative preparation of a plan for the areas concerned. The plan for changing or maintaining boundaries, and for controlling land use and services is sent to the Department of Administration. If the plan is approved, a contract binding the parties is put into effect.

Cooperative boundary plans or agreements involve decisions regarding the maintenance or change of municipal boundaries for a period of 10 years or more. The cooperative plan must include a plan for the physical development of the territory covered by the plan, a schedule for changes to the boundary, plans for the delivery of services, an evaluation of environmental features and a description of any adverse environmental consequences that may result from the implementation of the plan, and it must address the need for safe and affordable housing. The participating communities must hold a public hearing prior to its adoption.

Annexation

The State of Wisconsin provides cities and villages the power to annex. This power to extend municipal boundaries into adjacent unincorporated (town) lands allows a community to control development on its

periphery. Contrary to popular belief, annexation occurs at the request of town residents, not at the request of the incorporated municipality. Petitions for annexation are filed by the town landowners and the village or city acts upon the annexation petition.

Wisconsin Statute, 66.021, Annexation of Territory, provides three petition methods by which annexation may occur. Annexation involves the transfer of one or more tax parcels from a town to a city or village. Cities and villages cannot annex property without the consent of landowners as required by the following petition procedures:

1. Unanimous approval - A petition is signed by all of the electors residing in the territory and the owners of all of the real property included within the petition.
2. Notice of intent to circulate petition (direct petition for annexation) - The petition must be signed by a majority of electors in the territory and the owners of one-half of the real property either in value or in land area. If no electors reside in the territory, then only the landowners need sign the petition.
3. Annexation by referendum - A petition requesting a referendum election on the question of annexation may be filed with the city or village when signed by at least 20 percent of the electors in the territory.

Wisconsin Act 317 — Revisions to Annexation Procedures
Under this Act which was enacted in April of 2004, no city or village may annex any territory if none of the city's or village's territory is in the same county as the territory to be annexed. The Act also requires cities and villages to make payments for five years to towns that lose territory due to annexations. Cities and villages will have to pay to the town from which the land is annexed the amount of the town tax for the annexed property. The Act gives an exemption from this payment for cities and villages that have boundary agreements with the neighboring towns. Although Wisconsin Act 317 helps towns financially when land is annexed by a city or village, it does not stop the loss of agricultural land that may occur.

2009 Wisconsin Act 366 - clarifies that unanimous consent petitions must be contiguous to the annexing jurisdiction.

2011 Wisconsin Act 128 - repeals the prohibition against towns contesting unanimous consent annexations, and also permits towns to use the mediation process in s. 66.0307(4m) wis. Stats. to trigger Department review of annexations, including annexations in rural counties.

2021 Wisconsin Act 198 - repeals the prohibition against cities and villages annexing into new counties, provided that certain conditions are met.

1.11 Environmental Preservation

Being stewards of the environment is important in order to preserve the natural resources relied upon by all. Natural resources are continually facing significant pressure as populations are growing and expanding. With this growth and expansion there has been increased demand for groundwater, land, and raw materials. Planned development patterns can be a vital aspect in preserving and regulating the use of the natural resources within Green Lake County. During times of economic prosperity, there was a demand for country living which put growing stress on agricultural operations. Migration of persons from urban areas to more rural type suburbs, can have a potential for negative impacts on natural resources.

Many sensitive areas have state and federal regulations protecting them, such as wetlands, floodplains, and shore lands. Many of the state laws establish protective area setbacks for such resources, as well as

minimized use requirements. Unlike wetlands, shore lands, and floodplains, not all resources are protected by state law. Municipalities have the ability to choose to protect additional natural resources that they value within their community. Local ordinances help set standards and deal with any issues or conflicts that may arise during land use or development, and in turn provide protection for valued natural resources in the County.

Environmental Preservation Tools

Green Lake County Land and Water Conservation Department promotes environmental preservation through supplying financial, technical, and land planning assistance to landowners in the County. Programs administered by the Department, consist of the Farmland Preservation Program, the Land and Water Resource Management Plan, Crop Damage Program, Information and Education Programs, Environmental Quality Incentives Program (EQIP) Agriculture Conservation Easement Program (ACEP), and Lakes Streams and Ponds Program, Conservation Reserve Enhancement Program (CREP). The Land and Water Resource Management Plan primary purpose is to maintain funding levels needed to implement the conservation practices and programs in order to make a positive impact on resources in the County. The County also implements a Shoreland Zoning Ordinance in order to prevent water pollution and maintain stable and healthy conditions. In doing so the district protects fish spawning grounds and aquatic life by preserving shore cover within the County.

The Green Lake Conservancy Foundation (GLCF) is a non-profit origination that works to protect and enhance the greater Big Green Lake Watershed. The Conservancy identifies lands that are environmentally sensitive and works with land owners to acquire qualifying natural areas, or helps the landowners establish conservation easements.

1.12 Potential Weather Cycle Impacts

Weather cycles have the potential to impact agriculture in Wisconsin directly in both positive and negative ways, as summarized in Tables 2-1 and 2-2. These direct impacts typically consist of changes in temperature and precipitation amounts. Besides direct impacts to agriculture there are also indirect situational changes that will affect Wisconsin agriculture (Table 2-3). These variable weather cycles are likely to continue in the future and agricultural activities will need to adapt to the resultant conditions. There is increased pressure to increase current yields of agricultural crops, in order to continue to provide ecosystem goods as well as support the growth in bioenergy. The response by agricultural producers to these variable weather cycles contains plenty of uncertainty, as different climate scenarios require different responses in planting times and herbaceous and pest management practices in order to maximize crop yields.

With agriculture being a major economic component in Green Lake County and Wisconsin, it will be important for agricultural producers and policy-makers to have the best available information on weather cycles and the effects on agricultural production. Weather cycles will continue to have an effect on production and yields. It will be essential for policy-makers and agricultural producers to work together in order to continue to keep agricultural a strong and growing aspect of the economy and culture of Green Lake County.

Table 2-1
Direct Impacts on Agriculture - Positive

Aspects of Weather Cycles	Impact on Agricultural Production
Longer frost-free periods	Use of higher-yielding genetics
More freeze/thaw cycles in winter	Increased soil tilth and water infiltration
More summer precipitation	Reduced plant stress
Higher dew point temperatures	Reduced moisture stress
More diffuse light (increased cloudiness)	Reduced plant stress
Higher water-use efficiency	Higher yields
Warmer spring soil temperatures	Use of higher-yielding genetics
Reduced risk of late spring or early fall frosts	Use of higher-yielding genetics
Increased atmospheric CO_2 levels	Increased photosynthesis and yields

Source: "Agriculture and the Soil Resource", Wisconsin Initiative on Climate Change Impacts

Table 2-2
Direct Impacts on Agriculture - Negative

Aspects of Weather Cycles	Impact on Agricultural Production
More spring precipitation causes water-logging of soils	Delayed planting, reduced yields, compaction, change to lower-yielding genetics
Higher humidity promotes disease and fungus	Yield loss, increased remediation costs
Higher nighttime temperatures in summer	Plant stress and yield loss
More intense rain events at beginning of crop cycle	Replanting and field maintenance costs; loss of soil productivity and soil carbon; Increased soil erosion and runoff;
More droughts	Yield loss, stress on livestock, increase in irrigation costs, increased costs to bring feed and water to livestock
More floods	Replanting costs, loss of soil productivity and soil carbon; damage to transportation infrastructure may reduce delivery to milk processing plants
More over-wintering of pests due to warmer winter low temperatures	Yield loss, increased remediation costs
More vigorous weed growth due to temperature, precipitation and CO_2 changes	Yield loss, increased remediation costs
Summertime heat stress on livestock	Productivity loss, increase in miscarriages, may restrict cows on pasture
Temperature and precipitation effects on pollinators	Losses to cropping (forage, fruits, vegetables) systems
New diseases or the re-emergence of diseases that had been eradicated or under control	Enlarged spread pattern, diffusion range, and amplification of animal diseases

Source: “Agriculture and the Soil Resource”, Wisconsin Initiative on Climate Change Impacts

Table 2-3
Indirect Impacts on Agriculture

Situational Change	Impact on Wisconsin Agriculture
Regulation involving greenhouse gas emissions	Potential increased costs to meet new regulations; opportunities to participate in new carbon markets and increase profits
Litigation from damages due to extreme events or management of carbon markets	Legal costs may increase
New weed and pest species moving into Wisconsin	Control strategies will have to be developed; increased pest management costs and crop losses
Vigorous weed growth results in increased herbicide use	Increase in resistance or reduction in time for development of resistance; regulatory compliance costs or litigation over off-site damages from pesticides
Possibility of increased inter-annual variability of weather patterns	Increased risk in crop rotation, genetic selection, and marketing decisions
Increased global demand for food production due to weather cycles and demographic changes	New markets; increase in intensification of production; increase in absentee ownership
Increased period for forage production	Decreased need for large forage storage across winter for livestock operations
Increased taxes or regulations on energy-dependent inputs to agriculture (for example- nitrogen fertilizer)	Profitability impacts on producers; loss of small-scale farm supply dealers

Source: "Agriculture and the Soil Resource", Wisconsin Initiative on Climate Change Impacts

3.0 Land Use, Natural Resources & Physical Features

3.1 Existing Land Use

The majority of the land use in Green Lake County is in agricultural use with residential developments primarily clustered within the incorporated areas and around the lakes. Agriculture has traditionally been the predominant land use in Green Lake County. Generally speaking, the largest tracts of agricultural land are featured in the flatter topographic region of eastern Green Lake County often referred to as the plateau (See Map 2). This area also features the best agricultural soils so the opportunity to grow vegetable crops such as green snap beans and sweet corn and grain crops such as corn, soybean and winter wheat is greatest in this region. As the topography transitions into more wetlands and irregular soils found in the western portion of the County, land use becomes more diversified. However, agricultural land use is still the top land use type in all of the 10 Green Lake County townships.

The two largest open space land use types are state managed wildlife areas. These areas include the White River Marsh (north west – Towns of Seneca and St Marie) and the Grand River Marsh (south west – Towns of Kingston and Marquette).

The White River Marsh Wildlife Area contains 12,000 acres consisting of open marsh/wet meadow, swamp hardwoods/tamarack swamp, upland prairie/oak savannah and shrub carr. Grand River Marsh Wildlife Area is a 7,000 acre property.

Small cities and villages are scattered throughout the County. The cities of Berlin, Green Lake, Markesan and Princeton contain the most intensive development. Although, the cities and villages do not contain much agricultural land, they provide an important function to the surrounding agricultural towns relative to support materials and services. The interconnected function between town and incorporated communities is as evident and important in Green Lake County as anywhere in the State of Wisconsin.

Residential development around Green Lake and other water features such as the Fox River and Lake Puckaway are both year round and seasonal. These uses will continue and even expand throughout the planning period.

A more detailed existing land use analysis is available in the Green Lake County Comprehensive Plan.

3.2 Land, Soil, and Water Resources

In order to preserve and protect the natural resources in the County, it is important to understand the land, soil, and water resources within the County.

Geology

The northwest portion of Green Lake County is located within the Central Plain of Wisconsin and the southeast portion is located within the Eastern Ridges and Lowlands. The majority of the County consists of Potsdam sandstone. Located within the County are hills of igneous rock of Archean age. The sandstone within the western part of the County is primarily covered by loose material or soil, and marsh deposits, whereas the eastern part of the County the sandstone is covered by rock formations that were formed after the sandstone. The Potsdam sandstone can be seen at Lucas Bluff on the south shore of Green Lake.

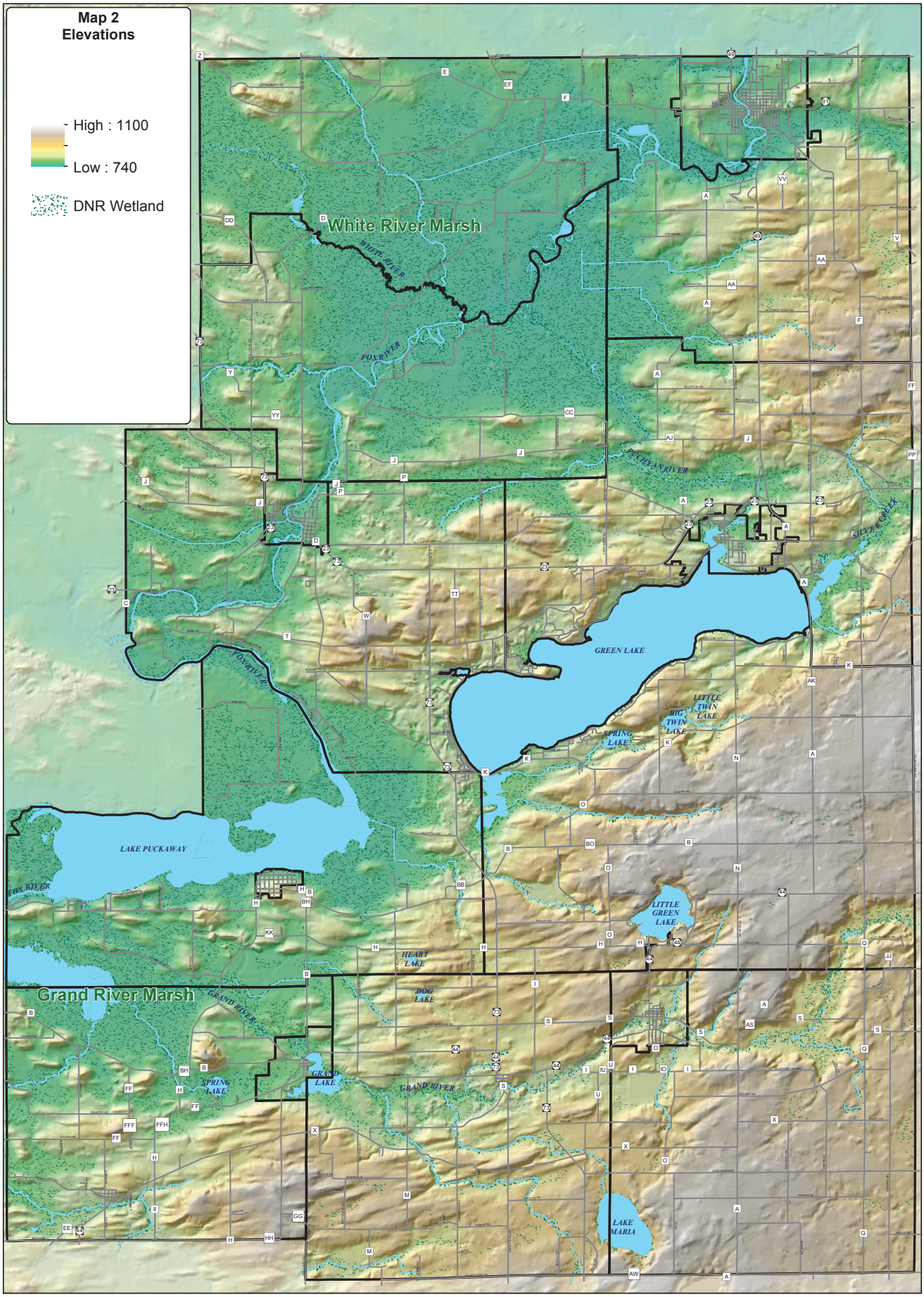
Following the creation of Potsdam sandstone, there was a deposit of Magnesian limestone, known as the Lower Magnesian limestone. The limestone commonly underlies all the upland areas of the County. It also formed caps on some of the hills in the County, for instance Mt. Moriah in the Town of Kingston and Mt. Tom in the Town of St. Marie.

Within the eastern portion of the County, formations of the St. Peter sandstone can be found. This formation can be seen at Mitchell's Glen, one-half mile southeast of the east end of Green Lake.

The major influences on the topography of the County from the ice age and the recession of the Green Bay Lobe. Located east of Princeton, west of Green Lake and north of Lake Maria, is a well-developed recessional moraine. The effects of the advancing and retreat of the glacier can been seen through the many knolls and kettles that make the surface very uneven between Green Lake, the Fox River, and Lake Puckaway. Green Lake was created through the blocking of a river valley with a glacier moraine. Lake Puckaway was formed similarly due to blocking of an old valley with deposits near Montello.

Topography

The topography of the land in Green Lake County determines the movement and drainage of water towards streams, rivers, lakes, wetlands and general lowlands. An area's watersheds, drainage basins and drainage corridors guide water movement. Land relief within the County is approximately 360 total feet, ranging in elevation from approximately 740 feet near the Fox River to approximately 1,100 feet in the Town of Green Lake. Map 2; Elevations, graphically shows the general topography throughout the County. Please note in Green Lake County, there is a direct correlation between the higher elevations and the amount of tillable working farmland. In addition, comparing the higher elevations with the Map 3; Prime Agriculture Soils, one can see the direct relationship between the higher elevations and prime agriculture soils.


Map 2
Elevations
High : 1100
Low : 740
DNR Wetland
White River Marsh
WHITE RIVER
FOX RIVER
PUCHYAN RIVER
SILVER CREEK
GREEN LAKE
LITTLE TWIN LAKE
BIG TWIN LAKE
SPRING LAKE
LAKE PUCKAWAY
FOX RIVER
LITTLE GREEN LAKE
HEART LAKE
DOG LAKE
Grand River Marsh
GRAND RIVER
GRAND LAKE
SPRING LAKE
GRAND RIVER
LAKE MARIA

Map 2

Soil

"Soil is a natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief (varying elevations of the land surface) over periods of time" (Green Lake County Soil Survey 1977). Plant and animal life have a symbiotic relationship with soil. Vegetative cover and organic matter accumulation from living organisms contributes to the formation of soil while the existing soil provides the nutrients and shelter required by organisms living within and on top of the soil. Soils also act as a natural filter for waters infiltrating the surface into the groundwater below. Some soils are not well suited for this filtration process. Soils that are very porous, located on steep slopes or in low-lying areas where the water table is high are at risk for groundwater pollution. For this reason, State and County regulations regarding the placement of septic systems are enforced. Good groundwater supplies are currently abundant. It should be the County's goal to maintain this supply, as it might become a more vital resource in the future.

According to the Green Lake County Soil Survey (1977) there are six general soil associations (types) found within Green Lake County: Plano-Mendota-St. Charles, Kidder-Rotamer-Grellton, Lapeer-Mecan-Okee, Boyer-Oshtemo-Gotham, Oakville-Brems-Grandby, Adrian-Houghton, and Willette-Poy-Poygan Associations (Map 3).

Plano-Mendota-St. Charles Association

This association is the most predominant type of soil in the County, located primarily in the southeast corner of the County and is the soil type that makes up the high quality farm lands commonly referred to as the 'Mackford Prairie'. Plano-Mendota-St. Charles is generally of high- er elevation; it is moderately to well-drained and ranges from almost level to sloping. This association has a subsoil mainly of silt loam and silty clay loam. Most of the acreage in this soil type can be used for cultivated crops such as corn, small grains or even used for canning crops such as sweet corn and peas. There are very few limitations for using sites in these areas for housing, sanitary leach fields, roads or landfills.

Kidder-Rotamer-Grellton Association

This association is located in an irregular band running from the northeast to the southwest corners of the County. It is found within and around the City of Berlin, along the north shore of Big Green Lake and is the predominant soil type in the Town of Kingston and the western half of the Town of Manchester. This soil type is moderately to well-drained and ranges from nearly level to steeply sloping. The subsoil consists of mainly loam, clay loam, and sandy clay loam. This soil is generally suitable for row crops with some concern for erosion. It is similar to Plano- Mendota-St. Charles in that there are few limitations for man-made developments.

Lapeer-Mecan-Okee Association

This association can be found throughout the County. Most commonly it is found adjacent to the Kidder-Rotamer-Grellton Association. It is described as ranging from well drained to excessively well drained and gently sloping to steeply sloping. It has a subsoil of sandy loam underlain by gravelly sandy loam. This Association has no serious limitations for use as sites for housing, septic absorption fields, roads and streets or sanitary landfills. The soils in this association are suited to all the general farm crops grown in the County, but in an average year crop yields are limited by the available water capacity. As with the Kidder-Rotamer-Grellton Association, this association also has concerns for erosion and soil blowing, which can affect the level of organic matter and fertility for crops.

Boyer-Oshtemo-Gotham Association

This association is the least common soil type in the County. Generally located "down-hill" from the previous associations it can be described as generally well drained and ranges from nearly level to steep slopes. This association has a subsoil mainly of loamy fine sand, sandy loam and loamy sand underlain by sand or stratified sand and gravel. It is similar to Kidder-Rotamer- Grellton in that there are few limitations for man-made developments. However, it has severe limitations for use as sanitary landfills. This association has the same crop potential as the La- peer-Mecan-Okee Association.

Oakville-Brems-Grandby Association
This soil association is commonly found on each side of the Fox & White Rivers as well as Lake Puckaway. Large portions of the northwestern corner of the County are made up of this soil type. This soil type ranges from moderately to well-drained to poorly-drained and from nearly level to steep slopes. It has subsoils of fine sand underlain by fine and medium sand. Where the land is relatively flat this soil type can have slight limitations for buildings, roads and streets. The soils of this association are better suited for pasture, woodland, or wildlife habitat than to cultivated crops.

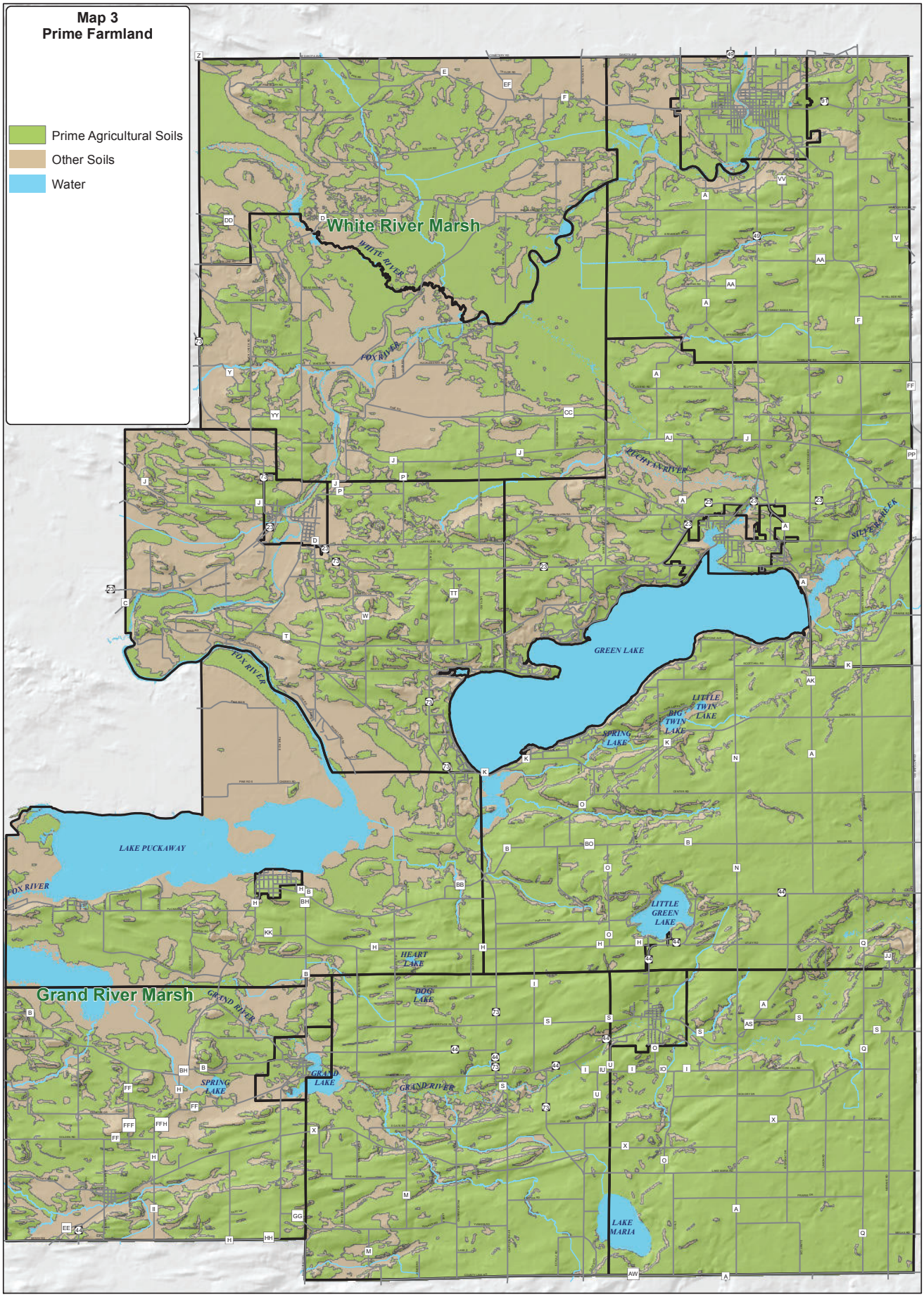
Adrian-Houghton Association
Like the Oakville-Brems-Grandby soil type, this association is most commonly found adjacent to the Fox & White Rivers and Lake Puckaway. This soil is very poorly drained and is nearly level with organic soils underlain by sandy, loamy, or clayey material. The soils in this association are too wet to cultivate crops, unless drained.

Willette-Poy-Poygan Association
This soil association is a lowland/wetland soil type. The largest concentration of this soil type can be found along the Puchyan River and within the White River Marsh area. This soil type is described as ranging from poorly drained to very poorly drained, nearly level organic soils and can have a subsoil of silty clay. Unless drained, groundwater is usually at or near the surface most of the year. Generally this soil type has severe limitations for use as sites for housing, septic tank absorption fields, roads and landfills. The areas with this soil type are also generally referred to as 'marsh', wetlands and floodplains. The major soils of this association are too wet for cultivated crops, unless drained. This soil association is primarily used for woodland, pastures, and wildlife habitat.

It must be noted that the above general soil associations are just that, "general". There are of- ten several other minor soil series that exist within these associations that may or may not be suitable for development. To obtain detailed soil maps and descriptions for a specific area to ensure proper land uses, refer to the *Soil Survey of Green Lake County, Wisconsin, 1977* (On file at with NRCS, Green Lake County office).

Prime Agricultural Soils

In an effort to further correlate the targeted areas for farmland preservation with productive agricultural soil types, Map 3 was developed. This map indicates the location of all 'Prime Agricultural Soils' as classified by the Green Lake Soil Survey. For the purpose of this plan, prime agricultural soils are defined as Soil Conservation Service capability classes I, II and III. Appendix C indicates all the soil names that comprise the 'Prime Agricultural Soils" definition in Green Lake County. Please note that location of these soils does not automatically represent agricultural use. Some of these soils support woodlands and other open space uses. Some have been converted to non-farm development. Best management practices can overcome class ratings of soils. Thus, a key resource becomes large, undisturbed tracts of farmland over soil type.


Map 3
Prime Farmland
Prime Agricultural Soils
Other Soils
Water
White River Marsh
WHITE RIVER
FOX RIVER
MECHAN RIVER
SILVER CREEK
GREEN LAKE
LITTLE TWIN LAKE
BIG TWIN LAKE
SPRING LAKE
LAKE PUCKAWAY
FOX RIVER
LITTLE GREEN LAKE
HEART LAKE
DOG LAKE
Grand River Marsh
GRAND RIVER
GRAND LAKE
SPRING LAKE
GRAND RIVER
LAKE MARIA

Map 3

Metallic and Non-Metallic Mineral Resources

There are eighteen active non-metallic operations in Green Lake County. Green Lake County requires all operators who conduct or plan to conduct non-metallic mining operations to develop a mining reclamation plan.

The Wisconsin Department of Natural Resources has principal regulating authority for metallic mining activities in the State. Further information regarding metallic mining in Wisconsin can be viewed at https://dnr.wisconsin.gov/topic/Mines.

Further information about non-metallic mines in Green Lake County can be obtained from Green Lake County Land Use Planning and Zoning Department.

Mining will have an impact on farmland loss. However, the materials derived from mining such as crushed stone and gravel are important materials in supporting local economic development, agricultural infrastructure included. In addition, mining reclamation projects on occasion are converted into agricultural uses. In Green Lake County, most mines are non-metallic and must be reclaimed to the standards established by NR 135 of the Wisconsin Administrative Code. All new non-metallic mines that are zoned A1 (Farmland Preservation district) are required to be reclaimed to an agricultural use.

Surface Water Features

An important part of Green Lake County is the 19,630 acres of open water consisting of lakes and rivers. Surface waters in the County make up approximately 7.5 percent of the total area. There are 36 lakes and 58 streams within the County. Green Lake is the largest lake and the Fox River is the largest stream. The Fox River covers approximately 800 acres and accounts for 75 percent to the total stream area. On average the Fox River is 160 feet wide. Streams within the County cover 217 miles, or approximately 1,070 acres.

Lakes are not well distributed throughout the County. The majority of the lakes are located within the eastern ridges and lowlands in the southeastern portion of the County. With the exception of Lake Puckaway and a few smaller potholes, the Central Plains in the northwestern portion of the County does not contain a significant number of lakes. This area is primarily dominated by large wetland complexes.

The largest surface water within the County is Big Green Lake. Along with several smaller lakes and lesser streams and rivers these surface waters not only serve the purpose of draining watersheds in which they exist, but also provide links to adjacent wetlands. In spring, these wetlands provide additional water storage capacity needed during spring runoff to prevent flooding. They also assist in filtering excess nutrients and debris out of the surface waters to improve the water quality of the receiving streams and rivers. Good water quality throughout the area is important to the fisheries in the lakes and streams, especially as the streams connect and grow larger downstream, as there are many species that use the rivers and its tributaries for spawning. Within the County there are three Exceptional Resource Waters (ERW) listed. The Snake Creek, White Creek, and Assembly Creek are classified as an ERW due to their listing as a Class I Trout Stream, and having little impact by human activities.

Big Green Lake was placed on the impaired waters list in 2002 for PCBs in fish tissue and in 2014 for total phosphorus and low dissolved oxygen. In 2018 assessments showed continued impairment by phosphorus; new total phosphorus sample data exceeded WisCALM listing thresholds for the Recreation use and Fish and Aquatic Life use. It is clear that Big Green Lake needs to be protected from phosphorus inputs.

The link below is to WDNR's Surface Water Data Viewer, an interactive GIS site that allows users to identify the locations of water features such as navigable streams and wetlands.

https://dnrmaps.wi.gov/H5/?Viewer=SWDV

Natural Wildlife Areas

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are areas within a landscape that encompass especially valuable natural resource features that should be protected from development.

The following areas within the County should be considered environmentally sensitive:

- Navigable waters with a 75 foot buffer
- WDNR wetlands with a 50 foot buffer
- FEMA floodplains
- Moderately steep to steep areas (>12% slopes)
- Areas that provide habitat for threatened and endangered species.

State Natural Areas

State Natural Areas (SNAs) protect significant landscape features, geological formations, and archeological sites throughout Wisconsin. These areas are valued primarily for research and educational purposes, while providing rare safe havens for scarce plants and animals. Site protection is provided by land acquisition, donations, conservation easements, and cooperative agreements.

Green Lake County has 7 SNAs. State Natural Areas include Fountain Creek Wet Prairie, Puchyan Prairie, Berlin Fen, Snake Creek Fen, Princeton Prairie, White River Sedge Meadow, and White River Prairie/Tamarack. For more information on SNAs go to https://dnr.wisconsin.gov/topic/StateNaturalAreas/county#Greenlake.

Public Wildlife Recreation Land

The White River Marsh Wildlife Area contains 12,000 acres consisting of open marsh/wet meadow, swamp hardwoods/tamarack swamp, upland prairie/oak savannah and shrub carr. There is a No Entry Wildlife Refuge located on the southwest corner of the White River Marsh Wildlife Area for the training and releasing of whooping cranes. The No Entry Wildlife Refuge is closed to all public access from June 15 through October 15. For more information go to: https://dnr.wisconsin.gov/topic/Lands/WildlifeAreas/whiteriver

Grand River Marsh Wildlife Area is a 7,000 acre property located in southwest Green Lake County and southeast Marquette County. Grand River Marsh Wildlife Area provides excellent habitat for a variety of wildlife and migratory waterfowl. The property consists of open marsh/emergent cattail wetland, upland prairie/oak savannah and shrub carr/wet meadow. For more information go to: https://dnr.wisconsin.gov/topic/Lands/WildlifeAreas/grandriver.

Wildlife Habitat and Threatened and Endangered Species

Federal and state records provide general information on wildlife habitat and threatened and endangered species, and should be consulted as part of the review process for new development projects. Township-wide occurrences of terrestrial, threatened or endangered species are indicated in the County. Information on wildlife habitat and threatened and endangered species is available from the Wisconsin Department of Natural Resources at:
https://dnr.wisconsin.gov/topic/NHI

Quality of wildlife habitat can be a challenge due to increased pressures caused by cultivation, pasture mowing, stream bank pasturing, urban development and invasion of exotic species. Protection of wildlife habitat can be addressed through education of the importance of environmental buffer zones for wetlands and water bodies and control of invasive species.

Watersheds and Drainage

A watershed is an area of land that collects and concentrates precipitation and other water, and delivers it to a common outflow. This same process of collection and concentration applies to the sediment and contaminants carried by water. Therefore, maintaining the health and integrity of the watershed by limiting sediment and contaminants becomes critical. Land use and development decisions made every day can have an impact on watershed health.

Green Lake County lies in two basins. The majority of the County is located within the Upper Fox River Basin and contributes to the Great Lakes watershed, whereas a very small SE portion of the County lies in the Upper Rock River Basin which contributes to the Mississippi watershed.

Surface waters in the County belong to 11 different watersheds as listed below in Table 3-1:

Table 3-1
Watersheds in Green Lake County

Watershed	Acres	Floodplain Acres	% Floodplain
Beaver Dam River	1871	0	0.00%
Big Green Lake	38191	9187	24.05%
Lower Grand River	44082	6093	13.82%
Mecan River	440	0	0.00%
Puchyan River-Fox River	85532	16056	18.77%
Puckaway Lake-Fox River	21988	9425	42.86%
Rush Creek	2071	0	0.00%
Swan Lake-Fox River	4315	0	0.00%
Upper Grand River	27974	2153	7.70%
West Branch Rock River-Rock River	4642	0	0.00%
White River	12194	3183	26.11%

Source: Green Lake County Land Use Planning and Zoning

The Beaver Dam and Rock River watersheds represents a sub-continental divide which is important if sewer or water systems are contemplated in the area of the divide because of the legal problems involved in transferring water between major basins.

The Big Green Lake Watershed was selected as priority watershed in 1980 due to the high sediment and nutrient load discharges into lake. Streams that are part of this watershed include Silver Creek, Dakin Creek, Spring Creek, Roy Creek and their tributaries.

Floodplains

Portions of the County are susceptible to flooding. According to the FEMA flood rate maps produced for the County, these areas are located primarily along the navigable waterways within the County. Future development in and around these areas will be restricted. Building can occur outside of the floodway and in the flood fringe (between the 10 and 100-year flood event) in these areas with certain restrictions including the lowest first floor elevation is two feet above the 100-year flood elevation, or the basement is flood-proofed.

Groundwater

Groundwater in Green Lake County is available within the glacial deposits and bedrock aquifers. It is hard and contains excessive iron in some places but otherwise it is satisfactory for most uses. According to the state's Groundwater Susceptibility Map (see the link below), most of the southwest portion of the County is located in an area deemed to be moderately to highly susceptible to groundwater contamination, whereas the northeast portion of the County is less susceptible to groundwater contamination. The reasons for this designation are determined by depths to bedrock, type of bedrock, depth to water table, and soil permeability:

http://wi.water.usgs.gov/gwcomp/find/greenlake/susceptibility.html

The protection of groundwater is especially important to the residents of the County as many rely on private wells for their primary source of water. Protection of this limited resource must be the focus of County leaders. It is critical that the quality of the potable water be monitored to identify any contamination. Septic systems can be a major source of local contamination, particularly when situated on soils unsuitable for this purpose.

More information about arsenic, including treatment options, can be found at the following web site: https://dnr.wisconsin.gov/topic/Groundwater/Arsenic

More information regarding groundwater that is specific to Green Lake County can be found at the following web site: http://wi.water.usgs.gov/gwcomp/find/greenlake/index.html

The Wisconsin Groundwater Coordinating Council (GCC) is an interagency group whose purpose is to serve as a means of increasing the efficiency and facilitating the effective functioning of state agencies in activities related to groundwater management. More information about the council's responsibilities, actions, activities, and coordination efforts with local officials can be viewed at this web site: https://dnr.wisconsin.gov/topic/Groundwater/GCC

In addition to the above, the following water quality facts and trends that will impact agricultural activities in the Green Lake County region:

- High iron and some sulfur have been identified as water quality concerns. However, it was felt that these issues can be managed and overcome for farming purposes.
- Abandoned wells are a water concern due to lack of proper abandonment procedures. Most abandoned wells occur around old farmsteads.
- While most people associate groundwater problems with the presence of livestock, grain farming can also negatively affect groundwater in not managed correctly.
- Water is generally not an issue – quality or quantity. UWEX has a water quality program for testing well water.

Wetlands

Development in wetlands can destroy important environmental benefits, including the filtering of storm water runoff, the provision of wildlife habitat, and natural flood control. Wetlands are the gateway to the recharge of groundwater aquifers. The DNR and Corps of Engineers have regulating authority over all wetlands, including the placement of fill materials within a wetland. In general, the most restrictive regulations apply to proposed development projects. The U.S. Department of Agriculture incorporates wetland preservation criteria into its crop price support program.

Wetlands contain some of the most unique and important ecosystems found on the planet. According to the State of Wisconsin, "the term 'wetlands' means an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophilic vegetation and which has soils indicative of wet conditions" (Wisconsin Stats 23.32(1)). Wetlands generally include swamps, marshes, bogs, sedge meadows, and similar areas.

There are a large number of mapped wetlands within the County. Approximately 23% of the County consists of mapped wetlands. Most of the wetlands are associated with the waterways or depressions. The majority of the wetland acreage located in the County is in the west and northwest portions of the County and associated either directly or indirectly with the Fox River. These wetlands have water tables that are located at or just below the soil surface and are dependent on the water level of the lake. The high water tables along with surface water runoff from the surrounding landscape keep the wetland soils saturated or inundated throughout most of the year.

Three important wetland complexes located within Green Lake County consist of the calcareous fen near Berlin, a rare and ecologically important wetland type for fauna and flora. The County also contains portions of two large wetland complexes; the White-Puchyan wetland and the Grand River Marsh. Collectively these two wetland complexes encompass over 15,000 acres. Large tracts of wetlands are especially important for habitat sources for wildlife that require large undisturbed portions of land for their survival.

This link (https://dnr.wisconsin.gov/topic/Wetlands) is a useful point of reference for community officials, developers, and/or interested persons to gain direction with wetland questions related to development projects or protection issues. The page provides links to specific administrative rules, discussions on wetland laws and programs, as well as other wetland issues.

3.3 Agricultural Infrastructure

Agricultural infrastructure is essential for maintaining a viable and productive agricultural network. This agricultural infrastructure consists of a network of businesses that are needed to keep agricultural day to day operations running smoothly. Without this infrastructure network it would be impossible for the agricultural community to be successful. Services provided by many of these businesses consist of supply, transportation, processing, and storage. Table 3-2 is a summary of the agricultural infrastructure network within Green Lake County. This list may not be all inclusive.

Table 3-2
Green Lake County Agricultural Providers

Activity	Green Lake County Agricultural Provider
Licensed Milk Producers	David and Julie Jones, David L Bruss, Busy Bee Acres LLC, Doug Kastenschmidt, Carl E Nehm, Cotterill Farms Inc., Roy Creek Dairy LLC, Kasuboski Acres LLC, John T Kearns, Omer Schwartz, Harley J Yoder, Mervin A Bontrager, , Daniel I Schmucker, Ervin A Bontrager, Terry and Linda Froehlich, Toby Troyer, , Bender Family Farms LLC, Soodsma Dairy LLC, Freeman and Marlene Bontrager, Harley and Loretta Mast, Nathan A Troyer, Martha H Troyer, Wayne Berg, Prideview Dairy LLC, Hilltop Dairy LLC, Damerow Brothers (Partnership), Schurecrest Farms Inc., Floyd M Bontrager, Vernon A Bontrager, Ronald R Kelm, Toby Petersheim, Mam Farms LLC, Ezra and Minerva Petersheim, Wilbur and Edna Bontrager, Matthew and Vicki Jahnke, William Mast Jr, David E Kohn, Alan Kohn, Frederick Family Farms LLC, Paul and LeEtta Mast, Richard Swanke, David Bogucke, Daniel Bontrager, Ronald Bogucke, Wargula's Dairy Farm LLC
Licensed Dairy Plants	Kingston Cheese Cooperative, WI Cheese Partners
Produce Auctions	Tri-County Produce Auction
Licensed Food Processing Plant	Wisconsin Spice Inc, Wisconsin Hickory Syrup LLC, The Country Cottage, Country Kitchen
Licensed Food Warehouse	JEP Bulk Foods, Culligan Water Conditioning, Wisconsin Spice Inc, Kuntry Foods
Food Processors	Darling Intl Inc, Wisconsin Spice Inc
Veterinary	Berlin Veterinary Clinic, Markesan Veterinary Clinic, Hickory Lane Animal hospital,
Farm Wholesale	Berlin Feed Inc; Jaster's Ag-Supply
Licensed Livestock Transport	Larry M Albright, V & J Trucking
Licensed Bulk Milk Tanker	KR Transport LLC, Matt Boelter Milk Hauling Inc, MAM Farms LLC, Retzlaff Milk Transport LLC, Terry and Joel Froehlich, Richard S Swanke
Licensed Meat Plant	Brian Lager, Far View Custom Cuts
Certified Organic Farms	Boerson Farm, Cedar Ridge Pullets, Millers Poultry farm, Russell Hoffman, Daniel Kuhfuss

Source: University of Wisconsin Extension, Department of Agriculture, Trade and Consumer Protection

Please note that the agricultural provider list above and below may not be comprehensive and/or complete as business names, business startups and business closings occur occasionally.

Table 3-3
Green Lake County Area - Agricultural Supply Facilities

Activity	Green Lake County Agricultural Supply Facilities
Feed Dealers	Alcvia Agronomy & Grain , Berlin Feed Inc., Do It Best, Country Visions Cooperative, United Co-op, Insight FS, Jasters Ag Supply, ADM(Archer Daniels Midland)
Farm Equipment Dealer and Supplies	Do it Best, Tractor Supply Co., The Farm Shop, Markesan Bancshars Inc., Orrin Luedke, Country Visions Cooperative, United Co-op, Insight FS, Jasters Ag Supply, ADM (Archer Daniels Midland), Ed Priebe Sales and Services LLC
Fuel Supply	Condon Oil Companies, Ferrellgas, L&L Sales & Service, Cole Distributing

Source: Green Lake County Planning & Zoning Department, Green Lake County Land Conservation Department, WI Department of Trade and Consumer Protection

In addition to the agriculture provider list, the Green Lake County Farmland Preservation Subcommittee determined that the following agriculture infrastructure facts and trends will impact the growth, transportation and processing of commodities in the Green Lake and Western Fond du Lac County region:

- Canning and processing plants are located in Ripon, Mayville, Oakfield and in Fairwater. They are key processing locations for commodities grown in or around Green Lake County.
- Expect to see the expansion of grain storage facilities and field irrigation.
- Expect to see the consolidation of farm support business such as fertilizer, chemical and machinery suppliers. Due to consolidation, agriculture support businesses will likely become even larger.
- State Highways 23, 44, 73, 49 and 91 provide the core infrastructure to move product by truck through the County. Significant County Trunk Highways include A, H, J, F and K. Typical product movement goes from the local town or county road system, to highway to rail. Most farm products are shipped to locations south of the County.
- The ability of the town road system to accommodate weight loads presented by agriculture, especially around the farm hubs, is a concern. Dairy centers, in particular, contain the most vehicular and farm equipment traffic in a “hub” location. Grain traffic moving to nearby ethanol plants has also become a major contributor to the wear and tear of town roads.
- Farmers are naturally consolidating trucking because of costs (fewer but larger loads).
- The size of trucks and other equipment serving the farms is increasing, causing premature wear of town roads. Controls over the size of farm equipment is unlikely.

3.4 Farmland Preservation and Agricultural Development Land Use Issues

There are various natural and human activities affecting the rural areas of the County. Many of these activities are responsible for emerging land use trends. These emerging land use trends and the changing demographics can have an effect on the County's farmland preservation and agricultural development activities. Below is a list of land use issues affecting rural land in Green Lake County as determined by the Green Lake County Farmland Preservation Subcommittee:

- Land values will likely increase as the pressure to convert open space/farmland to other non- agricultural land uses increases. This trend could be compounded due to the increased competition for agricultural land.
- Interest in land preservation programs will fluctuate by landowner, as some seek to maximize land sale profits by developing land, while others will seek to preserve as much land as possible.
- Due to a stabile agriculture economy, the interest in dairy, cash cropping and specialty farming will increase, thereby increasing demand for more agricultural land.
- Interest in "value-added" businesses to complement small dairy and general farming operations may increase.
- The gap between the values of land for agriculture versus development is narrowing. Reduced demographic changes along with associated housing preferences have reduced the market for rural residential lots and subdivisions.

In addition to the general trends noted above, the Green Lake County Farmland Preservation Subcommittee revised and identified the following agriculture facts, trends and general concerns and opportunities that may impact the agricultural economy in the Green Lake County region:

Key Agricultural Resources

- Green Lake County has some of the best and most reliable farming soils in the State. These soils can grow a variety of crops.
- The term “reliable soils” was further defined to mean a natural tolerance to weather extremes. The soils can tolerate periods of drought and wet conditions in given years still producing very acceptable yields.
- In addition to area soils possessing a tolerance to weather extremes, area topography seems to further protect crops from extreme weather losses.
- Field size has enlarged over the years improving cropping efficiencies and pest control success. For these reasons, this trend will likely continue. Thus, a key resource becomes large, undisturbed tracts of farmland for agricultural production.
- Green Lake County farmers are implementing sustainable agricultural practices in order to increase efficiency, profitability as well as decrease erosion and natural resources impacts.
- Even though the soils in the county are “reliable” and tolerate weather extremes, recently extended periods of draught and extended rain events are increasing.
- Urban/rural interface will continue.
- Green Lake County is home to the largest Fresh Market Auction House in the State.
- Green Lake Counties low rural population density appears to be an asset in attracting outside agricultural interest. This interest ranges from outside crop growers to Amish and/or Mennonite cultures.

- Zoning Conflicts do arise as “English” and Amish property owners of smaller acreage parcels engage in commercial uses, as their parcel is not large enough to produce a sustainable income through solely agricultural pursuits.
- People are referring to social media and sites like YouTube to better educate themselves in agriculture and agricultural production. The disconnect between the farmer and the nonfarmer is closing because people want to know where their food in coming from.
- Federal regulations continue to make farming challenging.
- Railroad infrastructure is in place to move agricultural product and increased investment in railroad is likely.
- Improved highway systems may lead to barriers for farmers to access land. For example, upgrades to State HWY 23 west of Green Lake has made it more difficult and dangerous for farmers to access land and for drivers to avoid agricultural equipment.
- Transportation (primarily highways) will impact future development patterns. If the highway systems stay the same (two-lane) on 23, 44, 73 & 49, development patterns will likely stay similar.
- Expect large farm equipment to place pressure on support infrastructure, especially town and county roads. Will local budgets be able keep up and support agriculture to the extent required?
- Green Lake itself (the water body) has a long history of water quality initiatives & programs designed to improve water quality. These programs may have been the catalyst for increased conservation practices elsewhere in the County.
- Green Lake County has a high percentage of family owned farms devoted to agriculture. Family-owned farms generate a strong “caretaker” attitude.
- Green Lake County farmers and land owners have a history of acceptance to conservation efforts. Many engage in conservation practices without any program assistance.
- Green Lake County’s Land Conservation Department is very active and engaging with area land owners and is highly respected.
- Wisconsin and the United States as a whole, contain an infrastructure advantage over other global countries and their producers in that the time to transport products is significantly quicker in connecting producers to buyers/users.
- The Mississippi River system is integral to this advantage and without a well-maintained lock & dam system agriculture will suffer.
- Land values will continue to increase due to the global demands for food both in volume and quality. Developing third world countries will play a big factor in increased food demand.

Trends in Agricultural Land Use

- The implementation of no till practices has leveled-off throughout the County. The benefits of these practices will continue to produce dividends in the future.
- Good land management practices still need to focus on erosion loss along with the need to preserve farmland.
- Over time crop production has increased, doing so while minimizing soil loss.
- Best management practices (BMP’s) and effective land management can overcome class ratings of soils. With increased commodity pricing, expect to see more “marginal” lands being put into production. With this, expect to see the definition of “marginal” land change over time as BMP’s improve and barriers are overcome.

- Technology changes will improve efficiencies. Increased efficiencies will likely lead to farm consolidation to take advantage of economies of scale.
- Expect to see more innovation in computer software and hardware designs working together to assist in agriculture management.
- Future renters of agricultural land must abide by the same farmland preservation and conservation standards of farmland owners ensuring protection of the resource.
- Minimal growth is likely in the organic market, due to higher costs and lower perceived value.
- The Fresh Market in Green Lake County will need to target more urbanized locations so its growth can continue. There is a limited local population to support the Fresh Market. Growers must understand buyer demographics and improve the supply chain into new markets.
- The Green Lake County region has experienced an increase in agricultural service providers spawned by reliable agricultural production and farmer commitment in the Green Lake County area.
- The gap between the value of land for agriculture versus development has narrowed significantly. High gas prices along with a slow housing economy have reduced the market for rural residential lots and subdivisions. The result is more land available for agricultural use and less farmer/non-farmer conflict.
- Covering up farmland with solar panels to produce electricity “solar farming” is proving to be a lucrative business. Agriculture needs to find a way to thrive amongst this new alternative to farming.
- Wind energy systems offer farmers alternative sources of income, as well. But how long will these green energy systems be subsidized by State and Federal governments.
- As deregulation of utilities continues to occur, land owners will look to becoming their own mini-utility, selling their power back to the grid.
- The power grid’s capacity will face significant strain due to explosive demand growth with forecasts indicating a potential increase in electricity demand by 128 gigawatts over the next 5 years. This 16% increase in power generation will be primarily driven by AI data centers and manufacturing expansions. Wind, solar, ethanol, methane, all will have a part to play in meeting this demand.
- Nonfarm development pressures have not been uniform throughout Green Lake County, as some towns receive more pressure than others. Farmland adjacent to water features like Big Green Lake or incorporated cities and villages see more development interest.
- The County must accommodate some population growth in order to maintain a viable workforce and economy. Planned and controlled growth will ensure an efficient development pattern while minimizing the conversion of farmland.
- Smaller acreage parcels (3 to 8 acres) may not have enough land to truly engage in an agricultural use for income or livelihood, but may be able to contribute to the ag economy as an agricultural service provider.

Key Land Use Issues and Trends Related to Preserving Farmland

- Some development will need to be accommodated in farmland preservation areas. Those areas should be limited to areas not considered prime agricultural soils, previously developed areas and / or poor crop history.
- Housing generates more local tax dollars and must be accommodated as well.
- Buyers of non-farm land that is housing or seasonal related, are geared to outdoor life- styles, not necessarily farming.
- In Green Lake County, the transformation of seasonal to permanent housing has had a positive impact

on local tax revenue. Reinvestment in existing structures is occurring.

- Land is coming out of the Conservation Reserve Program, and is not being renewed due to lack of funding. These lands are being put back into agricultural service.
- The commitment to Farmland Preservation Zoning must not be an emotional decision when presented to the County. This can lead to small and scattered rezones out of A-1 Agriculture which is not conducive to long term agriculture and its preservation. Decisions should always follow farmland preservation rezone protocol.
- Nonmetallic mining activities are currently allowed in the Farmland Preservation zoning district, and a conditional use permit is required. At reclamation, all disturbed lands are required to be put back into an agricultural use. Other counties are more restrictive than Green Lake County. Amendments related to un-reclaimed land maximums and permit duration are possible areas of additional regulation.

Forestry as a Component of Agriculture

- Some reforestation and habitat work is occurring on good farmland due to land owner values.
- Hardwood forestry is an important local economical resource. It creates spin-off job opportunities.
- Forest provides recreational opportunities as well attributing to the County's rural character.
- Unlike adjacent counties to the north and west, Green Lake County has good soils for hardwood production (cherry, walnut, maple and oak).
- There appears to be a need for more private forest management consulting. Over-harvest, especially hardwoods, maybe a growing issue.
- Can sustainable forestry, reforestation and tree farms economically compete with grain crops on an acre by acre profit standpoint? Are grain crops truly the highest and best economical use?
- Forest management must prepare for the impact of invasive species. Emerald Ash Borer mentioned specifically.

Accommodating Future Housing (Densities, Preferred Locations, Compatibility)

- Non-farm residential development is a big barrier to progressive agriculture.
- Low residential densities are more advantageous to farming. Keep ratio low. A one acre to 80 acre ratio of non-farm development to preserved farmland is not too bold.
- Accommodating non-farm residential development in rural areas needs to be balanced. Residential development pays the bills. Locations need to be identified.
- Government leaders should always look for residential clustering opportunities, especially as it relates to aging population. The concept of the "The Villages - North" was discussed
- The current trend, however, is to achieve domestic peace and tranquility through country estates and homesteads. Sharing of land, amenities, and utilities is not an observable trend in Green Lake County.
- Towns should look toward "land use planning" as means to accommodate other uses.
- There is a big difference in the non-farm development pattern north vs. south of Green Lake (Water Body).
- Green Lake County does not have the development pressure of other, more populous counties. This somewhat relieves the struggle between non-farm development and farmland preservation.
- Non-farm development (all types) should be directed to public systems (sewer & water) most of which are provided by cities and villages.

- By making buyer amenities available and affordable in cities and villages, future non-farm development maybe attracted to those locations thereby improving land use compatibility.
- Urban offered amenities must be affordable because there is a big cost difference between city/village vs. town land.
- Low crime, low taxes and a perceived better quality life push development to rural areas.
- Lure retirees out of the urban areas and into the small cities and villages to “in-fill” vacant properties. Tout low crime, low density, low taxes, and low stress living.
- Lenders are less willing to borrow money to young home buyers. Unsure what this will mean to future development patterns. It may make the rental market more active.
- The new generation of farmers may meet financial barriers to expansion due to limited financing. As the cost of land, equipment and technology rise, new farmers will only be able to absorb a limited amount debt.

Combined, all these trends, opportunities and general concerns have an effect on farmland preservation and agricultural development. Of all these statements, nonfarm type development in rural areas is the largest issue. Nonfarm type development in agricultural areas will make farmland preservation more difficult creating obstacles for agricultural expansion. Nonfarm development is and will continue to be a key land use issue in rural areas. Community leaders and officials must develop tools to deal with development pressures, demographic changes and land preservation in order to balance growth and preserve farmland.

4.0 Agricultural Trends

4.1 Agricultural Land Use

Outside the Cities of Berlin, Green Lake and Princeton, Green Lake County is largely a rural agricultural area. Historically, there has always been some pressure to convert agricultural land to other nonagricultural uses, especially nonfarm residential development. However, development pressure has not been uniform throughout the County as some towns receive more pressure than others. Farmland adjacent to water features such as Big Green Lake or incorporated cities and villages also receive more development interest. Often, these lands are annexed, developed and farmland is lost. However, it should be noted that recent non-farm residential development has slowed substantially since the Great Recession (2008 thru 2009). The County must accommodate some population growth in order to maintain a viable work force and economy. As long as growth is planned and controlled to ensure an efficient development pattern, the impacts of farmland conversion can be lessened significantly. Commodity prices play a huge role as well. Strong farm markets will keep farmers working the land and lessen the desire to convert land to other uses.

Since the agricultural economy fared better than most industries during the Great Recession, the perceived value of farmland to the local economy has increased. This increased value should equate to further protection of farmland during future planning efforts. The development, adoption and certification of the *2025 Green Lake County Farmland Preservation Plan* should create the foundation for future local planning efforts, especially in the Green Lake County Comprehensive Plan update.

4.2 Agricultural Production and Enterprises

Green Lake County is a strong player in the state's agricultural economy. Green Lake County is a highly diverse county in agricultural products. Agriculture production highlights for Green Lake County include the following:

- Total number of farms: 511 Average farm size: 239 acres
- Net cash farm income average per farm: $70,258
- Cows: 9,362 on 66 farms
- Market value of products sold: $143 million
- Livestock, poultry and their products: $65.03million
- Crops: $77.97 million
- Top 5 products:
- Milk and other dairy products from cows - $33.6 million
- Grains - $33.5 million
- Cattle & Calves - $10.5 million
- Vegetables - $10.4 million
- Poultry & Eggs - $565 thousand

Data Sources: National Agricultural Statistics Service (NASS) Census of Agriculture; County Data 2022 USDA NASS

Additional information regarding Green Lake County agriculture production and growing enterprises can be found in Appendix B, “Green Lake County Agriculture: Value & Economic Impact- 2019”

Figure 4-1

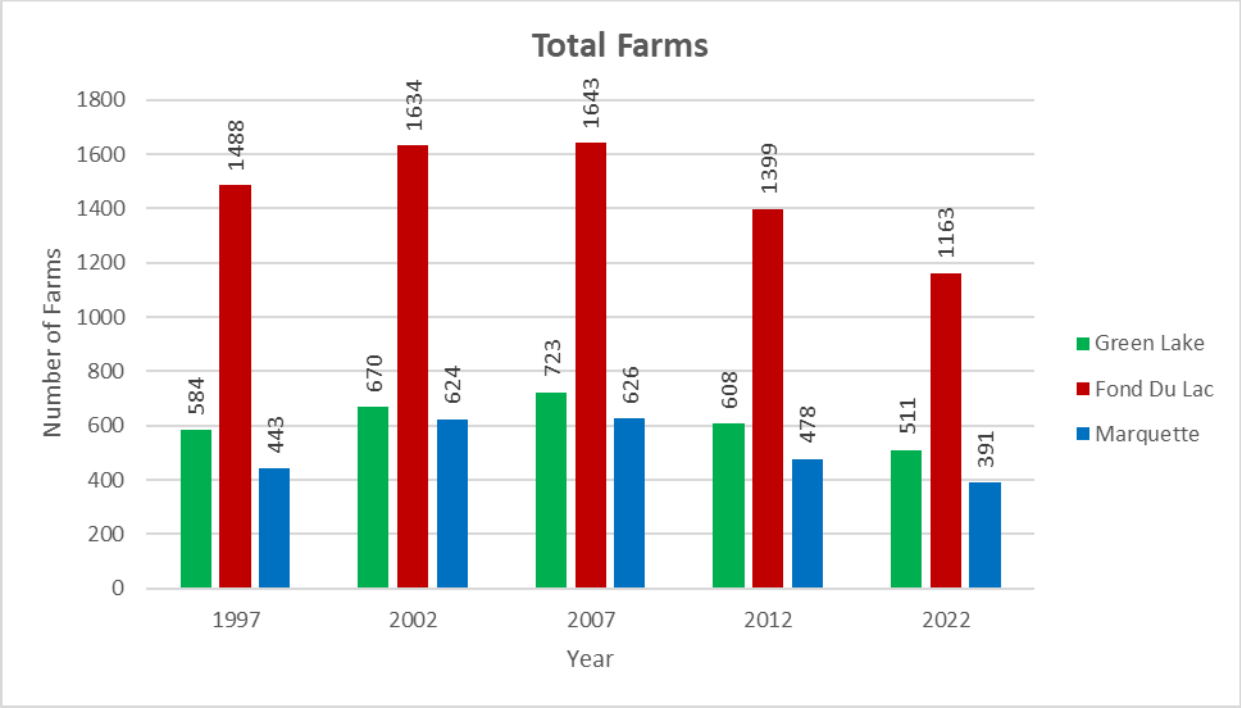
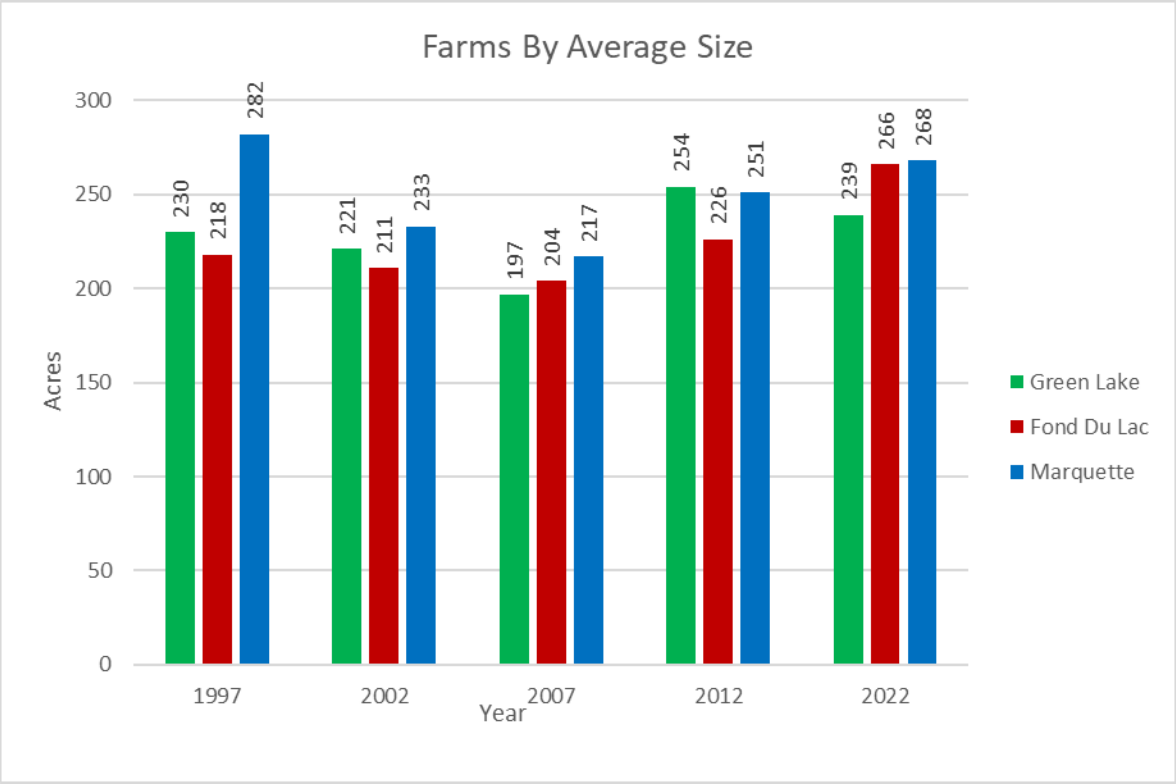


Figure 4-1 illustrates the trend in the amount of total farms located in Green Lake County and neighboring counties. A growth in the number of farms was experienced in Green Lake County until 2007. From 2007 to 2022 there has been a 30% decline, bringing Green Lake County’s farm totals close to the 1997 figures.

Figure 4-2



As the number of farms within Green Lake County decreased, the size of the farms has seen a slight increase. As with the decrease in the number of farms illustrated in Figure 4-1, Figure 4-2 shows that the remaining farms are generally larger in size by 17.6 percent. Figure 4-3 reconfirms the trend in the growth in the number of larger farms from 2007 to 2022.

Figure 4-3

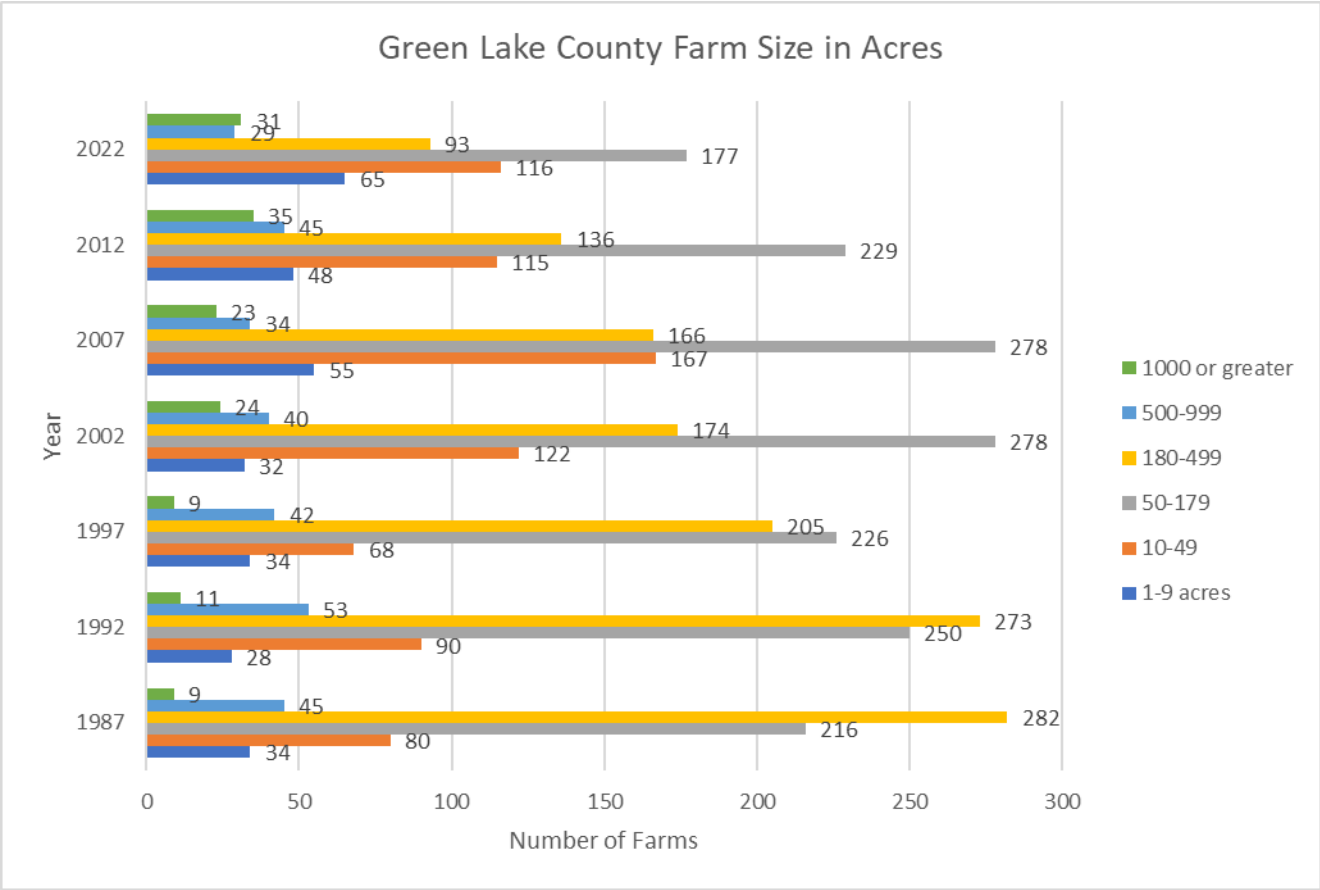


Figure 4-4

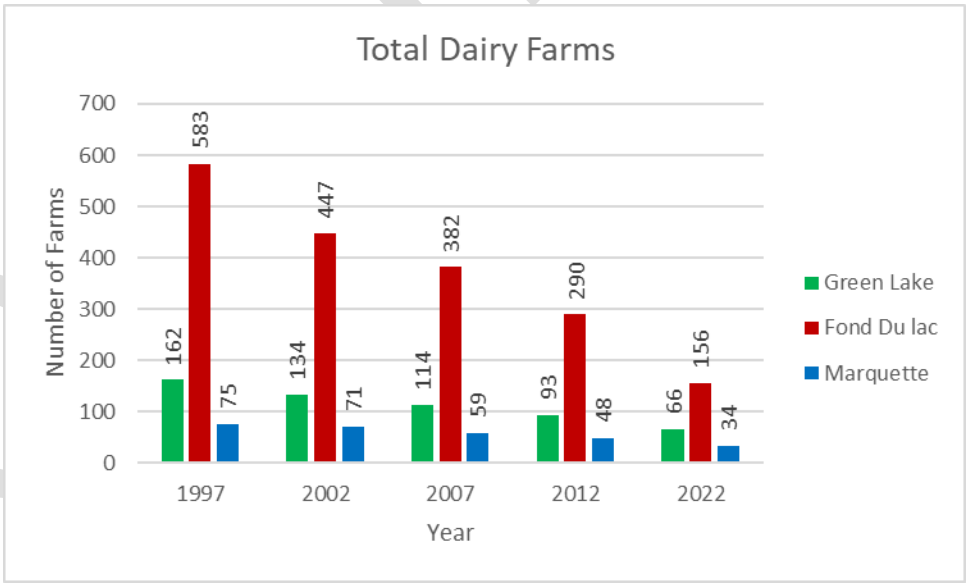


Figure 4-4 shows how all areas, not only Green Lake County are experiencing a steady decline in the number of dairy farms. The number of beef farms in the area, as shown in Figure 4-5 has also fluctuated, however beef farms remained a bit more stable than the dairy farms. This trend in dairy is likely from the higher number of larger commercialized dairy farms (consolidation) and the lack of younger generations taking over the smaller family farms. It may also reflect an increased competition for land between dairy and cash crop

farming. Dairy farming is more profitable if the crop land base is closer to the actual dairy operation wherein cash cropping close proximity is less of a profit factor. The decrease in beef farming maybe a reflection of strong grain prices during this period meaning that grain didn't have to be fed to beef cows to gain a profit.

Figure 4-5

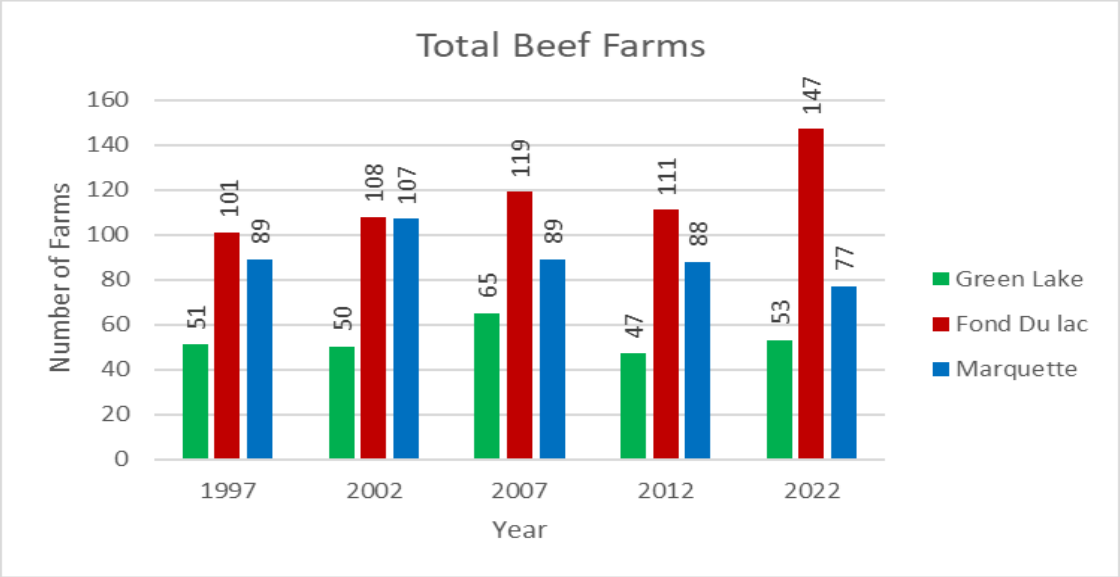
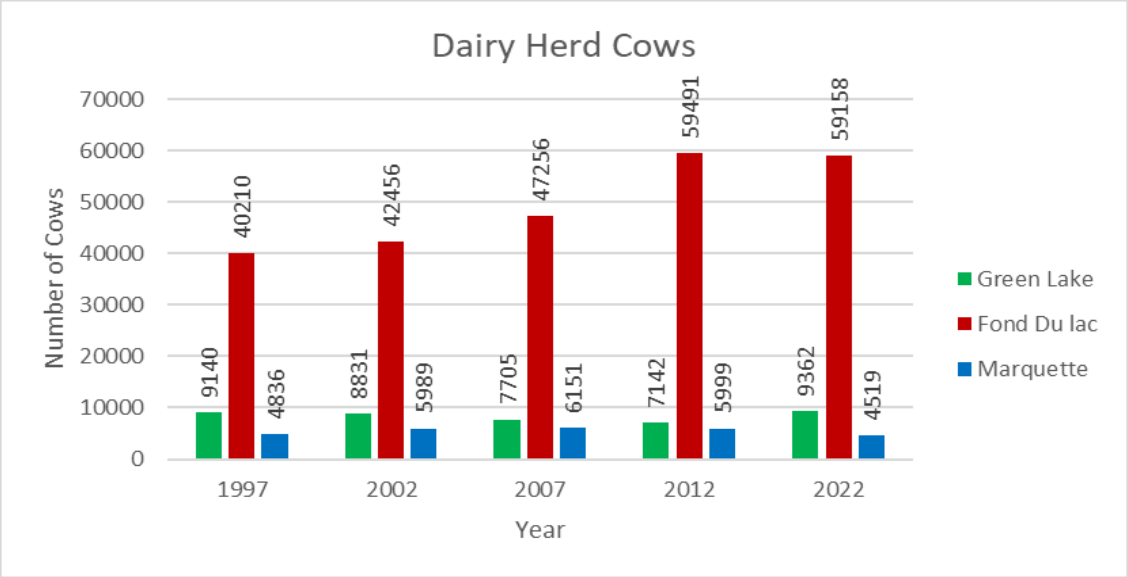


Figure 4-6



Green Lake County has experienced increasing numbers in their dairy herd since 2012. Fond du Lac County has had a stable number of dairy herd cows, likely due to the increase in larger commercialized dairies. This does not say that Green Lake County may see larger commercialized dairies move into the County in the future. Beef herd animals as shown in Figure 4-7 seem to fluctuate more frequently, which may be from a fluctuating meat market and/or grain prices. The comparison in the number of dairy and beef farms since 1997 can be seen in figure 4-8. Figure 4-9 shows the trend in the number of dairy and beef cows within the County since 1997.

Figure 4-7

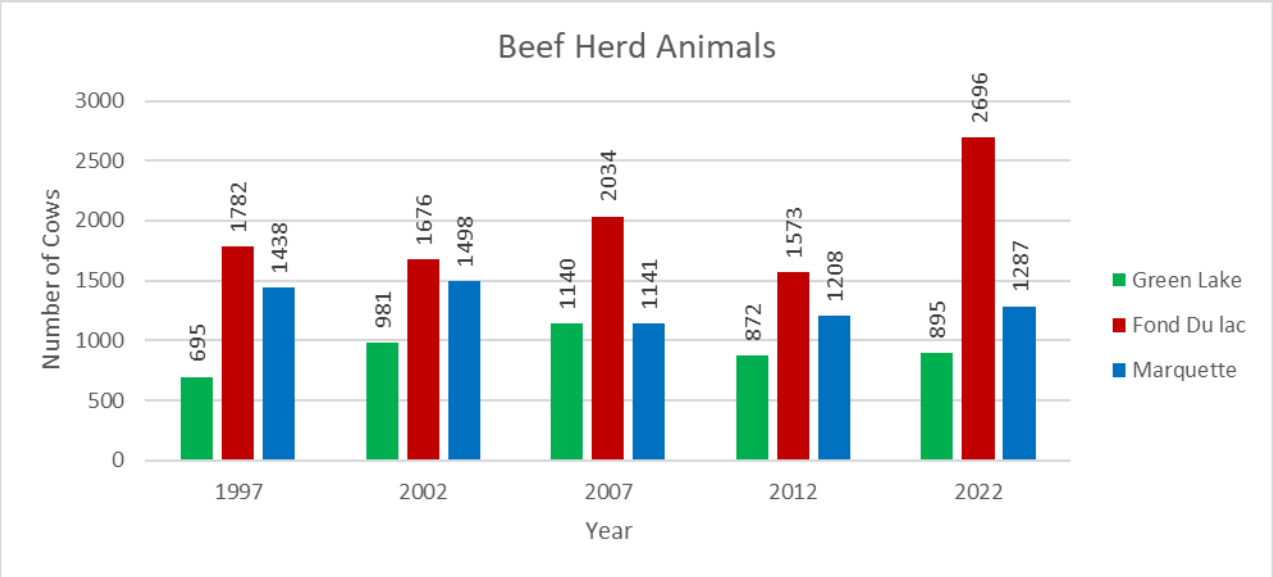


Figure 4-8

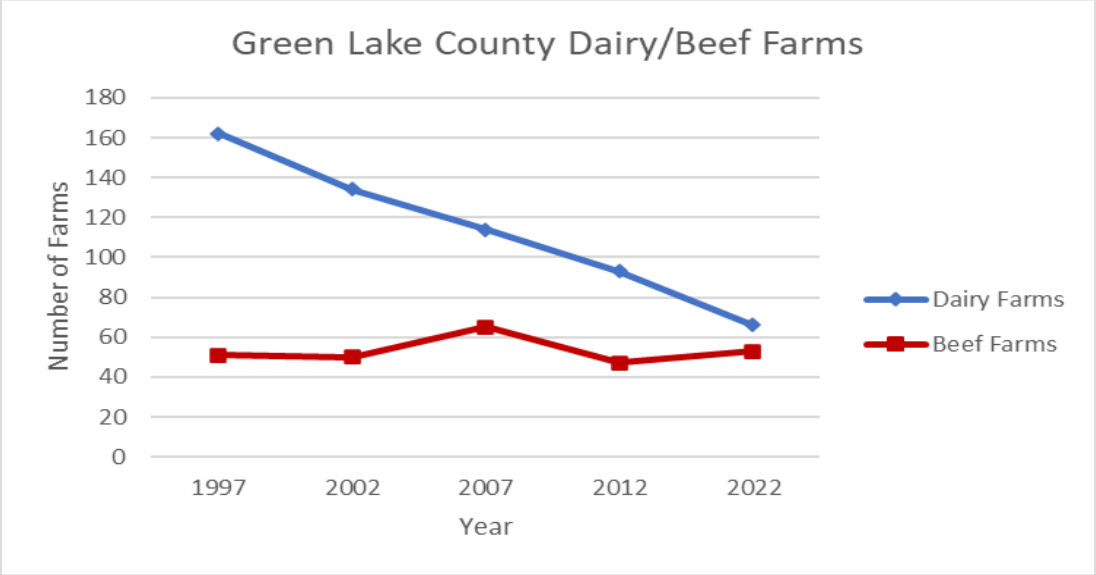


Figure 4-9

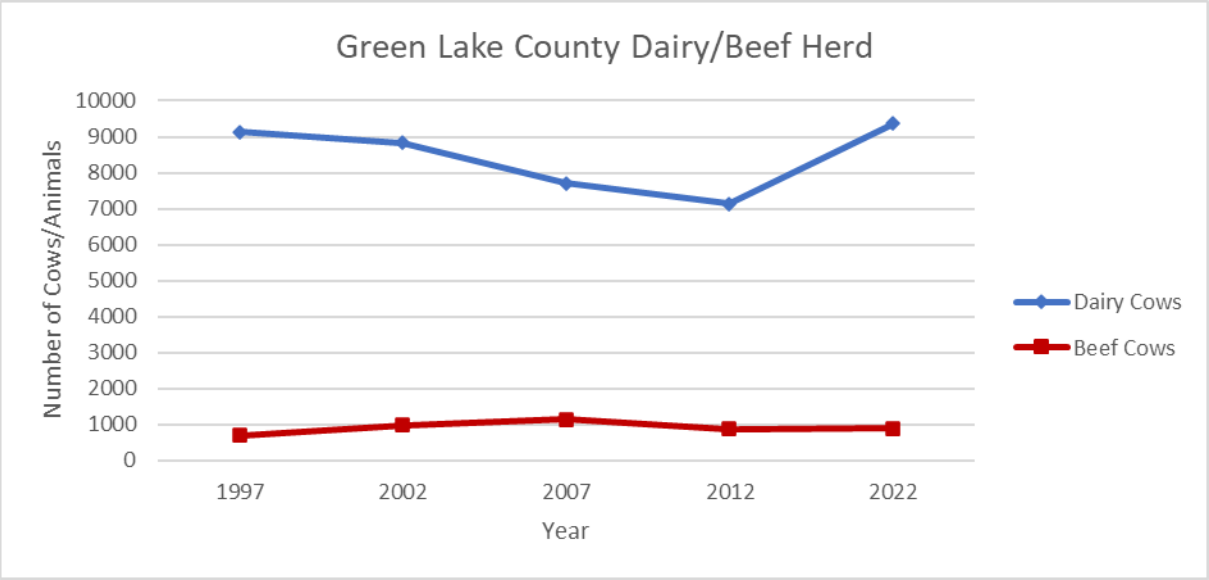
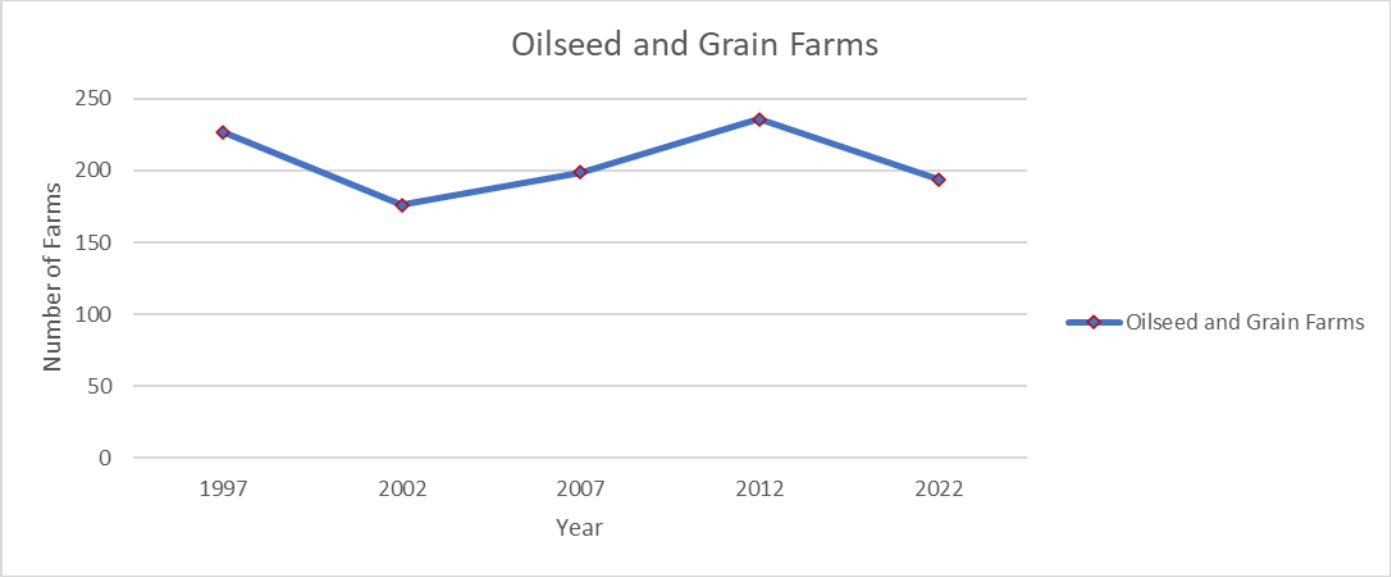


Figure 4-10



Over the decade spanning from 2012 to 2022 there has been a steady decrease in the number of grain farms (See Figure 4-10). These grain farms, often referred to as “cash croppers”, produce grains for sale on the market instead of feeding through livestock. Often dairy farms convert to grain farms with the sale of the dairy herd. The decision to feed the grain to beef fluctuates with the profit margins in both areas. If grain prices are high, beef production reflected in the number of animals, will likely drop.

4.3 Conversion of Agricultural Lands to Other Uses

There are various methods that can be used to show development pressure on agricultural land. One source is the Wisconsin Department of Revenue (WDOR). Acres of agricultural land are computed by WDOR on an annual basis. These acres are based on assessment records. This is valuable information when tracking the amount of agricultural land in use each year. It also shows the trend in conversion of agricultural land to

other uses. Table 4-1 shows the amount of existing agricultural acreage in each community within the County in 2012 and 2022.

According to 2022 statement assessments, Green Lake County had 111,541 acres of agricultural land. This is a 2.88% decrease from the amount of agricultural land available in 2012. Slightly more than 3,300 acres have been converted to other uses within the County over the 10 year time span. All the Towns in Green Lake County had changes in agricultural land from 2012 to 2020. Most changed very little with 6 Towns changing less than 1%. The Town of Saint Marie followed a similar trend of a decrease of 1.98% in agricultural. The greatest losses were experienced by the Towns of Seneca, Marquette, and Kingston with a decrease of 19.82%, 10.79%, and 8.04 respectively. The Town of Seneca experienced the greatest acreage loss of 1,187 acres, which was about 40% of all acreage lost by the townships within Green Lake County. The Town of Mackford experienced slight growth in agricultural land. The Towns of Berlin, Brooklyn, Green Lake, Manchester, and Princeton lost very little agricultural land over the 5-year period.

Due to annexations and development, it varied whether the villages or cities gained or lost agricultural land over the 10 year period. Villages within the County had a net loss of 12 acres, whereas the cities within the County had a net loss of 103 acres.

The loss in farmland does not appear to be excessive. However, once lost, the acreage is hard to revert to its original agricultural use. In some cases, land can be converted from an idle state back into production, but typically those acreages are marginal land for farming.

The best approach to maintaining farmland continues to be minimizing the conversion to other uses. Although land use planning and zoning play major roles, commodity prices play a huge factor in maintaining farmland. If markets are strong, farmers will stay in farming, creating a demand for farmland. The result is the desire to convert farmland to other uses is reduced.

Another method used to assess land conversion is to track the number of land divisions occurring in the County. Since most land divisions require County approval, the number of land division applications by community is a good indicator of the growth pressure within the County. Table 4-2 and Figure 4-11 summarize land division activity by town, village and city over the last 9 years. This data set incorporates the years of economic prosperity (mid 2010's) in conjunction with the more recent economic recession from COVID-19 (2020-2022). Although Green Lake County contains a strong agricultural land use presence, the County is not immune to the transition of farmland to other uses. During this period of time, 710 lots were created consuming 6,375.27 acres of land. The average loss of land to lot creation during this 9 year period was 708.36 acres annually. On average, each lot created in Green Lake County, consumed 8.98 acres during this time period.

However, 118 lots within this total (393.57 acres) occurred in cities and villages where one would expect land division activity of this nature to occur. So it's improper to technically classify these divisions as a non-planned agricultural land loss. The average lot size within incorporated communities was 3.34 acres.

If tracking land division activity in towns exclusively in Green Lake County, Table 2 reveals that 592 lots were created consuming 5,981.7 acres of land. The average size of lot created increased to 10.1 acres.

Please note that all lots created are not only for residential type uses. Lots created for commercial, industrial and institutional type uses also utilize land for development and often require larger parcel acreage. In addition, not all land utilized for lot creation may have been farmland. Also, one cannot assume all the

acreage utilized to create lots and parcels, has been lost entirely to the practice of farming although the fragmentation of land is never conducive to the long range benefit of agricultural activity. Tracking land division activity is a useful barometer in gauging non-farm development activity.

From a general perspective, towns in Green Lake County located adjacent incorporated communities (i.e. Cities of Green Lake, Princeton & Berlin), lost more acres to lot creation than those more rural in nature. Again, this could be classified as an expected occurrence.

There appears to be a large discrepancy in the amount of farmland lost or converted to other uses between the two methods. The WDOR numbers, Table 1, are defensible strictly from a land use (assessment) stand point. But the figures can change annually without any impact of land division activity. Thus, tracking land division activity, Table 2 and Figure 4-11, includes a number of land use assumptions that may or may not occur (i.e. a lot created is not farmed) but the numbers do represent a perceived change in land use. It also measures the assumption that land divided is less conducive to future agricultural activity.

Acres of Agricultural Land by Community, 2012-2022

Table 4-1

		Acres		10 Year Change	
Community		**2012**	**2022**	**Number Change**	**Percent Change**
Towns	T. Berlin	10,419	10,336	--83	-0.80%
	T. Brooklyn	10,314	10,272	-42	-0.41%
	T. Green Lake	22,715	22,711	-4	-0.02%
	T. Kingston	8,428	7,750	-678	-8.04%
	T. Mackford	16,177	16,202	25	0.15%
	T. Manchester	16,525	16,501	-24	-0.15%
	T. Marquette	7,293	6,506	-787	-10.79%
	T. Princeton	9,266	9,252	-14	-0.15%
	T. Saint Marie	6,071	5,951	-120	-1.98%
	T. Seneca	5,990	4,803	-1,187	-19.82%
Subtotal		113,198	110,284	-2,914	-2.57%
Villages	V. Kingston	235	227	-8	-3.4%
	V. Marquette	60	56	-4	-6.67%
Subtotal		295	283	-12	-4.07%
Cities	C. Berlin	435	357	-78	-17.93%
	C. Green Lake	195	171	-24	-12.31%
	C. Markesan	617	607	-10	-1.62%
	C. Princeton	113	122	9	7.96
Subtotal		1,360	1,257	-103	-7.57%
Green Lake County Total		114,853	111,541	-3312	-2.88%

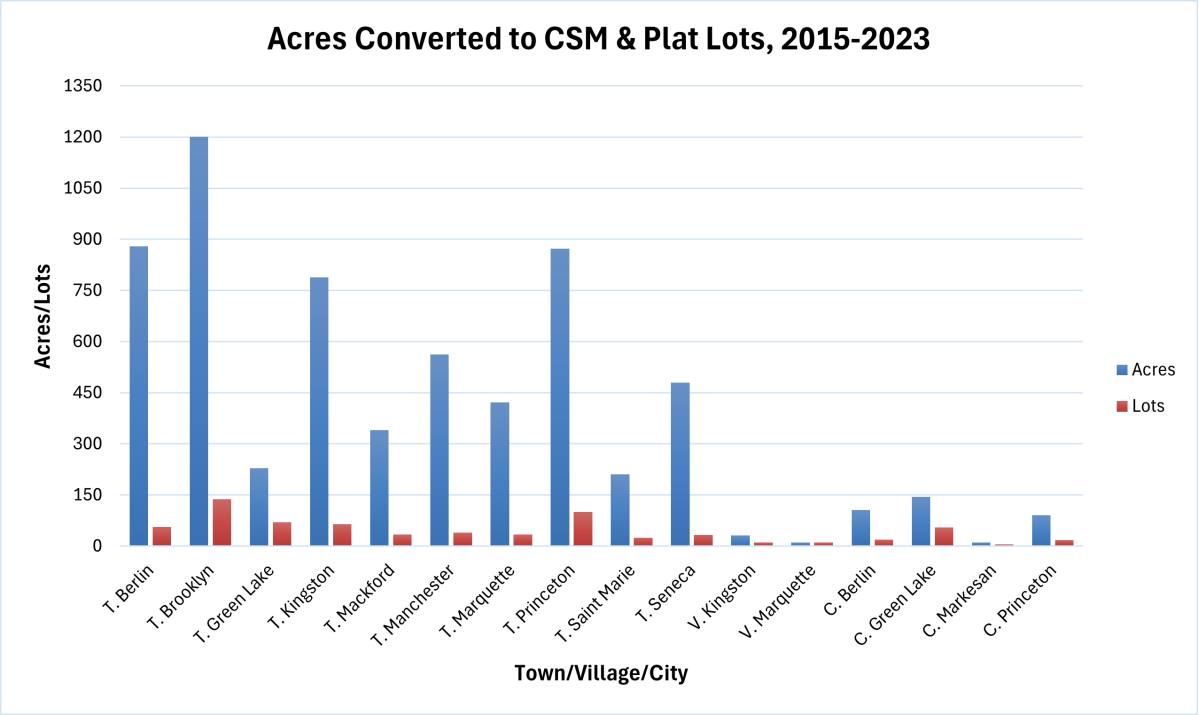
Source: Wisconsin Department of Revenue, 2012 and 2022

Table 4-2
CSM lots and Plat lots by Town, in Acres, 2015-2023

Town	Acres	% of Total	No. of Lots
Berlin	879.75	13.8%	56
Brooklyn	1200.1	18.82%	137
Green Lake	228.62	3.59%	70
Kingston	787.87	12.36%	64
Mackford	340.71	5.34%	34
Manchester	561.99	8.82%	40
Marquette	421.17	6.61%	34
Princeton	871.68	13.67%	100
Saint Marie	209.85	3.29%	24
Seneca	479.96	7.53%	33
Subtotal	5,981.7	93.83%	592
Village/City			
V. Kingston	31.73	0.5%	10
V. Marquette	10.89	0.17%	11
C. Berlin	105.51	1.65%	19
C. Green Lake	143.55	2.25%	55
C. Markesan	10.98	0.17%	5
C. Princeton	90.91	1.43%	18
Subtotal	393.57	6.17%	118
Grand Total	**6,375.27**		**710**

Source: Green Lake County Planning and Zoning Department, 2024

Figure 4-11



Source: Green Lake County Land Use Planning and Zoning Department

4.4 Anticipated Changes in Agricultural Production, Processing, Supply, and Distribution

From a state perspective, agriculture remains an important part of the Wisconsin Economy. One of the best analysis and publication to document the agricultural impact to Wisconsin's economy is a report titled: *Contribution of Agriculture to the Wisconsin Economy (2017)* developed by the University of Wisconsin-Madison Department of Agricultural & Applied Economics. Support for this work was provided in part by the University of Wisconsin-Cooperative Extension, DATCP and the Wisconsin Milk Marketing Board. This study was updated in 2019 using 2017 data.

Using the data from 2017, this study updated prior analyses of the contribution of agriculture to the Wisconsin economy (Deller 2004; Deller and Williams 2009, Deller 2014). In 2017, all of agriculture contributed 104.8 billion to industrial sales (revenues), up from 88.3 billion in 2012. The number of overall jobs created by agriculture was up 24,000 jobs in 2017 from 2012. Another $22.5 billion in labor income and the economic activity associated with agriculture generated $2.9 billion to state and local government revenues. The study does attribute some of the increases to inflation (6.7% between 2012 and 2017), but the increases in industry sales (15.7%), labor income (17.2 %) and total income (20%) outpaced inflation.

- On-farm activity contributes $22.0 billion to industrial sales or revenue (3.5% of the state total), 154,000 jobs (4.1%), $5.8 billion to labor income (2.9%), and $9.8 billion to total income (3.0%).
- Food processing activity contributes $82.7 billion to industrial sales (13.0% of the state total), 282,000 jobs (7.6%), $22.5 billion to labor income (8.4%), and $37.6 billion to total income (8.6%).
- The bulk of the growth in the contribution of agriculture to the Wisconsin economy between 2012 and 2017 is growth in the food processing sectors.
- "All agriculture", combined on-farm and food processing, contributes $104.8 billion to industrial revenues (16.4% of the state total), 435,700 jobs (11.8%), $22.5 billion to labor income (11.3%), and $37.6 billion to total income (11.6%).
- Dairy, combining both on-farm and dairy processing, contributes $45.6 billion to industrial revenues (7.1% of the state total), 157,100 jobs (4.2%), $9.0 billion to labor income (4.5%) and $15.1 billion to total income (4.7%). Dairy processing accounts for roughly two-thirds of this contribution.
- The economic activity supported by agriculture results in state and local government tax revenues of $2.9 billion, which is roughly 7.4% of "own source revenues".
- Foreign exports of agricultural products (on-farm and processing) accounts for $4.9 billion in industry revenue (0.8% of Wisconsin total), 21,539 jobs (0.6%), about $1.1 billion in labor income (0.5%) and $1.8 billion in total income (0.6%). Additionally the economic activity generated by agricultural foreign exports creates $129.7 million in state and local tax revenues.

A full copy of the *Contribution of Agriculture to the Wisconsin Economy (2017)* report can be found in Appendix D.

According to data obtained from the UW Cooperative Extension Office, Green Lake County agriculture:

- Provides 1,463 jobs throughout the County (15% of the county total of 9,769)
- Pumps $320 million into the economy (almost 27% of the County's total business sales)
- Contributes $88 million to county income (accounting for 16% of the County's total)

Every dollar of sales from agricultural products generates an additional $.40 of business sales in other parts of the County's economy.

For example, this includes business-to-business purchases of fuel, seed, fertilizer, feed and farm machinery, as well as veterinary services, crop and livestock consultants and financial services. This business-to-business activity then generates sales when people who work in agriculture related business spend their earnings in the local economy.

From a regional perspective, the anticipated changes for agriculture production, processing, supply and distribution look very favorable. Green Lake County is home to high quality farms which produce high quality milk that is in demand. This milk is processed and packaged locally and in the region. The south east portion of the County contains some of the best farmland and soils in the entire state. Green Lake County provides a well-established transportation network and support infrastructure that allows for product to move in and out of the County easily and efficiently. Finally, due to agricultural roots, workers in Green Lake County are known for their strong work ethic, making them attractive to local business and industry.

ORGANIC FARMING AND ECONOMIC IMPACTS:

Wisconsin has seen growth in the number of certified organic farms has grown from 1,202 in 2007 to 1,455 in 2021, which, according to the USDA, accounts for 8% of the nations' total. Green Lake County might expect an increase in organic activity similar to the state. Here are some key facts on organic farming:

- From 2011 to 2021, organic acreage in Wisconsin has increased from 195,603 acres to 245,333 acres, a 125% increase. In 2021, the average organic farm in Wisconsin was approximately 169 acres as compared to 281 acres for the U.S..
- Wisconsin is responsible for $313 million in sales of certified organic commodities which ranks 7th highest among the states. Milk from cows alone accounted for $107 million in sales, which is 7% of the national production. The state has approximately 26,250 organic milk cows on hand which makes up 8% of the national inventory. Wisconsin also accounts for 23% of the Nation's organic goat milk sales, totaling $469,806.
- Based on data from the University of Wisconsin Center for Dairy Profitability, even in the current economic downturn, Wisconsin organic farms generated nearly $1,000 in net profit per cow in 2009 while farmers receiving conventional prices for their milk lost $147 per cow. The organic farms in the study averaged $65,000 in net farm income in 2009.

For more information and to download the report please visit:
http://datcp.wi.gov/uploads/Farms/pdf/OrganicAdvisoryCouncilNewsletter.pdf

Continued growth in agriculture production, processing, supply and distribution can be expected county-wide and regionally. According to UW Extension data, Green Lake County has four Nationally Certified Organic Producers. Growth in the organic market appears very favorable.

5.0 Farmland Preservation Areas

This chapter provides detail on how the Farmland Preservation Maps were developed.

5.1 Rationale Used to Determine Preservation Areas

The *Green Lake County Farmland Preservation Plan* Map (Map 4) identifies two areas: "Farmland Preservation Areas" and "Nonagricultural Development Areas". The "Areas of Agricultural Use and Agriculture Related Use" are considered to be within the Farmland Preservation Area and the "Areas of Nonagricultural Development" are within the Nonagricultural Development Area. The rationale and criteria used to determine the Farmland Preservation Areas and Areas of Nonagricultural Development were left unchanged in the 2025 update and remain as follows:

Farmland Preservation Areas (Areas of Agricultural Use and Agriculture Related Use)

Please note that land designated as a farmland preservation area only needs to meet one of the following criteria.

- Working farmland defined as: Parcels greater than eight (8) acres that have 50% or more of working (managed) farmland.
- Additional agriculture, forest and open space land within the contiguous ownership border of identified working farmland parcels (those identified above).
- Additional agriculture, forest and opens space land on parcels greater than 8 acres that were not captured by the prior two criteria.
- Farmland currently zoned A-1 “Exclusive Agriculture”. The current A-1 zoning district includes large contiguous tracts of working farmland, pasture, forestry and open space areas.
- State and federal owned property managed for forestry, habitat conservation and recreation purposes.

Areas of Nonagricultural Development (Excluded)

- Land within incorporated municipalities (villages & cities)
- Land planned for uses other than agriculture and open space over the next 15 years.
- Land within a defined Sewer Service Area Planning boundary of a city, village or town sanitary district.
- Land zoned for intensive uses other than agriculture.

As town leaders participated in the Green Lake County farmland preservation planning process, it provided them a new opportunity to reconsider and adjust land use goals. Much has changed relative to land demand for development purposes since the Great Recession of 2008. Contrary to the economic slowdown in the development industry, the agricultural economy remained stable to strong and agricultural land prices rose throughout the County. The demand for farmland has increased.

In addition, the provisions of the Working Land Initiative, Wis. Chap. 91, now provided the opportunity to accommodate some non-farm residential development within the designated farmland preservation areas through farmland preservation zoning. This was not an option prior to the Working Lands Initiative when many of the plans were developed and often low density residential areas were planned to accommodate this type of use. Hence, the Green Lake County farmland preservation process has provided a new

opportunity to adjust land use goals based on changing economic conditions. The resultant adjustments via this planning effort will provide town leaders a more accurate picture of how land use will likely occur and how it should be planned.

Many small farms are finding that diversification is the key to survival. Land use regulations need to be open to this reality. Farm shops, wedding / event barns, farms stands, RNG (renewable natural gas), sawmills, just to name a few, are ways that small farms can weather traditional farming practice uncertainties.

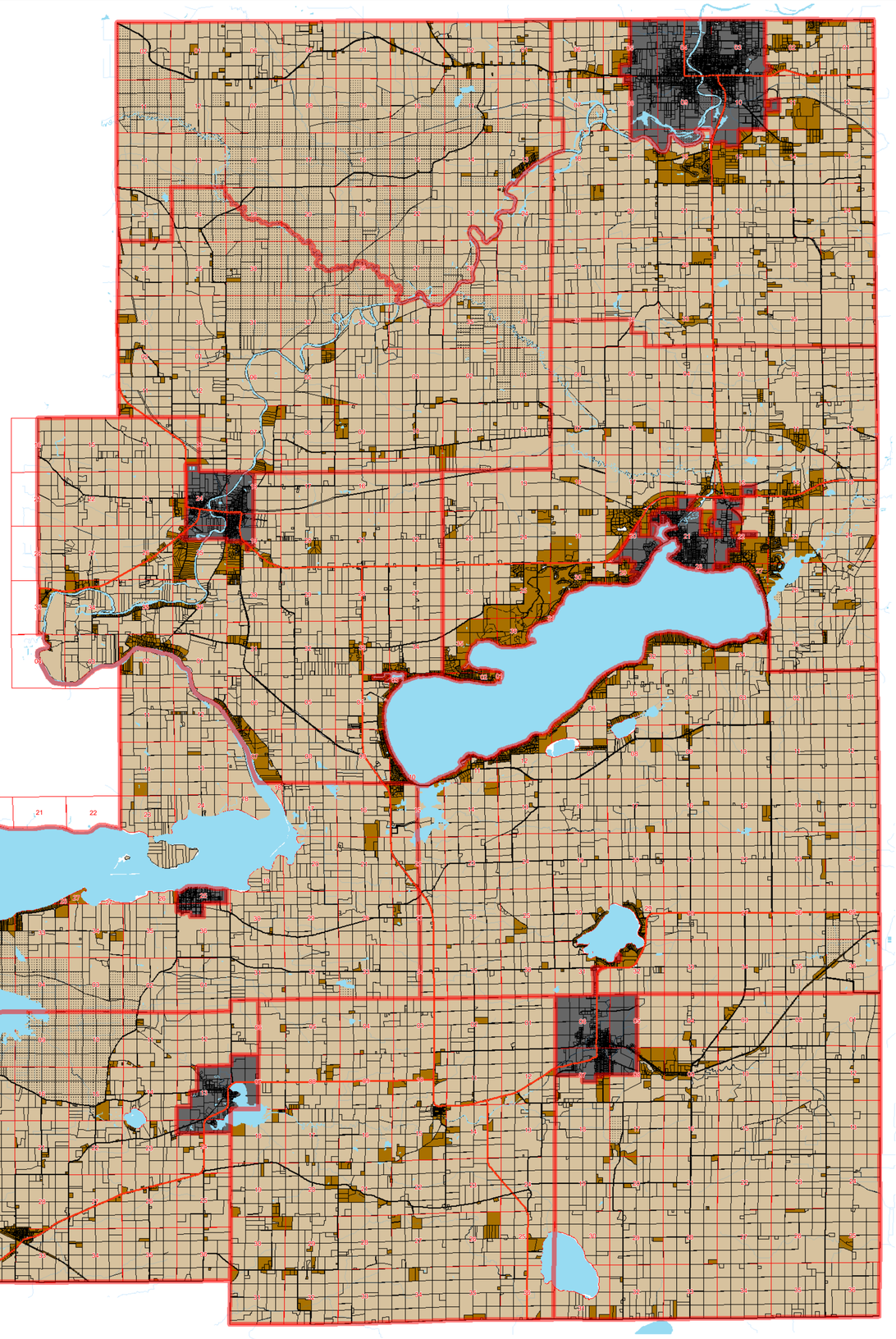
Amendments to local comprehensive plans should also occur to reflect the farmland preservation areas noted as part of this *Green Lake County Farmland Preservation Plan*. This effort will ensure consistency between the local comprehensive plans, the *Green Lake County Farmland Preservation Plan* and ultimately the Green Lake County Comprehensive Plan.

5.2 Farmland Preservation Map Category Description

There are only two description categories on the Farmland Preservation Plan Map: Farmland Preservation Areas and Nonagricultural Development Areas. The Farmland Preservation Areas include those areas of Agricultural Use and Agriculture Related Use (Light Brown Color) in accordance with the rationale described in section 5.1.

The Nonagricultural Development Areas include all other land uses and are placed within the Areas of Nonagricultural Development on the Map (Dark Brown Color). The Farmland Preservation Map and Map Legend include highways, town roads, railroads, town boundaries, section lines, parcel boundaries, incorporated areas, water bodies, and rivers and streams. The Farmland Preservation Map is done for the entire county excluding incorporated areas. However, in order to provide the necessary detail, the maps provided in the Farmland Preservation Plan are shown on a town by town basis in Appendix G. Table 5-1 includes the acreage totals of the Farmland Preservation Areas within each town.

For comparison purposes, those acreages are compared against the prime soil acreage totals for each town. As indicated by Table 5-1, the farmland preservation planning process has been very successful capturing prime agricultural soils within the Farmland Preservation Areas. A total of 199,931 acres have been designated as farmland preservation areas, accounting for 92.5% of the County's unincorporated area. Of the 159,650 acres of prime agriculture soils in the County, 149,291 acres (93.5%) are captured within the designated Farmland Preservation Areas.



Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4 Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

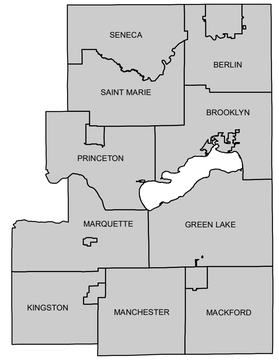
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



N
W E
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0 2,000 Feet

Map by Green Lake County GIS on 7/25/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

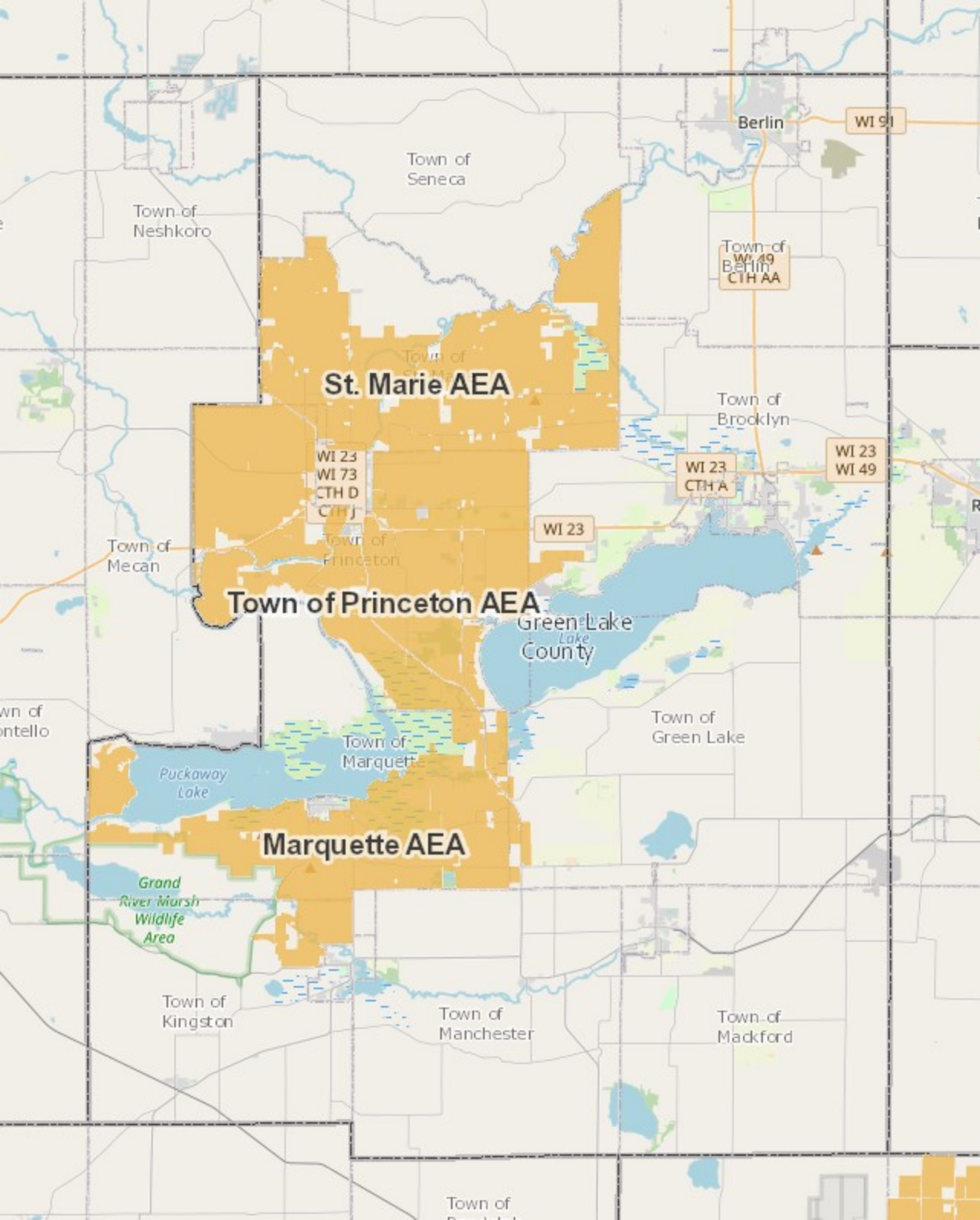
Berlin
WI 91
Town of Seneca
Town of Neshkoro
Town of Berlin
WI 49
CTH AA
St. Marie AEA
Town of Brooklyn
WI 23
WI 73
CTH D
CTH J
WI 23
CTH A
WI 23
WI 49
WI 23
Town of Princeton
Town of Mecan
Town of Princeton AEA
Green Lake
Lake
County
Town of Green Lake
Town of Marquette
Puckaway Lake
Marquette AEA
Grand River Marsh Wildlife Area
Town of Kingston
Town of Manchester
Town of Mackford

Table 5-1
Farmland Preservation Acres and Prime Agricultural Soils, Green Lake County

Township	Town Acres	Prime Ag Soil Acres	% Prime Ag Soils	Farmland Preservation Acres	% Farmland Preservation	Acres in FP & Prime Ag Soils	% FP & Prime Ag Soils
Berlin	18,943	15,713	82.9%	16,066	84.8%	13,830	73.0%
Brooklyn	22,071	17,476	79.2%	18,070	81.9%	14,651	66.4%
Green Lake	29,568	27,066	91.5%	27,287	92.3%	25,466	86.1%
Kingston	18,382	11,618	63.2%	17,884	97.3%	11,317	61.6%
Mackford	21,298	20,406	95.8%	20,052	94.2%	19,274	90.5%
Manchester	22,392	19,492	87.0%	20,718	92.5%	18,247	81.5%
Marquette	20,075	11,065	55.1%	19,314	96.2%	10,722	53.4%
Princeton	21,556	12,052	55.9%	19,950	92.5%	11,520	53.4%
Saint Marie	20,911	12,317	58.9%	20,134	96.3%	11,971	57.2%
Seneca	20,827	12,445	59.8%	20,456	98.2%	12,293	59.0%

Notes: (1) Cities/Villages and road right-of ways have been excluded from all calculations
(2) Sorted by % designated prime ag soils and farmland preservation

Implementation

6.0 Goals, Objectives and Policies for Agricultural Development

The Green Lake County Land Use Planning & Zoning Committee held a public workshop where current agricultural trends were discussed. In addition, the Green Lake County Farmland Preservation Plan Subcommittee held four publicly noticed meetings and discussed the Goals, Objectives and Policies listed in the 2016 *Green Lake County Farmland Preservation Plan.* The subcommittee recommended several changes to this section of the Plan.

Wisconsin Statutes 91.10 requires the plan must state the County's policy and goals related to farmland preservation and agricultural development, including the development of enterprises related to agriculture. For clarification, goals are general statements, whereas the policies build on the goals by providing more detailed actions to the goals. Policies that direct action using the words "will" or "shall" are advised to be mandatory and regulatory aspects of implementation.

In contrast, those policies that direct action using the words "should", "could", or "may" are advisory and intended to serve as a guide. Policies are used to assist the future decisions makers in the towns and the county. The revised and new goals and policies for agricultural and enterprise related agricultural developments are as follows:

Overall Farmland Preservation Goal

It is the goal of Green Lake County to maintain the integrity and viability of county agriculture. This should be accomplished without damaging the economic and social environment or the natural resources which provide a high quality of life for residents of this county.

Overall Policies

Prepare, in cooperation with applicable state agency (s), municipal, town, village and other intra-governmental bodies, a ten (10) year plan, in accordance with Chapter 91, ATCP 49 & ATCP 51 of the Wisconsin Statues, to sustain agriculture as an essential part of the economic and social structure of Green Lake County.

Build the Green Lake County Farmland Preservation Program on the concept that maintaining undisturbed tracts of farmland for agricultural production creates cropping efficiencies, improves pest control success and reduces land use conflicts with non-farm residences.

Recognize that a strong and profitable local agricultural economy provides the best growth management program to reduce sprawl and incompatible land use situations in designated agricultural areas.

Promote agricultural programs and educational efforts that are designed to create a stronger connection to the land and an understanding of agricultural systems, especially within younger generations and law makers.

Recognize that Green Lake County agriculture is impacted by regional, national and global policies, markets and initiatives and, where appropriate, engage in local support to move agriculture in a positive direction.

Continue to maintain a reliable county agricultural environment in order to maintain existing financial investment and spawn the expansion of agricultural related businesses.

Support and compliment local, regional and state efforts to preserve farmland.

Maintain and promote programs, efforts and initiatives that lead to a diversified agricultural base as diversity leads to sustainability.

Address and analyze the status of county and town agriculture, characteristics of natural re- sources, population statistics, and the need for urban growth, housing, and public facilities.

Provide flexibility for change by establishing a systematic and continuous procedure to ascertain preference and suggestions by citizens and to establish procedures whereby additions, deletions and other changes in the plan may be made as deemed necessary.

Continue to support Green Lake County farmers in their willingness to engage in innovation.

Support the expansion of technology, creativity and innovation to improve cost efficiencies and "economies of scale" in agriculture.

Understand that although the regional influence of agricultural players can improve the local agriculture economy, it can also create some stress within local types of farming which may cause transition. Attempts to balance agricultural interests should be acknowledged.

Maintain, support and enhance the opportunity for unique farm market niches like organics and specialty farming. Use these unique farming niches to further "brand' the areas rich agricultural traditions.

Target and expand opportunities to utilize locally grown and processed products in an effort to reduce transportation distances between producer and consumer.

Provide continuous information to farmers pertaining to the financial advantages and long-range benefits for the farmland preservation program and the use of best management practices.

Protect identified agricultural land through an integrated application of land use regulations, local planning, farm conservation plans and the use of Agricultural Enterprise Areas (AEA's).

Support a farmer's "Right to Farm" through the use of zoning to prevent nuisance conflicts.

Conduct informational meetings for agricultural organizations and the general public.

Maintain, and where required, expand the commitment to county departments, agencies and other agricultural partners in enhancing area agricultural programs, efforts and initiatives.

Goal 1

It is a goal of Green Lake County to preserve its farmland and unique natural resources by protecting those lands from encroaching incompatible land uses and by using appropriate best management practices.

Supporting Policies

Identify those lands most suitable for agriculture by using objective criteria. Map farmland preservation areas to be recommended for preservation.

Preserve and enhance the ability of the land to provide agricultural products.

Recognize forestry as an important component of the local agricultural economy and incorporate these forests as part of the farmland preservation planning areas.

Promote the utilization of forest management professionals to develop private forest management plans that will assist in maintaining this resource as a sustainable component of the local agriculture landscape.

All farmers, whether owner or renter, are to abide by the same farmland preservation and conservation standards ensuring resource protection.

Recognize the most unique and productive soils occur in the SE corner of the Green Lake County where prairie soils are common. This is an area where the most intensive farmland preservation efforts should occur.

Support responsive, quality and environment friendly management techniques that further enhance soil productivity.

Recognize, support and enhance conservation and land management practices that minimize soil disturbance while increasing crop production.

Encourage all farmers to utilize applicable best management practices in accordance with ATCP 50 to preserve the quality of their farmland.

Coordinate efforts with agencies involved with farmland preservation and soil and water conservation.

Provide information about cost sharing programs available to assist in the application of best management practices.

Assist local governments who desire more involvement in agricultural land use planning.

Partner with land preservation organizations. The County may establish a dialogue with and invite educational offerings from organizations that work with private landowners to protect natural resources and preserve open space, such as land trusts and conservancy organizations.

Promote field trips, exhibitions and other outreach activities that exhibit the areas' strong conservation and land management ethic.

Provide educational opportunities that inform farm and non-farm users of land about incompatibility issues that occur when these uses are in close proximity to each other.

Goal 2

It is a goal of Green Lake County to accommodate future non-farm and recreational growth in a manner which will not strain the natural or financial resources of the county or its towns.

Supporting Policies

Recognize that rural Green Lake County must accommodate some residential development to maintain a local tax base. Utilize the farmland preservation planning process and local comprehensive planning efforts to direct non-farm related development into compatible and service-oriented locations.

Recognize that Green Lake County Villages and Cities play an important role in preserving farmland as well by creating healthy, sustainable and affordable housing opportunities, markets for local products and hosting agricultural related business.

Increase efforts to secure larger allocations of local road aids and other agriculture infrastructure funding by the State to support and enhance the transportation of agricultural products.

Seek opportunities to work with the WDOT to improve county highway systems in a way that will not create barriers to the farmer's ability to adequately service their farmland.

Recognize the need to maintain and expand the county and regional agricultural infrastructure so that products can move efficiently and safely from producers to processors to buyers.

Through local zoning encourage growth in areas where it will not conflict with other land uses and is compatible with local comprehensive planning efforts.

County and Town comprehensive plans can provide for growth by identifying those areas that are presently in agricultural use but which may have characteristics which predicate future development.

Adhere to the policies established within the Working Lands Initiative and the revised farmland preservation program to manage and or accommodate non-farm development within established farmland preservation areas.

Encourage a coordinated planning program among the county, cities, villages and towns.

Encourage the implementation of county agricultural land use regulations in towns under county zoning, and town agricultural land use regulations in towns that have not adopted zoning.

Minimize rural and urban land use conflicts by coordinating county and town land use planning and regulations.

Encourage development allowed in agricultural areas to minimize the amount of land removed from production and the impact the development may have on surrounding farm operation through land use planning and the use of applicable land use regulations.

Recognize that farms that engage in a non-farm use to supplement their income are compatible with the farmland preservation program and contributes to the preservation of farmland.

6.1 Goals, policies, strategies and proposed actions to increase housing density in areas that are not identified as farmland preservation areas

The need for housing units will increase in Green Lake County. Table 104, Household Projections, show there will be a need for 377 additional housing units in the next 15 years (2015 to 2030).

The County will need to prepare for the some new housing demand. Maintaining higher housing density in areas suitable for housing development has been a long-time goal for the County. In addition, it is assumed a large majority of new non-farm related housing development will be directed to incorporated areas (cities and villages) or area mapped for Non-Agricultural activity as shown on Map 4.

There are many benefits to increasing housing density in properly planned locations. Such benefits include: the need for fewer acres per housing unit, reduced local government expenses as shorter/narrower streets cost less to maintain and fewer miles of sewer/water piping are needed, reduced storm-water runoff can reduce utility costs, public transit systems are more cost effective and higher housing density encourages healthier life styles (walk-able communities).

It should be noted that housing development regulations are not uniform throughout the County. Four (4) of the ten towns do not have any zoning. The six (6) towns that do have zoning, practice such through the Green Lake County Zoning Ordinance. All six towns also practice farmland preservation through Green Lake County zoning. By continuation in the farmland preservation program, the County will need to recertify their zoning ordinance in order for land owners to receive credits. The revised County Zoning Ordinance will need to address non-farm residential development within the farmland preservation zoned districts. At this time specific densities will be discussed. All Green Lake County cities and villages have zoning ordinances which address residential development.

Below are goals, policies and strategies and/or proposed actions the County may implement to achieve higher housing densities in areas outside the mapped farmland preservation areas. In addition, the Green Lake County Comprehensive Plan update which is also scheduled for adoption in 2026, will include additional discussion on housing demands, need, densities and planned locations.

However, Wisconsin Statutes 91.10 (c)(7m) requires a statement of policies, goals, strategies, and proposed actions to increase housing density in areas that are not identified as farmland preservation areas per Wisconsin Statutes 91.10(d). Goals are general statements, whereas the policies build on the goals by providing more detailed actions to the goals. Policies that direct action using the words “will” or “shall” are advised to be mandatory and regulatory aspects of implementation.

In contrast, those policies that direct action using the words “should”, “could”, or “may” are advisory and intended to serve as a guide. Policies are used to assist the future decisions makers in the towns and the County. Strategies and/or proposed actions are specific actions that the County should be prepared to complete. The completion of the strategies and proposed actions are consistent with the policies, and therefore will help fulfill the goals of the Farmland Preservation Plan.

Increase Housing Density Goal

Encourage higher housing density in incorporated communities and areas designated for non-agricultural development consistent with the *Green Lake County Farmland Preservation Plan*.

Policies

1. Non-farm residential development in farmland preservation zoned areas, shall not be permitted unless as a replacement to a residence built prior to January 1, 2014.
2. Infill development and new housing developments shall always be encouraged within areas served by public facilities (city and village sanitary districts).
3. Cluster residential development should be promoted to minimize land use impacts and increase housing density.

Strategies

1. The County will closely coordinate the DATCP Certified *Green Lake County Farmland Preservation Plan* with updating the Green Lake County Comprehensive Plan, specifically the Future Land Use Map. This will ensure consistency between mapping and implementation so that future non-farm residential development is directed to areas of non-farm activity.
2. The County should identify and provide sources of assistance that could provide funds to repair and maintain existing housing stock. This program will enable existing residential neighborhood to be strong and attractive places for new home buyers.
3. Green Lake County towns, villages and cities should also consult *the Green Lake County Farmland Preservation Plan* to accurately located future residential development when updating their individual comprehensive plans.

Strategies and Proposed Actions to achieve Goals, Policies and Strategies

County Planning Staff will continue to be a resource to towns wishing to update their existing comprehensive plans. This cooperation should ensure consistency between local planning, zoning and the *Green Lake County Farmland Preservation Plan.* Specifically, staff can work with communities to identify areas that are available for infill development. Identifying areas that are available for new housing development will provide a readily usable database (map) for developers to reference. Developers are encouraged to develop underutilized areas, prior to developing into open space and/or agricultural areas.

The County should also deny land division requests to create major subdivisions (5 or more lots) within agricultural zoned areas. This may result in more development occurring in areas planned for residential growth.

County staff should also assist with the development of any Agricultural Enterprise Areas (AEA's) through DATCP should the interest occur. The establishment of an AEA will further document and implement the County's commitment to farmland preservation.

As indicated earlier, a strong regional agricultural economy and support infrastructure is vital to further industry growth. As agriculture grows and prospers in the region, the momentum to preserve farmland will increase beyond the need to rely on regulations. Agricultural resources such as prime farmland, already is essential to the area economy. In order to promote a strong economic base for agriculture, business marketing and recruitment efforts must be supported by the County. Further investment in agriculture systems will anchor preservation efforts.

6.2 Farmland Preservation Programs

There are many farmland preservation programs available to landowners in Green Lake County. Programs are available on the county, state and federal levels. The principle effort of farmland preservation and rural land preservation programs is to implement agricultural conservation practices and natural resource protection. Both farmland and natural resource protection programs are listed below, as these programs often work in combination.

Landowners can get program information from the Green Lake County Planning & Zoning Department, Green Lake County Land Conservation Department, Natural Resource Conservation Service, USDA Farm Service Agency and the Wisconsin Department of Natural Resources. Agricultural related programs available to County landowners are listed below.

County Programs

County Zoning

Green Lake County administers zoning in six (6) of the counties' 10 towns. These towns include Berlin, Brooklyn, Green Lake, Mackford, Manchester, and Marquette, There are four (4) towns that do not have any zoning including Kingston, Princeton, Saint Marie and Seneca. However, all 10 towns are covered under the Green Lake County Shoreland Ordinance. The Green Lake County Zoning Ordinance has traditionally included a farmland preservation zoning district designed to meet the requirements of the state's farmland preservation program.

In addition Green Lake County Land Conservation Department is responsible for administering many State and Federal Programs discussed below.

State and Federal Conservation Programs

Farmland Preservation Program

Administered by the Department of Agriculture Trade and Consumer Protection, (DATCP), the purpose of this program is to help preserve farmland and promote soil and water conservation practices through local planning and zoning. Landowners that participate in the program are eligible for state tax credits. In order to be eligible for the program, land must be identified as a farmland preservation area in a DATCP certified farmland preservation plan and be zoned farmland preservation in a DATCP certified farmland preservation zoning district. Land must also be in compliance with the State's soil & water conservation standards. In towns without zoning, tax credits can be obtained by landowners if the area has been approved by as an "Agriculture Enterprise Area" (AEA) by DATCP. All land eligible for credits must be identified as a farmland preservation area in the *Green Lake County Farmland Preservation Plan*, certified by DATCP. Additional information can be found at:
https://datcp.wi.gov/Pages/Programs_Services/FarmlandPreservation.aspx.

Land and Water Resource Management Plan

The purpose of this program is to control soil erosion and reduce nonpoint source water pollution. The program provides cost share and technical assistance to landowners to install soil and water conservation practices. The following agricultural conservation practices may be utilized; grass waterways, diversions, critical area stabilization, terraces, grade stabilization structure, sediment basin, barnyard runoff control practices, rural well abandonment, manure storage abandonment and roof runoff system. The Land and Water Resource Management Plan is required through Wisconsin Statutes Chapter 92.10.

Crop Damage Program

The purpose of this program is to provide Federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist. Also known as the Wildlife Damage Abatement and Claims Program (WDACP). This program provides damage prevention assistance and partial compensation to farmers when

wild deer, elk, bear, geese and turkeys damage their agricultural crops.

AgrAbility of Wisconsin

The purpose of the AgrAbility program is to promote success in agriculture for people with disabilities through the development of a customized assistance plan based on the type of farm operation, type of disability, and the needs of the individual with a disability and their family. This plan could include: equipment and worksite modification, farm job restructuring, community and health care coordination, peer support involvement, etc. The Wisconsin AgrAbility Project is a cooperative effort of the University of Wisconsin Extension Service, University of Wisconsin Biological Systems Engineering and Easter Seals Wisconsin.

Center for Dairy Profitability

The purpose of the Center for Dairy Profitability is to develop, coordinate and conduct effective interdisciplinary educational and applied research programs, emphasizing business management, human resource management, production systems, and finance and marketing systems that enhance dairy profitability. In keeping with this mission statement, the Center's website has a variety of resources to improve production efficiency and profitability. The Center also has a real-time internet financial benchmarking site.

Wisconsin Farmer's Resource Guide

The Wisconsin Farmer's Resource Guide is a directory for farmers and rural citizens to find helpful information and services offered by public and private agencies across the state. Whether you need legal aid or want to apply for a loan, seek job training or financial counseling, this guide will help you find the right person to talk to.

Wisconsin Farm Bureau Federation Young Farmer Program

The Wisconsin Farm Bureau Federation Young Farmer Program is a leadership program for farmers under the age of 35. The Young Farmer Program provides leadership and skills development opportunities, along with the chance for young farmers to meet and network with other young farmers.

Discovery Farms

Discovery Farms is a University of Wisconsin program designed to address the environmental research needs of agricultural producers. Through addressing those needs, Discovery Farms is working to assure a healthy environment and a healthy farm economy. Discovery Farms is part of UW-Extension and the College of Agriculture and Life Sciences at UW-Madison, and have a relationship with the Wisconsin Agriculture Stewardship Initiative.

Wisconsin Focus on Energy

Focus on Energy works with eligible Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects. Focus information, resources and financial incentives help to implement projects that otherwise would not be completed, or to complete projects sooner than scheduled. Its efforts help Wisconsin residents and businesses.

WHEDA: Beginning Farmer Bonds

The purpose of the Wisconsin Housing and Economic Development Authority (WHEDA) Beginning Farmer Bond program, uses bond funds to be used for the purchase of a first farm including land, equipment, livestock, or buildings. Bonds can be used for transactions between related persons.

WHEDA: Credit Relief Outreach Program (CROP)

The purpose of the Wisconsin Housing and Economic Development Authority (WHEDA) Crop program is to make loans to farmers, which can be used to buy animal feed, seed, fertilizer, pesticides, or to pay land rent, custom hire, crop insurance, feeder animals, tillage services, equipment rental and repair, or utilities for commodity production.

WHEDA: Farm Asset Reinvestment Management (FARM)

The purpose of the Wisconsin Housing and Economic Development Authority (WHEDA) Farm program is to make loans to farmers, which can be used for a farm expansion or for the modernize an existing operation. The loan can be used to purchase agricultural assets including machinery, equipment, buildings, land, and livestock. The money can also be used to make improvements to farm buildings and land for agricultural purposes or refinance existing debt if the farmer is expanding their existing farm operation. The refinanced debt must not exceed 75% of the WHEDA guaranteed loa

WHEDA: Agribusiness Guarantee Program

The purpose of the Wisconsin Housing and Economic Development Authority (WHEDA) Agribusiness Guarantee program is to make loans to farmers for projects developing products, markets, method of processing or marketing for a Wisconsin-grown commodity. The maximum guarantee of 80% on loans can be used for equipment, land, buildings, working capital, inventory and marketing expenses.

Dairy grazing Apprenticeship Program

This program is for the training of new dairy farmers in grass-based farming practices. Program received a $750,000 grant in the 2014 Farm Bill to continue this service to new farmers.

Growing Power

This program serves as a training source for all types of individuals, ranging from students to farmers, or government personnel. Training areas include the following: acid-digestion, anaerobic digestion for food waste, biophyte remediation and soil health, aquaculture closed-loop systems, vermiculture, small and large scale composting, urban agriculture, permaculture, food distribution, marketing, value-added product development, youth education, community engagement, participatory leadership development, and project planning.

An all-inclusive summary of Federal programs can be found in the publication: "*Building Sustainable Farms, Ranches and Communities – A Guide to Federal Programs for Sustainable Agriculture, Forestry, Entrepreneurship, Conservation, Food Systems, and Community Development"*, September 2020. Below is the Introduction to this guide.

"This guide is written for anyone seeking help from federal programs to foster sustainable and innovative initiatives associated with agriculture and forestry in this country and territories. Sustainability can be understood to embrace the triple concepts of economic, environmental and social viability. A reader can find information about program resources pertaining to economic development; farm loans; insurance and risk management; local food systems, value added and marketing innovations; natural resources conservation and management; nutrition and consumer food access; renewable energy and energy conservation; and research and outreach. The guide can help farmers, researchers, entrepreneurs, community developers, private landowners, conservationists, and other individuals, as well as private and public businesses and organizations. It describes program resources ranging from grants and loans to technical assistance and information resources."

USDA and other agency employees can learn more about federal programs and resources available to their clients in supporting sustainable innovations in agriculture and forestry. This edition is the guide's seventh printing and fifth complete update, incorporating programs from the 2018 Farm Bill.

A list of the programs by category within the guide are below.

Economic Development for Farms, Small Businesses and Communities
Business and Industry Guaranteed Program
Intermediary Relending Program
Rural Business Development Grants
Rural Cooperative Development Grant Program Rural Microentrepreneur Assistance Program

Farm Loans
Direct & Guaranteed Farm Loans
Down Payment Loan Program
Farm Storage Facility Loans
Land Contract Guarantee
Loan Set Asides
Microloan Programs

Insurance and Risk Management
Agricultural Management Assistance
Extension Risk Management Education Program
Non-Insured Crop Disaster Assistance Program
Organic Crop Insurance
Whole Farm Revenue Protection

Local Food Systems, Value-Added, and Marketing Innovations
Community Food Projects Competitive Grants Program
Farmers Market and Local Food Promotion Program
Federal-State Marketing Improvement Program
GAP and GHP Audit Verification Program
Healthy Food Financing Initiative
Organic Certification Cost Share Program
Regional Food System Partnerships Program
Specialty Crop Block Grants Program
Value-Added Producer Grants

Natural Resources Conservation and Management Agricultural Conservation Easement Program
Clean Water State Revolving Grant
Community Forest & Open Space Conservation Program
Community Wood Energy & Wood Innovation Grant Program
Conservation Innovation Grants
Conservation Reserve Program
CRP Transitions Incentives Program Conservation Stewardship Program Environmental Quality Incentives Program
Forest Legacy Program
Forest Stewardship Program
Healthy Forest Reserve Program
Landscape Scale Restoration
Regional Conservation Partnership Program (RCPP)
Section 319 Nonpoint Source Management Program
Urban and Community Forestry Program

Nutrition and Consumer Food Access

Farm to School Grant Program
Farmers' Market Nutrition Program
Senior Farmers' market Nutrition Program
The Gus Schumacher Nutrition Incentive Program

Renewable Energy and Energy Conservation

Advanced Biofuels Payment Program
Biomass Crop Assistance Program
Rural Energy for America Program

Research and Outreach

Agriculture and Food Research Initiative
Appropriate Technology Transfer for Rural Areas
Beginning Farmer and Rancher Development Program
Cooperative Extension System
Crop Protection and Pest Management Program
Food Safety Outreach Program
Forest Products Laboratory
Organic Agriculture Research and Extension Initiative
Organic Transitions Research. Education and Extension Program
Outreach & Assistance for Socially Disadvantaged & Veteran Farmers & Ranchers ("2501" Program)
Small Business Innovation Research Program
Specialty Crop Research Initiative
Sustainable Agriculture Research and Education Program
Sustainable Agriculture Systems Research Program

6.3 Green Lake County Comprehensive Plan Consistency

Green Lake County developed and adopted a county wide comprehensive plan under Stats 66.1001 in 2003. The Comprehensive Plan was updated in 2016 and will be updated after this farmland preservation planning effort to ensure future land use mapping is coordinated properly.

Identifying areas of agricultural use first allows the County to achieve consistency between both documents as the farmland preservation areas will be incorporated as a future land use as part of the comprehensive plan. Likewise areas identified as non-farm development areas will be assigned a more appropriate future land use.

As was done in 2016, the *Green Lake County Farmland Preservation Plan* will be incorporated as a component within the County Comprehensive Plan and adopted as such achieving consistency between the two planning documents.

6.4 County Actions & Strategies to Preserve Farmland and Promote Agri- cultural Development

Strategies and/or proposed actions are specific tasks that the county should be prepared to complete. The completion of strategies and proposed actions are consistent with the policies, and therefore will help fulfill the goals of the Farmland Preservation Plan.

1. Develop and adopt a Farmland Preservation Plan in accordance with state statutes in order to allow all interested towns to be eligible for farmland preservation pro- grams.
2. Develop Farmland Preservation Plan Maps for each town and encourage towns to provide input into the map development process.
3. Encourage towns, villages and cities to maintain consistency with the Farmland Preservation Plan when developing local comprehensive plans.
4. Share with towns, villages, cities, the general public, and other interested groups on the benefits of the *Green Lake County Farmland Preservation Plan*.
5. Update the Farmland Preservation Plan at least once every 10 years or sooner as the need for amendments occur.
6. Pursue the development of Agriculture Enterprise Areas where desired and consistent with the Farmland Preservation Plan to further support and market agricultural products and increase tax credits.
7. Utilize state and federal easement programs as recommended by the Green Lake County Land Conservation Department.

6.5 County Actions to Address Land Use Issues affecting Farmland Preservation and Agricultural Development

1. County Planning Staff should support and facilitate planning services to towns to update their comprehensive plans.
2. County Planning Staff shall also provide assistance to the four unzoned towns within their shoreland and floodplain zones. Should the four towns someday consider “general zoning”, county staff could assist with the establishment efforts.

3. In order to maintain or obtain eligibility for the Farmland Preservation Program, the County will need to amended and recertify their County zoning ordinance text and map consistent with Chapter 91 requirements. This action should ensure planning and zoning consistency with the Farmland Preservation Plan.
4. Continue to support the business marketing and recruitment efforts by the Green Lake County Economic Development Corporation and area Chambers of Commerce to promote a strong economic base for regional agriculture.
5. The County should deny any request for a major subdivision (5 or more lots) in areas designated as a Farmland Preservation Area unless an amendment to the local comprehensive plan identifying the change has occurred.
6. The County Highway Department should work cooperatively with local towns interested in the "Implements of Husbandry" permit program.
7. Implement the strategies and actions proposed in Section 6.2 of this Plan in order to increase housing density in the County.

Please note that many of the actions noted in Section 6.5 apply to Section 6.6 as well.

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APPENDIX A

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Table 100 Historical Population Change						
	Green Lake County	Fond du Lac County	Marquette County	Waushara County	Winnebago County	Wisconsin
1970	16,878	84,567	8,865	14,795	129,931	4,417,821
1980	18,370	88,964	11,672	18,526	131,772	4,705,642
1990	18,651	90,083	12,321	19,385	140,320	4,891,769
2000	19,105	97,296	15,832	23,154	156,763	5,363,675
2010	19,051	101,633	15,404	24,496	166,994	5,686,986
2020	19,018	104,154	15,592	24,520	171,730	5,893,718
2023 (est.)	18,990	103,498	15,548	24,445	172,369	5,951,400
% Change						
1970 to 1980	8.80%	5.20%	31.70%	25.20%	1.40%	6.50%
1980 to 1990	1.50%	1.30%	5.60%	4.60%	6.50%	4.00%
1990 to 2000	2.40%	8.00%	28.50%	19.40%	11.70%	9.60%
2000 to 2010	-0.30%	4.00%	-2.70%	5.80%	6.50%	6.00%
2010 to 2020	-0.20%	2.50%	1.20%	0.10%	2.90%	3.60%
2020 to 2023	-0.10%	-0.60%	-0.30%	-0.30%	0.40%	1.00%

Source: Wisconsin Department of Administration

Table 101 Population Race and Ethnicity						
	Green Lake County			Wisconsin		
	2010		2020	2010	2020	
	No.	%	No. %	No. %	No.	%
Total Persons	19,051		19,018	5,686,968	5,893,718	
White (not incl. Hispanic)	18,428	96.70%	17,255 90.7%	4,738,411 83.3%	4,634,018	78.60%
Hispanics of All Origin	743	3.90%	979 5.1%	336,056 5.9%	447,290	7.60%
Black or African American	88	0.50%	117 0.6%	350,898 6.2%	376,256	6.40%
American Indian & Alaska Native	52	0.30%	68 0.4%	48,511 0.9%	60,428	1.00%
Asian and Pacific Islander	91	0.50%	115 0.6%	129,617 2.3%	177,901	3.00%
Some Other Race	268	1.40%	407 2.1%	4,095 0.1%	182,054	3.10%
Two or More Races	124	0.70%	806 4.2%	79,398 1.4%	359,534	6.10%

Source: US Census Bureau, American FactFinder

Table 102 Population Age and Median Age						
	Green Lake County			Wisconsin		
	2010		2020	2010	2020	
	No.	%	No. %	No. %	No.	%
< 10 years old	2,375	12.50%	2,115 11.1%	727,060 12.8%	667,363	11.30%
10 - 19	2,407	12.60%	2,466 13.0%	775,136 13.6%	762,645	12.90%
20 - 29	1,747	9.20%	1,883 9.9%	758,899 13.3%	774,462	13.20%
30 - 39	1,991	10.50%	2,027 10.7%	694,675 12.2%	745,409	12.60%
40 - 49	2,589	13.60%	2,036 10.7%	817,965 14.4%	690,582	11.70%
50 - 59	2,988	15.70%	2,455 12.9%	822,112 14.5%	791,881	13.40%
60 - 69	2,330	12.20%	3,093 16.3%	540,854 9.5%	756,118	12.80%
70 - 79	1,483	7.80%	1,961 10.3%	314,719 5.5%	446,795	7.60%
80 - 84	577	3.00%	514 2.7%	117,061 2.1%	118,954	2.00%
> 85 years old	564	3.00%	543 2.9%	118,505 2.1%	127,919	2.20%
Total Population	19,051		19,018	5,686,986	5,893,718	
Median Age	46		45	39	40	

Source: US Census Bureau, GetFacts, The Applied Population Laboratory, University of Wisconsin - Madison, University of Wisconsin - Extension

Table 103 Population Projections					
	Green Lake County	**Fond du Lac County**	**Marquette County**	**Waushara County**	**Wisconsin**
2010 Actual	19,051	101,633	15,404	24,496	5,686,986
2015	19,190	102,885	16,000	24,705	5,783,015
2020 Actual	19,018	104,154	15,592	24,520	5,893,718
2025	19,400	108,485	16,970	27,180	6,203,850
2030	19,445	110,590	17,325	28,230	6,375,910
2035	19,225	111,040	17,305	28,385	6,476,270
2040	18,885	110,250	17,015	27,990	6,491,635
% Change					
2010 to 2015	0.70%	1.20%	3.90%	0.90%	1.70%
2015 to 2020	-0.80%	1.20%	-2.60%	-0.70%	1.90%
2020 to 2025	2.00%	4.20%	8.80%	10.80%	5.30%
2025 to 2030	0.20%	1.90%	2.10%	3.90%	2.80%
2030 to 2035	-1.10%	0.40%	-0.10%	0.50%	1.60%
2035 to 2040	-1.80%	-0.70%	-1.70%	-1.40%	0.20%

Source: Wisconsin Department of Administration Demographic Services Center Data

Table 104 Household Projections					
	Green Lake County	Fond du Lac County	Marquette County	Waushara County	Wisconsin
No. of Households					
2010 Actual	7,919	40,697	6,571	9,949	2,279,768
2015	8,106	42,423	7,073	10,315	2,371,815
2020 Actual	8,099	42,824	6,769	10,173	2,428,361
2025	8,360	46,020	7,770	11,550	2,600,538
2030	8,483	47,419	8,058	12,095	2,697,884
2035	8,474	48,079	8,201	12,263	2,764,498
2040	8,408	48,076	8,219	12,240	2,790,322
Persons per Household					
2010 Actual	2.38	2.41	2.32	2.34	2.43
2015	2.34	2.34	2.24	2.28	2.38
2020 Actual	2.34	2.43	2.3	2.41	2.43
2025	2.29	2.28	2.16	2.24	2.32
2030	2.26	2.25	2.13	2.22	2.3
2035	2.23	2.22	2.08	2.2	2.28
2040	2.2	2.2	2.04	2.17	2.26

Source: Wisconsin Department of Administration Demographic Services Center Data

Table 105 Municipal Population Projections #1						
	City of Berlin	City of Green Lake	City of Markesan	City of Princeton	Village of Kingston	Village of Marquette
1990	5,304	1,064	1,496	1,458	346	182
2000	5,222	1,100	1,396	1,504	288	169
2010	5,524	960	1,476	1,214	326	150
2015	5,600	980	1,455	1,170	330	150
2020	5,655	970	1,450	1,120	330	145
2025	5,755	965	1,450	1,075	335	140
2030	5,800	955	1,440	1,025	340	135
2035	5780	930	1410	960	340	130
2040	5,720	900	1,370	895	335	125
% Change						
1990 to 2000	-1.50%	3.40%	-6.70%	3.20%	-16.80%	-7.10%
2000 to 2010	5.80%	-12.70%	5.70%	-19.30%	13.20%	-11.20%
2010 to 2015	1.40%	2.10%	-1.40%	-3.60%	1.20%	0.00%
2015 to 2020	1.00%	-1.00%	-0.30%	-4.30%	0.00%	-3.30%
2020 to 2025	1.80%	-0.50%	0.00%	-4.00%	1.50%	-3.40%
2025 to 2030	0.80%	-1.00%	-0.70%	-4.70%	1.50%	-3.60%
2030 to 2035	-0.30%	-2.60%	-2.10%	-6.30%	0.00%	-3.70%
2035 to 2040	-1.00%	-3.20%	-2.80%	-6.80%	-1.50%	-3.80%

Source: Wisconsin Department of Administration Demographic Services Center Data

Table 105 Municipal Population Projections #2										
	Town of Berlin	Town of Brooklyn	Town of Green Lake	Town of Kingston	Town of Mackford	Town of Manchester	Town of Marquette	Town of Princeton	Town of Saint Marie	Town of Seneca
1990	996	1,798	1,335	776	616	774	400	1,363	348	395
2000	1,145	1,904	1,258	900	585	848	481	1,540	341	424
2010	1,140	1,826	1,154	1,064	560	1,022	531	1,434	351	408
2015	1,145	1,840	1,135	1,100	555	1,065	555	1,440	355	405
2020	1,150	1,840	1,105	1,145	550	1,110	580	1,430	355	400
2025	1,160	1,855	1,075	1,200	540	1,160	605	1,430	360	400
2030	1,170	1,850	1,045	1,245	535	1,205	630	1,425	360	395
2035	1,160	1,825	995	1,275	515	1,235	645	1,395	360	385
2040	1,140	1,785	945	1,295	500	1,250	650	1,360	355	375
% Change										
1990 to 2000	15.00%	5.90%	-5.80%	16.00%	-5.00%	9.60%	20.30%	13.00%	-2.00%	7.30%
2000 to 2010	-0.40%	-4.10%	-8.30%	18.20%	-4.30%	20.50%	10.40%	-6.90%	2.90%	-3.80%
2010 to 2015	0.40%	0.80%	-1.60%	3.40%	-0.90%	4.20%	4.50%	0.40%	1.10%	-0.70%
2015 to 2020	0.40%	0.00%	-2.60%	4.10%	-0.90%	4.20%	4.50%	-0.70%	0.00%	-1.20%
2020 to 2025	0.90%	0.80%	-2.70%	4.80%	-1.80%	4.50%	4.30%	0.00%	1.40%	0.00%
2025 to 2030	0.90%	-0.30%	-2.80%	3.80%	-0.90%	3.90%	4.10%	-0.30%	0.00%	-1.30%
2030 to 2035	-0.90%	-1.40%	-4.80%	2.40%	-3.70%	2.50%	2.40%	-2.10%	0.00%	-2.50%
2035 to 2040	-1.70%	-2.20%	-5.00%	1.60%	-2.90%	1.20%	0.80%	-2.50%	-1.40%	-2.60%

Source: Wisconsin Department of Administration Demographic Services Center Data

Table 106 Median Income				
	Green Lake County		Wisconsin	
	2009	2022	2009	**2022**
Median Household Income	$47,624	$66,395	$49,001	$70,996
% Change		39.41%		44.88%
Median Family Income	$61,232	$81,534	$62,088	$91,700
% Change		33.15%		47.69%

Source: US Census Bureau, 2022 American Community Survey

Table 107 Household Income								
	Green Lake County				Wisconsin			
	2009		2022		2009		2022	
	No.	%	No.	%	No.	%	No.	%
< $10,000	283	3.60%	281	3.50%	143,642	6.30%	114,591	4.60%
$10,000 to $14,999	567	7.10%	257	3.20%	131,222	5.80%	87,189	3.50%
$15,000 to $24,999	1,077	13.60%	626	7.80%	275,041	12.10%	174,378	7.00%
$25,000 to $34999	992	12.50%	771	9.60%	261,412	11.50%	184,343	7.40%
$35,000 to $49,999	1,243	15.70%	907	11.30%	347,038	15.20%	298,934	12.00%
$50,000 to $74,999	1726	21.70%	1654	20.60%	456,952	20.00%	450,893	18.10%
$75,000 to $99,999	1,029	13.00%	1148	14.30%	292,914	12.80%	341,284	13.70%
$100,000 to $149,999	690	8.70%	1517	18.90%	251,263	11.00%	450,893	18.10%
$150,000 or more	333	4.20%	859	10.70%	120,048	5.30%	388,615	15.60%
Source: US Census Bureau, 2022 American Community Survey								

Table 108 Per Capita Income			
	Per Capita Income		
	2010	2022	% Change
Green Lake County	$24,973	$35,222	41%
State of Wisconsin	$25,458	$40,188	57%
Source: US Census Bureau, 2022 American Community Survey			

Table 109 Poverty Status				
	Green Lake County		Wisconsin	
	2009	2022	2009	**2022**
Total Persons	19,051	18,726	5,495,845	5,763,986
Total Persons Below Poverty	1,962	2,393	683,408	617,037
% Below Poverty	10.30%	12.80%	12.40%	10.70%
Total Families	5,311	5,269	1,476,615	1,511,105
Total Families Below Poverty	351	427	121,082	102,755
% Below Poverty	6.60%	8.10%	8.20%	6.80%
Source: US Census Bureau, 2022 American Community Survey				

Table 110 Labor Force					
	2000	2010	2022	% Change 2000 to 2010	% Change 2010 to 2022
Green Lake County					
Labor Force	10,775	10,008	9,295	-7.10%	-7.10%
Employed	10,354	9,071	8,987	-12.40%	-0.93%
Unemployed	421	937	308	122.60%	-67.10%
Unemployment Rate	3.90%	9.40%	2.00%		
State of Wisconsin					
Labor Force	2,996,091	3,062,636	3,127,697	2.20%	2.10%
Employed	2,894,884	2,807,301	3,036,963	-3.00%	8.18%
Unemployed	101,207	255,335	86,461	152.30%	-66.10%
Unemployment Rate	3.40%	8.30%	1.80%		

Source: US Census Bureau, 2022 American Community Survey

Table 111 Employment of Residents by Type of Industry						
	2010		2022		Change 2010-2022	
	No.	%	No.	%	No.	%
Green Lake County						
Agriculture, Forestry, Fishing, and Mining	618	6.30%	474	5.30%	-144	-23.30%
Construction	791	8.10%	810	9.00%	19	2.40%
Manufacturing	2,320	23.70%	2,179	24.20%	-141	-6.10%
Transportation and Utilities	431	4.40%	366	4.10%	-65	-15%
Wholesale Trade	167	1.70%	208	2.30%	41	24.50%
Retail Trade	1,010	10.30%	1,100	12.20%	90	8.90%
Finance, Insurance, and Real Estate	518	5.30%	330	3.70%	-188	-36.30%
Services	3,569	36.50%	3,026	33.70%	-543	-15.20%
Public Administration	356	3.60%	494	5.50%	138	38.70%
All Industries	9,780		8,987		-793	-8.1%
Wisconsin						
Agriculture, Forestry, Fishing, and Mining	70,599	2.50%	66,238	2.20%	-4,361	-6.20%
Construction	150,622	5.40%	187,841	6.20%	37,219	24.70%
Manufacturing	501,176	17.90%	558,063	18.40%	56,887	11.40%
Transportation and Utilities	124,762	4.40%	149,708	4.90%	24,946	19.90%
Wholesale Trade	80,592	2.90%	73,768	2.40%	-6,824	-8.50%
Retail Trade	324,308	11.60%	331,505	10.90%	7,197	2.20%
Finance, Insurance, and Real Estate	169,750	6.10%	184,373	6.10%	14,623	8.60%
Services	1,281,441	45.70%	1,376,311	45.30%	94,870	7.40%
Public Administration	101,852	3.60%	109,156	3.60%	7304	7.20%
All Industries	2,805,102		3,036,963		231,861	8.30%

Source: US Census Bureau, 2022 American Community Survey

Table 112 Employment of Residents by Type of Occupation				
	Green Lake County		Wisconsin	
	No.	%	No.	%
2022				
Management, professional, and related	2,669	29.70%	1,213,187	39.90%
Service	1,301	14.40%	452,131	14.80%
Sales and office	1,670	18.60%	574,792	18.90%
Farming, fishing, and forestry	178	1.90%	26,561	0.80%
Construction, extraction, and maintenance	1,080	12%	235,016	7.70%
Production, transportation, and material moving	2,089	23.20%	535,276	17.60%
2010				
Management, professional, and related	2,452	25.10%	943,330	33.60%
Service	1,597	16.30%	479,222	17.10%
Sales and office	2,212	22.60%	681,229	24.30%
Natural resources, construction, and maintenance	1,315	13.40%	236,713	8.40%
Production, transportation, and material moving	2,204	22.50%	464,608	16.60%
Source: US Census Bureau, 2022 American Community Survey				

Table 113 Industry of Employed Persons						
	2010		2022		Change 2010-2022	
	No.	%	No.	%	No.	%
Green Lake County						
Natural Resources & Mining	123	1.90%	186	3.30%	63	51.20%
Construction	280	4.40%	247	4.30%	-33	-11.70%
Manufacturing	1,202	19.00%	1,007	17.90%	-195	-16.20%
Trade, Transportation, Utilities	1,226	19.30%	1,204	21.40%	-22	-1.70%
Information	Suppressed	N/A	48	0.80%	N/A	N/A
Financial Activities	288	4.50%	243	4.30%	-45	-15.60%
Professional & Business Services	218	3.40%	217	3.80%	-1	-0.10%
Education & Health Services	1,621	25.60%	1,258	22.30%	-363	-22.40%
Leisure & Hospitality	691	10.90%	546	9.70%	-145	-20.10%
Other Services	158	2.50%	186	3.30%	28	17.70%
Public Administration	530	8.40%	477	8.50%	-53	10%
Unclassified	Suppressed	N/A	Suppressed	N/A	N/A	N/A
All Industries	6,337	100.00%	5,619	100.00%	-766	-12.10%
Wisconsin						
Natural Resources & Mining	24,450	0.90%	31,246	1.00%	6,796	27.80%
Construction	96,649	3.70%	133,116	4.60%	36,467	37.70%
Manufacturing	429,454	16.30%	477,029	16.50%	47,575	11.10%
Trade, Transportation, Utilities	517,412	19.70%	557,752	19.40%	40,340	7.80%
Information	48,229	1.80%	47,827	1.60%	-402	-0.80%
Financial Activities	151,290	5.80%	154,243	5.30%	2,953	1.90%
Professional & Business Services	271,014	10.30%	327,702	11.30%	56,688	20.10%
Education & Health Services	595,546	22.60%	637,510	22.10%	41,964	7.00%
Leisure & Hospitality	261,057	9.90%	277,425	9.60%	16,368	6.20%
Other Services	86,359	3.30%	77,692	2.70%	-8,667	-10.00%
Public Administration	142,534	5.40%	131,673	4.50%	-10,861	-7.60%
Unclassified	6,250	0.20%	23,936	0.80%	17,686	282.90%
All Industries	2,630,244	100.00%	2,877,151	100.00%	246,907	9.40%

Source: Wisconsin Department of Workforce Development Wisconomy Wisconsin LMI DATA access tool

Table 114 Fox Valley Wisconsin Workforce Development Area Industry Employment Projections, 2020-2030

WDA4: (Calumet, Fond du Lac, Green Lake, Outagamie, Waupaca, Waushara, and Winnebago Counties)

Industry	2020 Employment (1)	2030 Projected Employment	Employment Change (2020-2030)	Percent Change (2020-2030)
Total All Industries	203474	214775	11301	5.55
Goods Producing	60376	62950	2574	4.26
Natural Resources and Mining	6443	5957	-486	-7.54
Construction	10104	11234	1130	11.18
Manufacturing	43829	45759	1930	4.40
Services Providing	131278	141086	9808	7.47
Trade, Transportation, and Utilities	32032	33969	1937	6.05
Information	3036	2865	-171	-5.63
Financial Activities	7830	7894	64	0.82
Professional and Business Services	15633	16716	1083	6.93
Educaton and Health Services	37901	41191	3290	8.68
Leisure and Hospitality	13902	16185	2283	16.42
Other Services (except Government)	10323	11238	915	8.86
Government	10621	11028	407	3.83
Self Employed	11820	10739	-1081	-9.15

(1) Employment is a count of jobs rather than people, and includes all part- and full time nonfarm jobs. Emplyment also includes jobs among self-employed.

Source: Office of Economic Advisors, Wisconsin Department of Workforce Development, December 2022

Table 115 Average Weekly Wages				
	2010	2022	Difference	% Change 2010-2022
Green Lake County				
Natural Resources & Mining	$769	$1,018	$249	32.40%
Construction	$1,007	$1,367	$360	35.70%
Manufacturing	$694	$944	$250	36.00%
Trade, Transportation, Utilities	$543	$793	$250	46.00%
Information	Suppressed	$1,066	N/A	N/A
Financial Activities	$779	$1,200	$421	54%
Professional & Business Services	$990	$1,578	$588	59.40%
Education & Health Services	$680	$936	$256	37.60%
Leisure & Hospitality	$223	$329	$106	47.50%
Other Services	$417	$832	$415	99.50%
Public Administration	$492	$750	$258	52.40%
Unclassified	Suppressed	Suppressed	N/A	N/A
Wisconsin				
Natural Resources & Mining	$589	$890	$301	51.10%
Construction	$945	$1,394	$449	47.51%
Manufacturing	$965	$1,278	$313	32.40%
Trade, Transportation, Utilities	$656	$983	$327	49.84%
Information	$995	$1,993	$998	103.00%
Financial Activities	$1,026	$1,695	$669	65.20%
Professional & Business Services	$895	$1,446	$551	61.50%
Education & Health Services	$817	$1,125	$308	37.70%
Leisure & Hospitality	$281	$460	$179	63.70%
Other Services	$436	$776	$340	77.90%
Public Administration	$801	$1,074	$273	34.10%
Unclassified	$901	$1,148	$247	27.40%

Source: Wisconsin Department of Workforce Development Wisconomy Wisconsin LMI DATA access tool

Table 116 Travel Time to Work								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
Minutes	No.	%	No.	%	No.	%	No.	%
Less than 10	2,163	22.70%	1,946	22.00%	494,170	18.70%	538,339	18.10%
10 to 14	1,328	21.30%	1,114	12.60%	457,174	17.30%	484,802	16.30%
15 to 19	1,328	15.00%	760	8.60%	443,961	16.80%	496,699	16.70%
20 to 29	1,570	16.90%	1273	14.40%	562,879	21.30%	431,266	14.50%
30 to 34	835	9.40%	734	8.30%	277,475	10.50%	324,193	10.90%
35 to 44	494	5.10%	1,016	11.50%	142,702	5.40%	187,377	6.30%
45 to 59	628	4.70%	750	8.50%	142,702	5.40%	160,609	5.40%
60 or more	637	4.80%	565	6.40%	121,560	4.60%	142,763	4.80%
Worked at home:	613	4.60%	689	7.80%	115,539	4.20%	300,409	10.10%
Total:	9,596		8,845		2,757,982		2,974,249	
Did not work at home:	8,983	95.40%	7,963	90.00%	2,642,623	95.80%	2,673,840	89.90%
Source: US Census Bureau, 2022 American Community Survey								

Table 117 Educational Attainment Age 25 Or Older								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
	No.	%	No.	%	No.	%	No.	%
Less than 9th Grade	616	4.60%	397	2.90%	133,010	3.50%	97,775	2.40%
9th - 12th Grade	1,136	8.40%	809	6.00%	243,219	6.40%	181,630	4.50%
High School Graduate	5,672	42.20%	5,079	37.60%	1,265,498	33.30%	1,211,254	29.90%
1 - 3 Years of College	3,799	28.30%	4,189	31.10%	1,155,291	30.40%	1,260,899	31.20%
4 Years or More	2,222	16.50%	3,028	22.40%	1,003,278	26.40%	1,296,273	32.00%
Total Age 25 or Older	13,445		13,502		3,800,295		4,047,831	
Source:US Census Bureau, 2022 American Community Survey								

Table 118 Age of Housing				
Year Structure Built	Green Lake County		Wisconsin	
	No.	%	No.	%
2020 or later	11	0.10%	9,984	0.40%
2010 to 2019	340	3.20%	165,816	6.10%
2000 to 2009	1,021	9.50%	333,032	12.20%
1990 to 1999	1,381	12.90%	365,107	13.40%
1980 to 1989	1,089	10.20%	263,915	9.70%
1970 to 1979	1,543	14.40%	394,115	14.40%
1960 to 1969	1,009	9.40%	262,836	9.60%
1950 to 1959	885	8.30%	287,354	10.50%
1940 to 1949	625	5.90%	147,777	5.40%
1939 or earlier	2,797	26.10%	504,575	18.50%
Total	10,703		2,734,511	

Source: US Census Bureau, American Community Survey

Table 119 Median Housing Values		
	Green Lake County	Wisconsin
2010 Actual	$137,500	$169,400
2022 Actual	$186,100	$231,400
Percent Change		
2010-2022 Actual	35.30%	36.60%

Source: US Census Bureau, 2022 American Community Survey

Table 120 Housing Values								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
	No.	%	No.	%	No.	%	No.	%
Less than $50,000	280	4.60%	219	3.60%	79,716	5.10%	66,191	4.00%
$50,000 to $99,999	1,629	26.90%	788	12.80%	213,097	13.60%	117,725	7.20%
$100,000 to $149,999	1,465	24.20%	1,308	21.20%	336,426	21.50%	211,786	12.90%
$150,000 to $199,999	968	16.00%	1,035	16.80%	337,190	21.50%	274,669	16.70%
$200,000 to $299,999	904	14.90%	1,333	21.60%	363,355	23.20%	439,017	26.70%
$300,000 or More	811	13.40%	1,475	24.00%	236,255	15.10%	532,202	32.40%
Total Units	6,057		6,158		1,566,039		1,641,590	

Source: US Census Bureau, American Community Survey

Table 121 Types of Housing Units								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
	No.	%	No.	%	No.	%	No.	%
Single Family	8,688	82.60%	8,915	83.30%	1,854,787	70.70%	1,934,556	70.70%
2 to 4 Units	590	5.60%	446	4.20%	278,935	10.60%	265,000	9.70%
5 or more Units	712	6.80%	819	7.70%	393,405	15.00%	448,394	16.40%
Mobile Home or Other	522	5.00%	523	4.90%	97,906	3.70%	86,561	3.20%
Total Units	10,512		10,703		2,625,033		2,734,511	
Source: US Census Bureau, American Community Survey 2022								

Table 122 Housing Occupancy and Tenure								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
	No.	%	No.	%	No.	%	No.	%
Owner Occupied	6,019	76%	6,158	77%	1,566,039	68%	1,641,590	68%
Renter Occupied	1,900	24%	1,867	23%	713,93	32%	783,898	32%
Total Occupied Units	7,919		8,025		2,279,532		2,425,488	
Vacant Units	796		797		345,945		130,312	
Seasonal Units	1,901		1,881		193,046		193,046	
Total Units	10,616		10,703		2,818,523		2,734,511	
Source: US Census Bureau, American Community Survey								

Table 123 Vacancy Status								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
	No.	%	No.	%	No.	%	No.	%
For Sale	212	7.90%	173	7.90%	34,219	9.90%	16,618	5.40%
For Rent	254	9.40%	166	9.40%	63,268	18.40%	46,493	15.00%
Seasonal Units	1,901	70.50%	1,881	70.50%	193,046	56.00%	178,711	57.80%
Other Units	330	12.20%	458	12.20%	54,057	15.70%	67,201	21.70%
Total Vacant Units	2,697		2,678		344,590		309,023	
Owner Vacancy Rate	3.40%		2.00%		2.20%		1.70%	
Renter Vacancy Rate	11.70%		1.10%		8.00%		2.30%	
Source: US Census Bureau, American Community Survey								

Table 124 Household Types								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
	No.	%	No.	%	No.	%	No.	%
Total Households	7,919		8,025		2,279,768		2,425,488	
Total Family	5,257	66.40%	5,269	65.70%	1,468,917	64.40%	1,488,300	61.40%
Total Nonfamily	2,662	33.60%	2,756	34.30%	810,851	35.60%	937,188	38.60%
With Children	2,127	26.90%	1,978	24.60%	647,472	28.40%	643,844	26.50%
Without Children	5,792	73.10%	6,047	75.40%	1,632,296	71.60%	1,781,644	73.50%
With Married Couple	4,290	54.20%	4,128	51.40%	1,131,344	49.60%	1,152,787	47.50%
Living Alone	2,294	29.00%	2,277	28.40%	642,507	28.20%	745,807	30.70%
Female Headed	623	7.90%	726	9.00%	583,376	25.60%	225,419	9.30%
With Occupant(s) 65+	2,546	32.20%	2,728	33.90%	547,650	24.00%	667,538	27.50%
Source: US Census Bureau, American Community Survey								

Table 125 Persons Per Household				
	Green Lake County		Wisconsin	
	Persons	No. per HH	Persons	No. per HH
1990	18,651	2.59	4,891,769	2.68
2000	19,105	2.48	5,363,675	2.57
2010	19,051	2.41	5,686,986	2.49
2022	19,018	2.37	5,893,986	2.43
Source: Wisconsin Department of Administration and US Census Bureau, American Community Survey				

Table 126 Household Size								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
	No.	%	No.	%	No.	%	No.	%
1 Person	2,294	29.00%	2,277	28.40%	642,507	28.20%	745,807	30.70%
2 Person	3,082	38.90%	3,291	41.00%	817,250	35.80%	900,733	37.10%
3 Person	1,054	13.30%	1,064	13.30%	339,536	14.90%	324,114	13.40%
4 or More Person	1,489	18.80%	1,393	17.40%	480,475	21.10%	454,834	18.80%
Total Households	7,919		8,025		2,279,768		2,425,488	
Source: US Census Bureau, American Community Survey								

Table 127 Owner Affordability								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
% of Income	No.	%	No.	%	No.	%	No.	%
< 20%	2,975	49.10%	3,908	49.10%	696,379	44.50%	999,405	61.30%
20% to 24%	818	13.50%	623	13.50%	244,266	15.60%	204,687	12.50%
25% to 29%	700	11.60%	388	11.60%	175,319	11.20%	128,942	7.90%
30% to 34%	319	5.30%	245	5.30%	111,459	7.10%	76,224	4.60%
> 34%	1,223	20.20%	926	20.20%	331,754	21.20%	222,195	13.60%
Not Computed	22	0.40%	68	0.40%	6,862	0.40%	10,137	0.60%
Total Households	6,057		6,090		1,566,039		1,631,453	
% Not Affordable	25.50%		19.20%		28.30%		18.30%	
Source: US Census Bureau, American Community Survey								

Table 128 Renter Affordability								
	Green Lake County				Wisconsin			
	2010		2022		2010		2022	
% of Income	No.	%	No.	%	No.	%	No.	%
< 20%	548	29.10%	615	29.10%	170,604	37.80%	236,712	32.10%
20% to 24%	320	17.00%	223	17.00%	89,920	14.20%	99,206	13.40%
25% to 29%	189	10.00%	139	10.00%	79,133	10.60%	83,777	11.40%
30% to 34%	191	10.10%	138	10.10%	61,319	6.90%	61,749	8.40%
> 34%	431	22.90%	470	22.90%	270,591	25.40%	256,234	34.70%
Not Computed	204	10.80%	282	10.80%	41,926	5.20%	46,220	6.20%
Total Households	1,883		1,585		713,493		737,678	
% Not Affordable	33.00%		38.40%		46.50%		43.10%	
Source: US Census Bureau, American Community Survey								

APPENDIX B

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AGRICULTURE WORKS HARD FOR
▶ GREEN LAKE COUNTY

Family-owned farms, food processors and agriculture-related businesses generate thousands of jobs and millions of dollars of economic activity for Green Lake County, while contributing to local income and tax revenues.

Agriculture's annual impact:

WHAT DO OUR FARMS PRODUCE?

1. Milk — $33.6 million
2. Grain — $33.5 million
3. Cattle & Calves — $10.5 million
4. Vegetables — $10.4 million
5. Poultry & Eggs — $565 thousand

HOW MANY PEOPLE DOES AGRICULTURE EMPLOY?

1,864 **jobs** in the county

WHAT IS THE ECONOMIC IMPACT?

$553 million in economic activity

HOW MUCH TAX DOES AGRICULTURE CONTRIBUTE?

Farms pay $9.9 million in sales tax, property tax & income tax

WHO OWNS THE FARMS?

96% (482) are **family farms**

HOW MUCH IS SOLD LOCALLY?

$290 thousand sold directly to consumers

WHO TAKES CARE OF THE LAND?

502 farms manage **126,751 acres** (57% of county total)

THE AGRICULTURE SECTOR BENEFITS THE ENTIRE COUNTY

Green Lake County is a county of farming diversity; there is every type of operation from small niche market farms to mega grain and dairy. What really makes the county's farmers unique is the attention they give to soil and water quality. Year after year the number of acres planted into cover crops grows as does the number of farmers adapting the practice of no-till. The topography of the county lends itself to fruit production and the loamy soils to a variety of field crops, including vegetables. The picturesque landscape attracts agri-tourists who come to experience a different kind of life on the various destination farms dotting the gently rolling hills of the county.

Did you know?

GREEN LAKE COUNTY IS

No. 9 in Wisconsin's vegetables industry

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The University of Wisconsin–Madison Division of Extension is part of the local and statewide network of organizations and agencies that support Wisconsin's $104.8 billion agriculture industry. Extension helps enhance the economic impact of agriculture by providing research-based information that increases farm profitability, improves food safety, reduces environmental impacts and expands agribusiness networks.

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Produced in cooperation with Dairy Farmers of Wisconsin, Wisconsin Department of Agriculture, Trade and Consumer Protection and Wisconsin Farm Bureau.

APPENDIX C

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Appendix C
Prime Agricultural Soils
Green Lake County, Wisconsin

Bb	Barry loam
BpB	Boyer loamy fine sand
BpC2	Boyer loamy fine sand
BsA	Briggsville silt loam
BsB	Briggsville silt loam
Co	Colwood silt loam
DdB	Dodge silt loam
DdC2	Dodge silt loam
FoA	Friesland loam
FoB	Friesland loam
GnA	Grellton fine sandy loam
GnB	Grellton fine sandy loam
GnC2	Grellton fine sandy loam
GrA	Griswold silt loam
GrB	Griswold silt loam
GrC2	Griswold silt loam
Ho	Houghton muck
JoA	Joy silt loam
KbA	Kibbie loam
KdA	Kidder fine sandy loam
KdB	Kidder fine sandy loam
KdC2	Kidder fine sandy loam
KeA	Kidder loam
KeB	Kidder loam
KeC2	Kidder loam
KwA	Knowles silt loam
KwB	Knowles silt loam
KwC2	Knowles silt loam
LaB	Lapeer loamy fine sand
LaC2	Lapeer loamy fine sand
Lb	Lapeer fine sandy loam
LrC2	LeRoy silt loam
LvB	Lomira silt loam
LvC2	Lomira silt loam
MaA	Manawa silt loam
McA	Marcellon loam
MdB2	Markesan silt loam
MdC2	Markesan silt loam
Mh	Marshan silt loam
MnB	Mecan loamy fine sand
MnC2	Mecan loamy fine sand
MsA	Mendota silt loam
MsB	Mendota silt loam
MsC2	Mendota silt loam
OkB	Okee loamy fine sand
OkC	Okee loamy fine sand

OmB	Oshtemo loamy fine sand
OmC2	Oshtemo loamy fine sand
Os	Ossian silt loam
Pa	Palms muck
PnA	Plano silt loam, till substratum
PnB	Plano silt loam, till substratum
Pr	Poy silty clay loam
Py	Poygan silty clay loam
RaB	Richford loamy sand
RaC	Richford loamy sand
ReB	Ripon silt loam
RhB2	Ritchey silt loam
RtB2	Rotamer sandy loam
RtC2	Rotamer sandy loam
ScA	St. Charles silt loam
ScB	St. Charles silt loam
ScC2	St. Charles silt loam
SnB	Sisson loam
SnC2	Sisson loam
TuB	Tustin loamy fine sand
UrB	Urne loamy fine sand
UrC2	Urne loamy fine sand
We	Willette muck
ZtA	Zittau silty clay loam

APPENDIX D

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The Contribution of Agriculture to the Wisconsin Economy

AN UPDATE FOR 2022

STEVEN DELLER

JEFFREY HADACHEK

Department of Agricultural and Applied Economics
Economic Development Administration, University Center
Division of Extension University of Wisconsin-Madison

Support for this work was provided by the Dairy Farmers of Wisconsin, Wisconsin State Cranberry Growers Association, the Economic Development Administration, University Center within the Community Economic Development Program Area within the UW-Madison, Division of Extension, and the State of Wisconsin Department of Agriculture, Trade and Consumer Protection. The authors acknowledge Jeremy Beach, Doug Reinemann and Leonard Polzin for helpful comments. All errors are the responsibility of the authors.

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Community Economic Development
UNIVERSITY OF WISCONSIN-MADISON

Executive Summary

This study provides an update on the Contribution of Agriculture to the Wisconsin Economy undertaken by Deller (2019) using data for 2022, the most current available. Despite the declining number of farms between 2017 and 2022 (from 64,793 in 2017 to 58,521 in 2022, see Hadachek and Deller 2024) there was an increase in the number of food processors (including beverage manufacturers) over the same period (1,160 in 2017 to 1,245 in 2021 (most current year available). Together, the Wisconsin agricultural production and food processing sectors contributed a combined $116.3 billion in industrial revenues in 2022 (14.3% of the state total), an increase of 10.9% from 2017. The contribution to employment, however, declined from 437,700 jobs in 2017 to 353,900 jobs in 2022, a decline of 19.1%. Labor income (wages, salaries, and proprietor income) decreased by 5.5% going from $22.5 billion in 2017 to $21.2 billion in 2022. There was a modest increase in total income (labor income plus all other sources of income), going from $37.6 billion in 2017 to $37.78 billion in 2022.

- "All agriculture", combined on-farm and food processing, contributes $116.3 billion (14.3% of the state total) to industrial sales or revenues, 353,900 jobs (9.5% of the state total), $21.2 billion to labor income (8.7%), and $37.8 billion (9.4%) to total income.
- On-farm activity contributes $30.5 billion to industrial revenue (3.7% of the state total), 143,690 jobs (3.9%), $6.4 billion to labor income (2.6%), and $13.7 billion to total income (3.4%).
- Food processing, including beverages, contributes $107 billion to industrial revenues (13.1% of state total), 298,400 jobs (8.1%), $18.7 billion to labor income (7.7%), and $32.4 billion to total income (8.1%).
- Dairy, both on-farm and processing (which is dominated by cheese production), contributes $52.8 billion to total industrial revenues or sales (6.5% of state total), 120,700 jobs (3.3%), $7.9 billion in labor income (3.2%) and $13.7 billion in total income (3.4%). It is important to note that dairy processing accounts for much of the contribution of dairy.
- "All agriculture" in Wisconsin contributes 17 million metric tons of CO2 equivalent (MMTCO2eq) in greenhouse gas emissions or 14% of statewide emissions. Approximately 7 MMTCO2eq are associated with dairy production in the state.

Table of Contents

Introduction

Agriculture is an integral part of Wisconsin's culture, where the agricultural heritage is celebrated and cherished by residents, contributing to a strong sense of pride in Wisconsin's rural roots and agrarian traditions. The Green Bay Packers are named after their initial sponsor the Indian Packing Company, a meat packing company who provided funding for team equipment and uniforms and provided the facilities for practice and games. The Milwaukee Brewers selected the name to reflect the city's strong association with brewing and beer production, including famous breweries such as Pabst, Schlitz, and Miller. Whether it is the "Sausage Race" at Brewer's games or the pride of wearing cheesehead hats, agriculture is engrained in Wisconsin. Agriculture has also been documented as a fundamental part of the Wisconsin economy (i.e., Deller 2004; Deller and Williams 2009; Deller 2014, 2019). The current study is intended to build off the recently released 2022 Census of Agriculture and update the contribution of agriculture to the Wisconsin economy.

To be consistent with prior studies, we define agriculture as composed of two parts: (1) on-farm production or "inside the farm gate" and (2) food processing or "beyond the farm gate". For Wisconsin, these two parts of agriculture are integral to each other and could be considered two halves of the same whole. Wisconsin, for example, proudly refers to itself as "America's Dairyland", where dairy farms and cheese processors are intertwined. Indeed, nearly 90 percent of milk production in Wisconsin goes to the production of cheese. Further, both the Packers and Brewers are named after food processing where significant value is added to raw farm products. For this study, we explore both on-farm production and food processing independently and aggregated together. We also explore the dairy industry separately and as part of the broader Wisconsin agricultural economy. Finally, we also explore the contribution of forestry-related activities (including the more modest hunting, trapping, and seafood sectors) as a unique part of the Wisconsin economy.

The report is composed of several sections including historical trend analysis, economic cluster analysis, and the contribution to the Wisconsin economy analysis. As in prior studies in this line of work, we conduct the analysis at the state level and the eight subregional groupings of counties (defined

as the National Agriculture Statistical Services reporting districts). A new component of the analysis is a detailed assessment of the environmental impacts of agriculture using measures related to air pollution, water pollution, and water use.

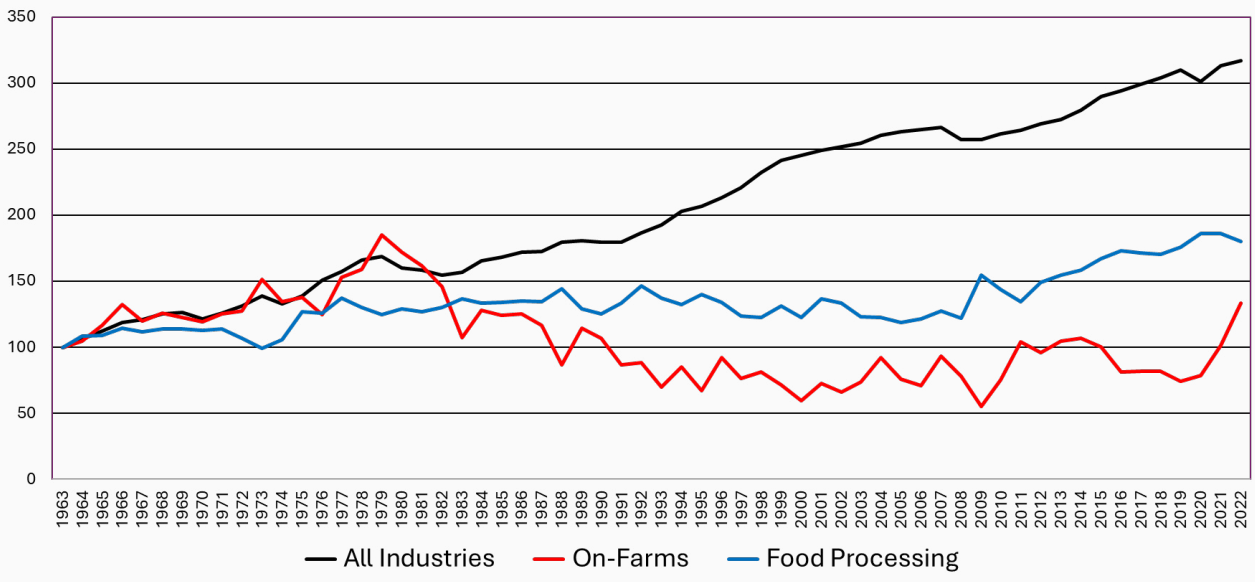
Historical Trends

In a simple analysis of the two most recent Census of Agriculture (2022 and 2017), Hadachek and Deller (2024) noted that despite a relatively stable period in the number of farms between 1997 to 2007, Wisconsin lost 6,272 farms between 2017 and 2022, a 9.7% decline. Over the 25-year period (1997 to 2022) Wisconsin went from 79,541 farms to 58,521, a loss of 21,020 farms or 26.4%. This rate of decline in the number of Wisconsin farms was faster than the national average, which experienced a 14.2% decline between 1997 and 2022 and 6.9% between 2017 and 2022. At the same time, there was stable growth in the number of food processors (e.g., cheese, canning, breweries, etc.). From 2012, the number of food processors increased from 1,056 to 1,245 firms in 2021, an increase of 17.9%. Correspondingly, employment in food processing increased 28.2%, going from 65,040 to 83,400 jobs.

While tracking the number of farms and food processors over time is one way to explore historical changes in the Wisconsin agricultural sector, an alternative measure of economic activity and overall performance is Gross Domestic Product (GDP). Examining long-term trends (1963 to 2022) in Wisconsin, the real GDP (adjusted to 2022 dollars, thereby removing the effects of inflation) of the overall economy grew by 216.8%, while on-farm GDP grew by 33.7% and food processing grew by 80.2% (Figure 1). By comparison, the overall U.S. economy grew by 332.1% over the 1963 to 2022 period, on-farm real GDP grew by 23.1% and food processing grew by 47.4%. Thus, relative to the U.S., the Wisconsin economy grew more modestly, but both farm and food processing GDP grew relatively more. This latter result points to the relative importance of agriculture (both farming and food processing) to the Wisconsin economy.

Trends can provide valuable insights into the growth and decline of the agricultural sector. Figure 1 shows that Wisconsin's economy (all industries) grew little throughout the 1980s, but then entered a period of strong growth in the 1990s through today. Looking at Wisconsin farming, the impact of the Farm Crisis of the early to middle 1980s is clear. Starting in 1979, on-farm Gross Domestic Product steadily declined until 2000, and on-farm GDP flattened and stabilized. In recent years, higher commodity prices in 2021 and 2022 led on-farm GDP to increase by 79.8%. Wisconsin was not unique in this increase as the U.S. farming sector experienced a 66.4% increase and states in the Great Lake region experienced a 153.3% increase. The USDA Economic Research Service (February 7, 2024) suggests however that, "[f]arm sector income is forecast to continue to fall in 2024 after reaching record highs in 2022," and thus, it is unlikely that this recent growth rate in on-farm GDP will persist.

Figure 1 Wisconsin Gross Domestic Product Growth Index (in 2022 dollars)

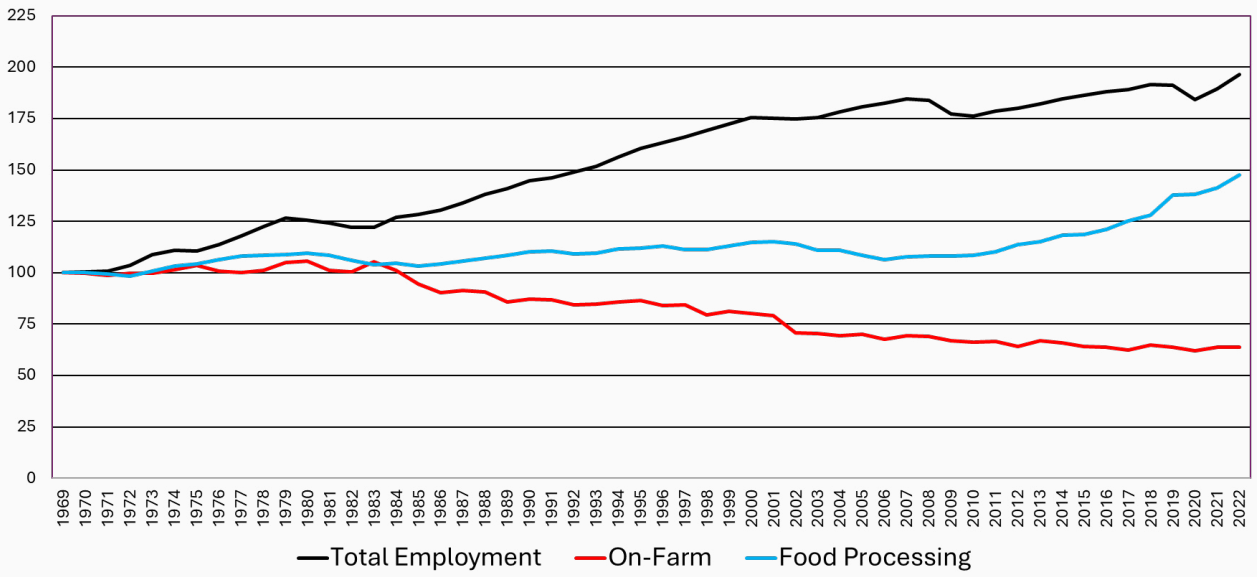


Source: BEA-REIS, calculations by the authors.

Food processing GDP showed strong growth relative to the nation and the Great Lakes region, but the long period between about 1980 and 2008 saw very little meaningful growth in food processing GDP.[1] Starting in 2009, Wisconsin's food processing GDP began to grow steadily. Most of the growth in Wisconsin food processing occurred in the 1970s and since 2009 with the latter period dominating. This growth in food processing GDP over the past 10-12 years complemented the growth in the number of food-processing firms and accompanying employment. In summary, this figure demonstrates that over the last 60 years, an increasing amount of Wisconsin's agricultural GDP occurred off-farm in the value-added stages of food production.

If we examine trends in employment, we see similar patterns as we saw in Gross Domestic Product (Figure 2). While the GDP data began in 1963, the employment data began in 1969 and goes through 2022. Total employment in Wisconsin grew by 96.5% over the period (U.S. total employment increased by 133.3% and the Great Lake States experienced a 64.3% increase), again with clear evidence of economic recessions. On-farm employment, however, declined by 36.3% (U.S. farm employment declined 21.1 % over the same period and farm employment declined 48.8% in the Great Lake States). Note that on-farm employment in Wisconsin was relatively stable from 1969 to 1983 before a period of sustained decline began. This decline in farm employment reflects the decline in the number of farms. Employment in the Wisconsin food processing industry remained relatively flat until about 2010, when it noticeably increased. Over the entire period, employment in food processing in Wisconsin increased by 47.5% (U.S. food processing employment increased by 13.0% over the same period, while food processing employment in the Great Lake States declined by 1.9%), and much of this growth occurred since 2010.

Figure 2 Wisconsin Employment Growth Index

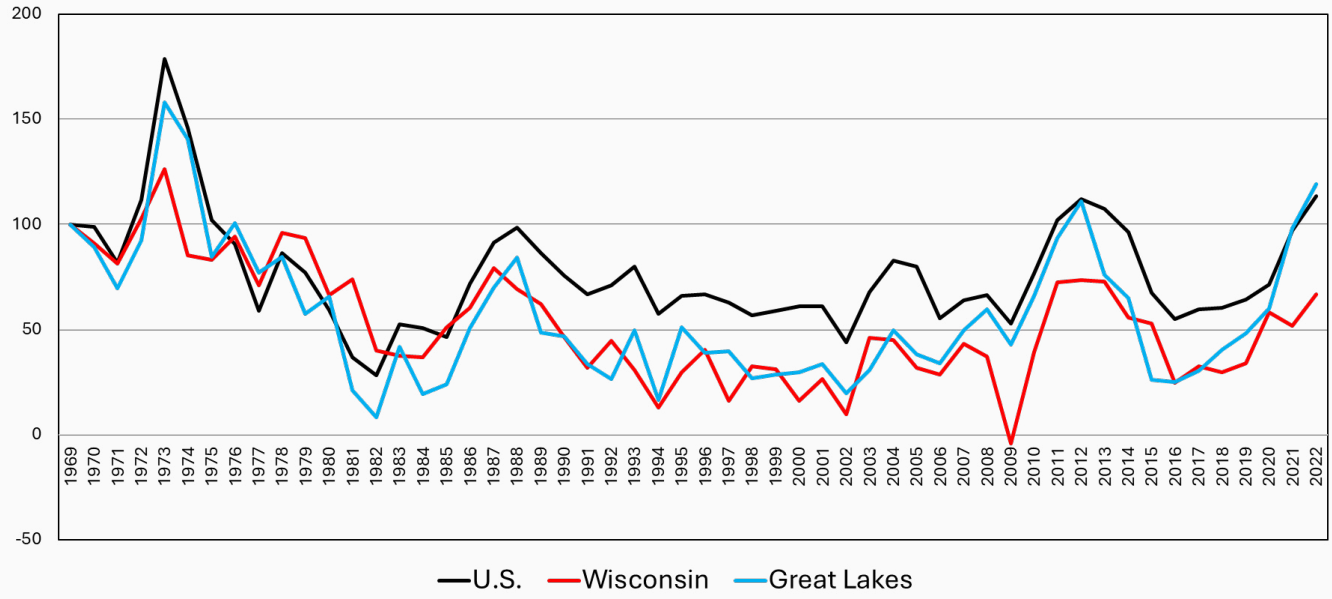


Source: BEA-REIS, calculations by the authors.

1 See Appendix A for figures detailing the Wisconsin, U.S., and Great Lake States comparisons.

Because of tax filing requirements of farm enterprises, specifically Schedule F (Form 1040), we can more closely track the financial health of farms. Here we track Realized Net Farm Income (revenues-expenses) (Figure 3), Farm Proprietor's Income (Figure 4), and Farm Earnings (Figure 5), and adjust all data to 2022 price levels (effects of inflation are removed). For Wisconsin, most farms, nearly nine out of ten, are structured as some form of proprietorship (family, individual, or partnership), and only 6.3% are organized as corporations. Most farms that are structured as a corporation are family-controlled (88.2%). The remaining 1.8% of farms are organized as trustors or are owned by Tribal farmers among other unique forms. How the farm is structured from a business perspective is important in understanding farm income: For most Wisconsin farms, operators take income in the form of proprietor income only after all expenses have been paid. In other words, net farm income (Figure 3) closely tracks farm proprietor income (Figure 4). Because farm earnings capture all sources of farm income, it is slightly more stable.

Figure 3 Realized Net Farm Income Growth Index (in 2022$)



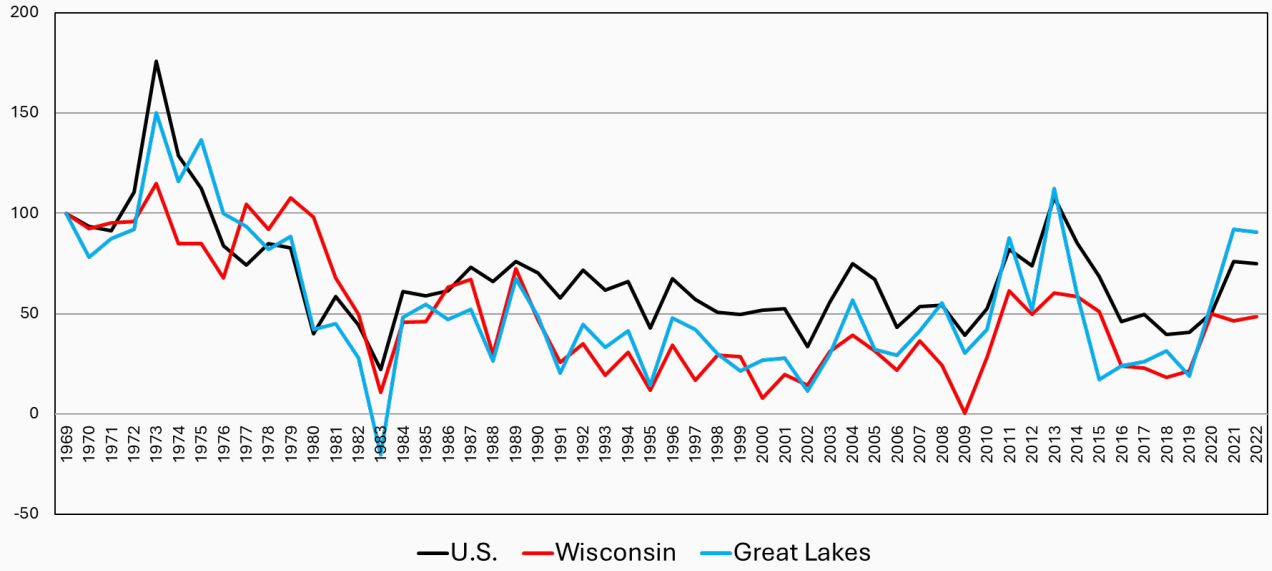
Source: BEA-REIS, calculations by the authors.

2 These data are available from the USDA Economic Research Service (ERS) Farm Income and Wealth Statistics program and the Bureau of Economic Analysis (BEA) Regional Economic Accounts System (REIS). The USDA data is derived from the Agricultural Resource Management Survey (ARMS), while the BEA REIS data primarily utilizes IRS records. Although there are technical differences in definitions and measurements between the two sources, these differences are minimal at the trend analysis level reported here. This study is based on the BEA REIS data.

3 Farm proprietor's income is defined as income that is received by the sole proprietorships and the partnerships that operate farms. Income received from farms organized as corporations are not included.

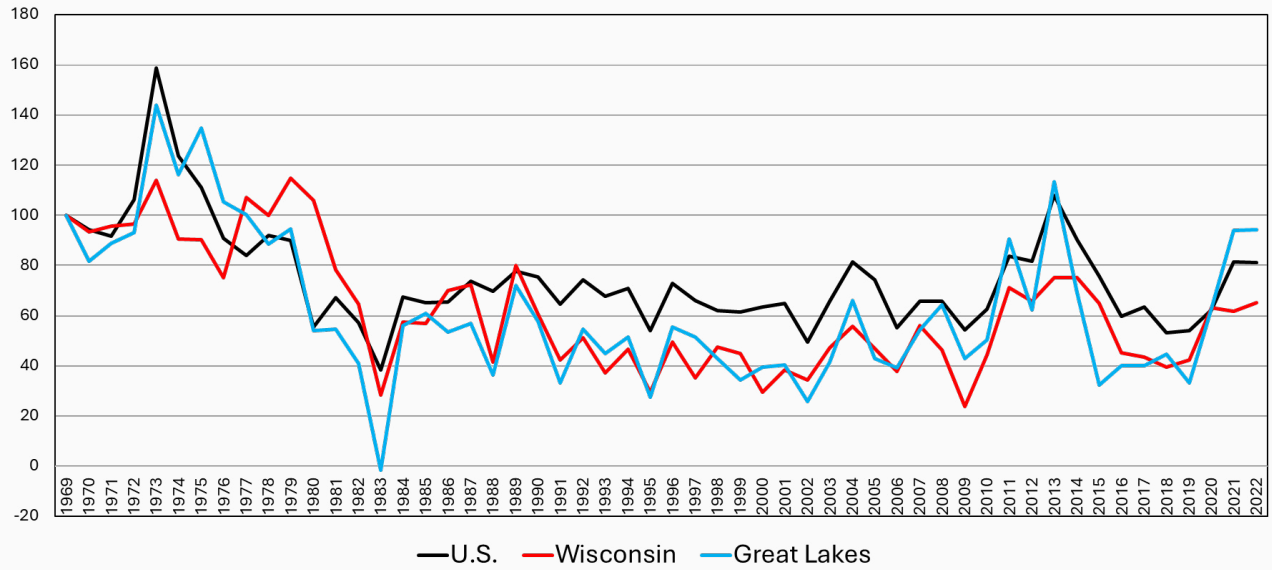
4 Farm Earnings is defined as income from all sources of farm activity including proprietor's income, corporate farm income, farm worker's income, and rental income, among other more minor sources.

Figure 4 Farm Proprietor's Income Growth Index (in 2022$)



Source: BEA-REIS, calculations by the authors.

Figure 5 Farm Earnings Growth Index (in 2023)



Source: BEA-REIS, calculations by the authors.

1 See Appendix A for figures detailing the Wisconsin, U.S., and Great Lake States comparisons.

There are several patterns observed in the farm financial and income data: (1) growth in farm income has been flat for five decades, (2) the inherent instability in farm income is readily apparent, and (3) most "down" years are followed by "up" years. Note that 2022, the year for this contribution analysis, appears to be at the top of a couple of good years. As noted above, the USDA Economic Research Service expects national farm income will continue to fall in 2024 after reaching record highs in 2022. Because of this inherent instability in farm income, farmers are adept at managing risk and planning over successive years. There are two periods of sustained down years, the early 1980s and 2013-2019 Both periods ended with what could be referred to as a "farm crisis". The inability of farmers to recoup losses by rebuilding assets (e.g., cash reserves) and paying down debt, forced farmers into unacceptable financial situations. Because most Wisconsin farmers take their earnings (income flowing to the family/household) from net farm income, successive down years creates an unsustainable fiscal situation for the farm family and accumulating farm debt can overleverage the farm enterprise. The result is farm failures and exits.

One strategy that many Wisconsin farm families (households) have pursued to provide some stability in family finances is off-farm income (e.g., Deller 2022). While off-farm employment has been a tradition for numerous years, primarily as a source of health insurance, the farm family (household) has become increasingly dependent on off-farm income. Using the USDA ARMS (Agricultural Resource Management Survey) data for Wisconsin farms, over the five-year average (2018-2022), 79.3% of farm family income came from off-farm sources. While this share is lower for the largest farms (sales over $1M the average is 15.1%), for the smallest farms, which are the preponderance of farms in Wisconsin (sales under $100,000), the average is 102.5%. This off-farm income provides a buffer for many Wisconsin farms and may cover average losses for the smaller farms. Off-farm income is not considered in the contribution analysis which is the focal point of this study. One policy implication of the growing dependence on off-farm income to sustain more modest-sized Wisconsin farms is to promote greater employment opportunities in nearby communities.

The historical analysis reveals several key takeaways. First, the number of farms and number of people employed on farms in Wisconsin continues to decline. Despite this, however, on-farm GDP has been relatively stable over the long term with periods of volatility in the short term. This is consistent with the notion that fewer large farms produce larger commodity volumes. Second, some of the on-farm contraction is offset by growth in the State's food processing sector. While similar growth has happened nationally, Wisconsin showed extraordinary growth over the period, perhaps because of the strong dairy and processed vegetable industries. Overall, the Wisconsin agricultural economy is dynamic and changing. Increasingly, value-added processes are a source of revenue and employment growth for the Wisconsin agricultural industry, and fewer people are directly involved in on-farm production. Can the sustained growth in specialized food processing create opportunities for Wisconsin farms? If so, how can the industry work strategically to build on those opportunities? We will explore these questions in the next section.

Agricultural Cluster Analysis

The Wisconsin Economic Development Corporation has identified six "key industries" or "economic clusters" that are fundamental to the Wisconsin economy. These industries are bio-health; water technology; advanced manufacturing; forest products; energy, power, and controls; and food and beverage industries. Our intent in this section is to explore the changing nature of the food and beverage industry, which for our purposes, includes on-farm activities and food and beverage processing. Specifically, using IMPLAN-sourced employment data for 2001 and 2022 (consistent with the contribution analysis), we track the relative strength of Wisconsin's individual on-farm and food processing sectors relative to the nation.

The specific framework we employ is commonly used to identify what is widely referred to as "economic clusters". As noted in Deller (2014), Forward Wisconsin, which is embedded in the Wisconsin Economic Development Corporation, defined economic clusters in 2003 as:

> . . .geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field. Clusters develop because they increase the productivity with which companies can compete in an increasingly more competitive global market, and they are the source of jobs, income, and export growth. The philosophy behind clusters is that large and small companies in a similar industry achieve more by working together than they would individually [emphasis added]. Clusters give businesses an advantage by providing access to more suppliers and customized support services, skilled and experienced labor pools, and knowledge transfer through informal social exchanges. In other words, clusters enhance competitiveness.

Consider the observation above noting that growth in food processing in Wisconsin could create unique opportunities for Wisconsin farmers with the challenge of the industry working in partnership to leverage those opportunities. An effective economic cluster, where "companies in a similar industry achieve more by working together", is an industrial setting where such leveraging is possible. The question is how the public sector (e.g., state government, the University of Wisconsin, the Wisconsin Technical College System, along with local and regional groups) can help leverage those networks underpinning the economic cluster.

While there are numerous methods to identify economic clusters, location quotients (LQ) have been widely used across Wisconsin. The location quotient (LQ) is an indicator of the self-sufficiency, or relative strength, of a particular industry.[5] The LQ is computed as:

$$LQ_i = \frac{\textit{Percent of local economic activity in sector } i}{\textit{Percent of national economic activity in sector } i}$$

The proportion of national economic activity in sector i located in the region (state or community) measures the region's production of product i, assuming equal labor productivity. The proportion of national economic activity in the region is a proxy for local consumption, assuming equal consumption per worker. The difference between local production and consumption is an estimate of production for export (i.e. production > consumption).

How close to one is close enough?

While the Location Quotient has a definitive threshold of one, there remains room for interpretation. Some have suggested that when interpreting Location Quotient more reasonable thresholds might be above 1.1 and below 0.9 and Location Quotients between those two ranges are closed enough to 1.0 to be acceptable.

5 The key underlying assumptions of the location quotient approach is that regional production technology is identical to national production technology (i.e. equal labor productivity) and that local tastes and preferences are identical to national tastes and preferences (i.e. equal consumption per worker). Assuming the national economy is self-sufficient (i.e., no international trade), the comparison between the community and the national benchmark gives an indication of specialization or self-sufficiency.

As constructed, the LQ is centered on a value of one, where an LQ equal to one means the region has the same proportion of economic activity in sector i as the nation. This indicates that local production of a specific good or service exactly meets local consumption in that region. If the location quotient is less than one (1), the region is not producing enough to meet local needs. If the location quotient is greater than one, the region has a larger proportion of its economy in sector i than does the rest of the nation.

Consider a simple mapping of the level and change of the LQ as outlined in Figure 6. There are four potential combinations.

- First, if the industry has a LQ less than one and is decreasing over time, this industry is considered a "weakness and declining" industry, and generally, should not be considered a potential cluster.
- Second, if the LQ is less than one but increasing, the industry can be considered a "weakness and growing", and it may be a possible industry of focus for economic development.
- Third, if the LQ is greater than one but is declining over time, the industry is considered a "strength and declining." Industries in this category might be considered at risk and deserving of special consideration to understand why a strong industry (i.e. LQ>1) is weakening (i.e. Δ LQ<0). In particular, does the decline of these industries present a potential risk to the regional economy?
- Fourth, if the LQ is greater than one and growing over time, it is considered a "strength and growing." Industries in this category might be considered potential clusters for economic growth and development. These industries have self-identified the region as having a comparative advantage over other regions and may have further growth potential.

Figure 6 Possible Industry Combinations

On-Farm Cluster Analysis

Using employment data from IMPLAN for 2001 and 2022, we calculate the Location Quotients and summarize the results in Table 1 and Figures 7a and 7b for on-farm industries. Focusing first on on-farm industries that are classified as potential economic clusters, it becomes clear that dairy farming and milk production are strengths (LQ=7.41) and are growing (an increase of 3.38), and at the same time, they account for 53.1% of all on-farm employment. Clearly, dairy farming is a viable economic cluster. But there are also several other on-farm sectors that fall into the potential cluster quadrant of Figure 6, including fur-bearing animal and rabbit production, goat farming, oilseed (other than soybean) farming, aquaculture, and vegetable (and melon) farming among a few others. Consider fur-bearing animal and rabbit production, where the location quotient is a remarkably high 20.12 and grew by 8.40 from 2001. By all measures, this is a remarkably strong cluster, and it is widely known that Wisconsin dominates the fur-for-clothing market in the U.S. Having said that, its share of total on-farm employment is only 0.8%. A similar observation could be made for goat farming. It had a location quotient of 6.61 in 2022, and it accounted for only 0.3% of all on-farm employment in 2022.[6] The policy question is whether these smaller on-farm sectors are of sufficient size or scale to warrant special consideration.

When is the share of employment sufficient large?

A key element of any clusteranalysis is assessing when therelative size of an industry issufficiently large to warrant furtherconsideration. Unfortunately, thereis no definitive threshold as share ofemployment will grow smaller asthe level of industry specificity becomes more refined. Clearly asone explores more detailedindustrial groups the relative sizeswill become smaller. Consequently,the results of such cluster analysesare meant to be indicative ratherthan conclusive

Vegetable (and melon) farming, corn farming, and support activities for animal production are three other economic clusters in the state. Consider the latter, support activities for animal production, which accounts for 7.5% of all on-farm employment, and a location quotient of 3.58 in 2022, which increased by 1.22 from 2001. In 2022, there were 135 Wisconsin businesses in this category, each with an average of just over 15 employees. This sector includes businesses that provide artificial insemination services for livestock, livestock breeding services more generally, poultry house cleaning, and hoof trimming, among others. Given the importance of livestock-based farm activities across Wisconsin, the relative importance of this sector perhaps matches expectations. From an economic growth and development perspective, it is intuitive that fostering strategies and policies aimed at enhancing the on-farm economy should include businesses that provide support activities for livestock farming.

6 The key underlying assumptions of the location quotient approach is that regional production technology is identical to national production technology (i.e. equal labor productivity) and that local tastes and preferences are identical to national tastes and preferences (i.e. equal consumption per worker). Assuming the national economy is self-sufficient (i.e., no international trade), the comparison between the community and the national benchmark gives an indication of specialization or self-sufficiency.

Given that parts of Wisconsin are contained within the Corn Belt, it is no surprise that corn farming is considered an economic cluster within the Wisconsin on-farm industry.[7] The location quotient for corn farming is 2.23 in 2022 (a modest increase of 0.12 from 2001) and accounts for 2.8% of all on-farm employment. Finally, given the scale of operations in Wisconsin's Central Sands region, vegetable (and melon) production is a potential cluster in the on-farm sector. Still, unlike some of the other on-farm sectors in the cluster quadrant of Figure 6, the size of the 2022 location quotient is only modestly above one.

There are a handful of on-farm operations that have location quotients less than one in 2022, indicating that the sectors are not necessarily strengths, but the location quotient has increased from its 2001 value. For example, the value of the location quotient for hay farming was 0.45 in 2022, an increase of 0.42 from 2001 values. The level of employment, however, is relatively modest, accounting for 0.3% of total on-farm employment. Other sectors in this "potential opportunity" quadrant of Figure 6, including, poultry hatcheries, support activities for forestry, and horses and other equine farms, show similar signs of growing importance through increases in the location quotient, but account for small shares of on-farm employment. Other on-farm sectors warrant further consideration, such as sheep farming and noncitrus fruit and tree nut farming. Sheep farming, much like goat farming, did not have a statistical presence in Wisconsin in 2001 but had an employment presence in 2022 (0.1%). As such, the location quotient went from zero in 2001 to a positive value in 2022 (0.72). The same could be said about tobacco farming, but the size of the location quotient and employment share for tobacco farming suggest that it is a minor crop for Wisconsin. Noncitrus fruit and tree nut farming, which includes cranberries and a more modest hazelnut industry, has a location quotient of 0.41, which increased by 0.09 from 2001, accounts for 4.4% of on-farm employment, and places it sixth highest out of the 35 on-farm sectors included in this cluster analysis. Given the dominance of the Wisconsin cranberry farm production relative to the U.S., one would expect cranberry production to be classified as a potential cluster. The way IMPLAN aggregates its industrial sectors, unfortunately, does not allow for a more refined analysis.

A handful of on-farm sectors appear to be shrinking relative to the U.S., measured by a declining location quotient. Only one sector is classified as a "threat" by being in the lower right-hand quadrant of Figure 6, or the current location quotient was greater than one but declined over the 2001-2022 period. The hunting and trapping sector experienced a sizable decline (-12.90) but this sector accounted for only 0.2% of on-farm employment. Perhaps of more concern is the decline in the beef cattle farming sector, which went from a location quotient of 2.33 in 2001 to 0.58 in 2022, a decline of 1.75. Given that beef farming accounts for 2.2% of on-farm employment in 2022 (ranked 9 out of the 35 on-farm sectors examined), this could be reclassified from "neither opportunity nor threat" to "potential threat". Nursery and floricultural production is a relatively large employment sector and experienced a decline in its location quotient. In 2022, this sector accounted for 6.5% of on-farm employment, placing it behind only dairy farms (53.1%) and support activities for animal production (7.5%). While the location quotient was 0.73 in 2022, the decline from 2001 to 2022 of 0.03 indicates that this part of the Wisconsin on-farm economy may warrant special attention.

While dairy farming dominates the Wisconsin on-farm economy, one of the important takeaways from this cluster analysis is the diversity of agriculture across the state. Using USDA data, the Wisconsin Department of Agriculture, Trade, and Consumer Protection notes that in 2022 Wisconsin ranked as the top producer of corn for silage, cranberries, snap beans, milk goats, and mink pelts; second in forage and dairy cows; and third in carrots, green peas, sweet corn, and potatoes (Wisconsin 2023

7 The data used in this analysis is not sufficiently detailed to distinguish between sweet corn for humanconsumption and field corn often used for animal feed

Agricultural Statistics). The cluster analysis provided in Table 1 and Figures 7a and 7b reaffirms the conclusions of the statewide statistics and national rankings: The Wisconsin on-farm agricultural sector is exceptionally diversified which presents unique opportunities and challenges.

Because of the diversity, Wisconsin on-farm agriculture is not as exposed to volatility in any one sector, except perhaps for dairy milk production. Rather, the risk is spread across agricultural products, and a shock to one sector may not be as devastating to the entire State's economy. The farm crisis of the 70s and 80s, for example, was dampened in Wisconsin relative to less-diversified corn-belt states. In addition, having a foundation of diverse products and the infrastructure to support them allows for opportunistic expansion if one sector experiences market growth. Take for example a positive demand shock for American ginseng. The capability and knowledge already exist in Wisconsin, and Wisconsin would stand to be almost exclusive beneficiaries of such a shock.

The challenge of this, however, centers on the unique needs of various on-farm sectors. The needs for goat and sheep farming, which may overlap some elements of the dairy and beef sectors, are very different than vegetable or fruit farming. Developing a portfolio of policies that are custom to such a variety of farms can be challenging. Because so many Wisconsin farms are relatively modest in scale, the needs for business management training and support, for example, are similar regardless of the commodity or product being produced. As noted in the definition of economic clusters, a key element of a dynamic cluster is "companies in a similar industry achieve more by working together than they would individually". Here, public institutions such as those referenced above and organizations such as the Wisconsin Cranberry Growers Association, Wisconsin Beef Council, or the Wisconsin Corn Growers Association can provide an institutional mechanism for producers to network and exchange information and ideas. But the scale or size of the sector can be a limitation: Is there a sufficient number or scale of farmers to build deep networks? Here dairy farming is sufficiently large that groups such as Dairy Farmers of Wisconsin and Professional Dairy Producers of Wisconsin have critical mass. In addition, the degree of networking across different commodity (product) groups can be limited. Clearly, the opportunities associated with such a diversified on-farm economy outweigh the challenges.

Table 1 Wisconsin On-Farm Cluster Analysis

	LQ 2022	Change LQ 2001-2022	Share of On Farm Employment (%)
Potential Cluster			
Fur-Bearing Animal and Rabbit Production	20.115	8.403	0.78
Dairy Cattle and Milk Production	7.415	3.381	53.13
Goat Farming	6.608	6.608	0.27
Support Activities for Animal Production	3.576	1.221	7.49
Other Poultry Production	3.384	2.128	0.40
Oilseed (except Soybean) Farming	2.473	2.473	0.04
Corn Farming	2.227	0.120	2.77
Dry Pea and Bean Farming	1.683	1.249	0.05
Aquaculture	1.167	0.852	0.63
Vegetable and Melon Farming	1.038	0.033	5.84
Potential Threat			
Hunting and Trapping	1.392	-12.895	0.20
Potential Opportunity			
Logging	0.767	0.009	2.39
Apiculture	0.760	0.611	0.20
Sheep Farming	0.726	0.726	0.05
Other Grain Farming	0.680	0.514	1.01
All Other Crop Farming	0.519	0.231	1.56
Hog and Pig Farming	0.471	0.146	0.93
Hay Farming	0.450	0.415	0.28
Noncitrus Fruit and Tree Nut Farming	0.413	0.086	4.41
Horses and Other Equine Production	0.376	0.156	0.15
Support Activities for Forestry	0.296	0.061	0.44
Poultry Hatcheries	0.264	0.180	0.17
Support Activities for Crop Production	0.229	0.118	5.25
Tobacco Farming	0.173	0.173	0.02
Timber Tract Operations	0.062	0.019	0.03
Broilers and Other Meat Type Chicken Production	0.033	0.033	0.02
Neither Opportunity or Threat			
All Other Animal Production	0.998	-1.494	0.77
Chicken Egg Production	0.856	-0.010	1.20
Nursery and Floriculture Production	0.734	-0.033	6.55
Beef Cattle Ranching and Farming, including Feedlots	0.581	-1.752	2.19
Soybean Farming	0.221	-0.097	0.08
Food Crops Grown Under Cover	0.197	-0.019	0.64
Fishing	0.188	-0.167	0.08
Turkey Production	0.029	-0.125	0.01
Forest Nurseries and Gathering of Forest Products	0.000	-0.242	0.00

Figure 7a Wisconsin Food Processing Cluster Analysis

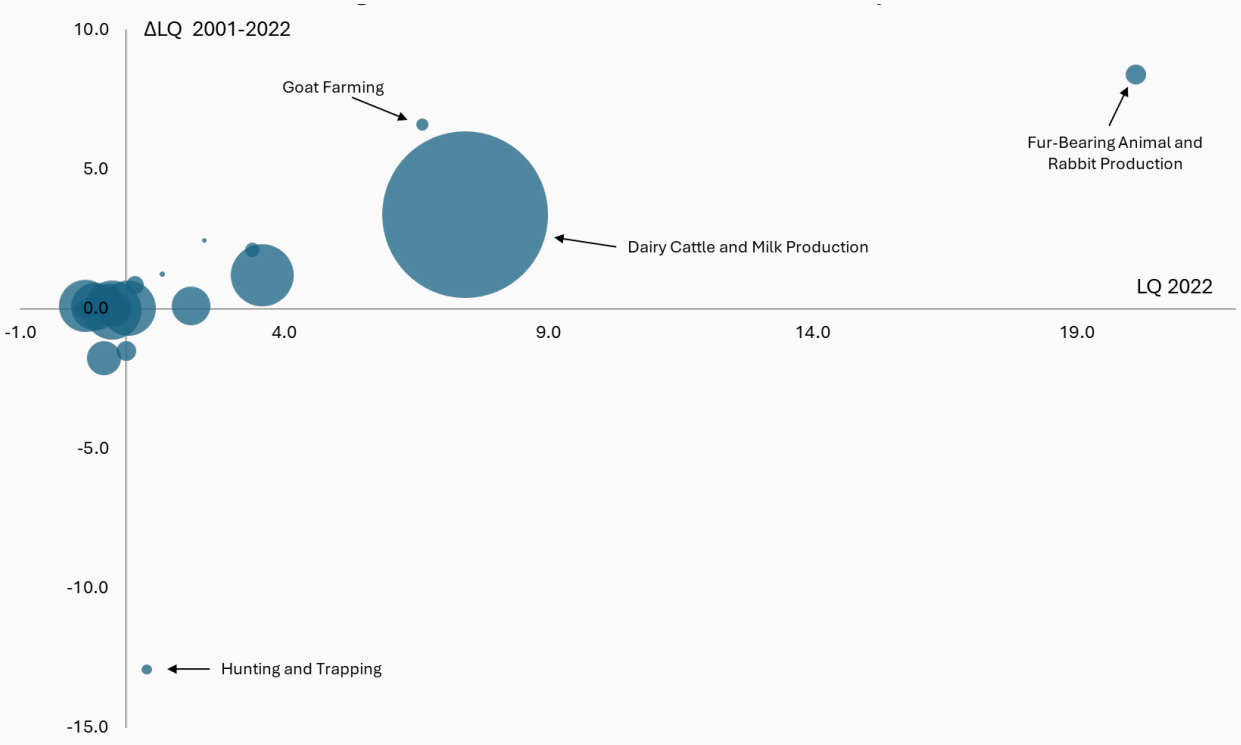
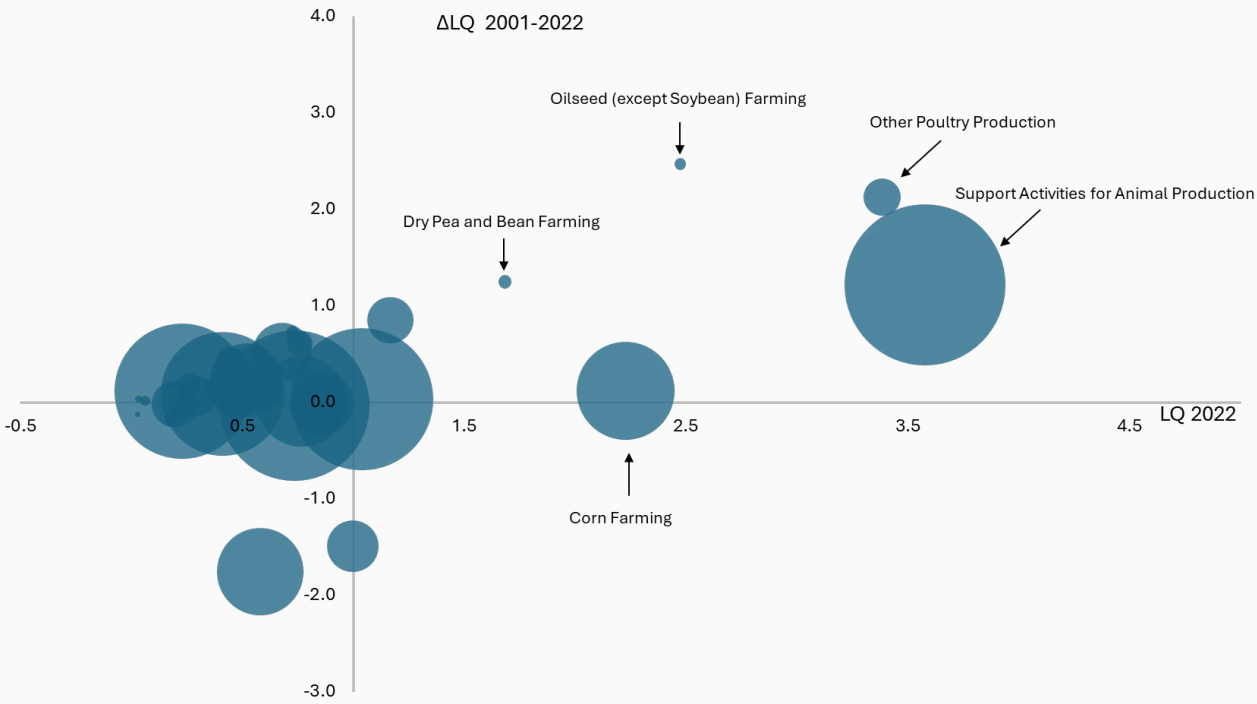


Figure 7b Wisconsin Food Processing Cluster Analysis



Food Processing Cluster Analysis

As with the on-farm cluster analysis, using employment data from IMPLAN for 2001 and 2022, we calculated the location quotients and summarize the results in Table 2 and Figures 8a and 8b for food processing industries. Here, 24 individual sectors make up food processing, and ten are identified as strengths and are growing (upper right-hand quadrant of Figure 6) and are classified as potential economic clusters. Much like how dairy farming "stood out" as the largest potential cluster in the on-farm analysis, dairy product (except frozen) manufacturing dominates Wisconsin's food processing sector. While this sector includes a handful of sub-sectors, such as fluid milk processing and butter, the overall sector is dominated by cheese production. With a location quotient of 10.33 in 2022, an increase of 3.38 over 2001 levels, this sector accounted for almost one-third (31.8%) of all employment within food processing. This result on dairy processing aligns with expectations. In 2022, Wisconsin was ranked as the top-producing state for American, Cheddar, and Italian cheeses and second for Mozzarella cheese, which accounted for 25.0% of all cheese produced in the U.S. (Wisconsin 2023 Agricultural Statistics). Indeed, almost 90% of dairy milk production in Wisconsin goes into the production of cheese. There were other components of the Wisconsin food processing industry beyond dairy processing (predominately cheese) that were strengths and growing (upper righthand quadrant of Figure 6) including frozen food manufacturing, animal food production, seasoning and dressing manufacturing, and a handful of other smaller (in terms of employment) food processing sectors.

Unlike on-farm activity, where only one relatively small sector (hunting and trapping) was classified as a potential threat because of the declining value of the location quotient, six food processing sectors were classified as posing a potential threat. For example, flour milling and malt manufacturing had a location quotient of 1.32 in 2022, which was a decline of 0.22 from its levels in 2001. But this sector accounted for only 0.6% of the total food processing sector. Most of the food processing sectors identified here experienced modest declines in their location quotients over the study period. For example, nonchocolate confectionery manufacturing experienced a decline of only 0.08. Breweries, which accounted for 4.5% of all food processing employment in 2022, experienced a decline in their location quotient of 0.18. While there was a significant growth in the number of craft and microbreweries across Wisconsin over the 2001 to 2022 period, some of the larger breweries experienced restructuring. This analysis is not sufficiently detailed to suggest that this restructuring may threaten the whole of the Wisconsin brewery industry. There was also a modest decline in the relative strength (i.e., a declining location quotient) in the animal slaughtering and processing sector. While a decline of only 0.08 may appear insignificant, this sector accounted for 19.7% of all food processing employment in Wisconsin. It is not clear if the noticeable decline in the beef cattle farming sector noted in the previous section was linked to the modest decline in animal slaughtering and processing. As with the brewery industry, perhaps additional analysis of this sector is warranted beyond what is presented here.

One food processing sector, fruit and vegetable canning (pickling/drying), has experienced difficulties for several years. Most of the vegetable production in Wisconsin goes directly into canning and freezing processes. Considering it has a relatively large location quotient (3.28) and a high share (6.2%) of total food processing employment, the decline in the location quotient of 1.36 is a potential concern. Multiple reasons might explain why this sector has experienced pressures (e.g. international competition, changes in consumer demands, and the costs of aluminum for the cans), and why it poses a potential threat to the Wisconsin food processing industry.

There are signs of some pressure alleviation through the growth in frozen food manufacturing (identified as a potential cluster), but frozen food manufacturing encompasses more than just vegetable processing.

The cluster analysis of Wisconsin's food processing sector using employment data from 2001 to 2022 suggests that six subsectors are potential opportunities (upper left-hand quadrant of Figure 6). While each of these, except for soft drink (and ice) manufacturing accounts for less than one percent of total food processing employment, two subsectors warrant further discussion: Distilleries and wineries. While distilleries are a small industry relative to the rest of the Wisconsin food processing industry (0.3% of food processing employment), the location quotient of 0.59 was a marked increase over the 2001 level. Indeed, based on the IMPLAN employment data, there were no distilleries with statistically significant employment in 2001. In essence, this is a new industry within Wisconsin. The second industry, wineries, has also shown growth. While there have been wineries in Wisconsin for decades, such as in Door County, there was noticeable growth over the study period. In 2022, the location quotient for Wisconsin wineries was 0.56, an increase of 0.32 over 2001 levels, and the industry accounted for 1% of Wisconsin food processing employment. The growth in these two sectors can be attributed to changing consumer tastes and preferences, particularly the continued growth in preferences for local foods. In addition, local breweries, artisan cheese manufacturers, wineries, and distilleries have formed tourism-focused economic clusters. By forming partnerships these food-based industries have formed viable economic clusters akin to the food and wine cluster of Napa Valley California.

As with the on-farm activity, the food processing industry in Wisconsin is relatively diversified. While dairy processing (i.e., cheese) and animal processing (slaughtering) accounted for more than half (51.5%) of employment in the food processing sector, food processing in Wisconsin has a wealth of diversity including breweries, distilleries, and wineries. This diversity is important because it helps protect the Wisconsin food processing industry from outsized shocks to any one part of the industry portfolio. Continued pressure in the vegetable canning industry, however, is a potential cause for concern.

Table 2 Wisconsin Food Processing Cluster Analysis

	LQ 2022	Change LQ 2001-2022	Share of Food Processing Employment (%)
Potential Cluster			
Dairy Product (except Frozen) Manufacturing	10.33	3.38	31.83
Seasoning and Dressing Manufacturing	3.24	0.77	3.54
Frozen Food Manufacturing	3.22	0.28	6.93
Animal Food Manufacturing	2.33	0.68	3.78
Chocolate and Confectionery Manufacturing	2.32	1.01	2.21
All Other Food Manufacturing	2.01	0.03	4.72
Coffee and Tea Manufacturing	1.81	1.27	1.1
Flavoring Syrup and Concentrate Manufacturing	1.4	0.8	0.29
Bread and Bakery Product Manufacturing	1.2	0.06	6.75
Cookie, Cracker, and Pasta Manufacturing	1.17	0.16	1.57
Potential Threat			
Fruit and Vegetable Canning, Pickling, and Drying	3.28	-1.36	6.16
Breweries	1.86	-0.18	4.46
Animal Slaughtering and Processing	1.63	-0.08	19.67
Nonchocolate Confectionery Manufacturing	1.62	-0.08	0.89
Flour Milling and Malt Manufacturing	1.32	-0.22	0.64
Snack Food Manufacturing	1.25	-0.15	1.8
Potential Opportunity			
Soft Drink and Ice Manufacturing	0.62	0.06	1.48
Distilleries	0.59	0.59	0.34
Wineries	0.56	0.32	0.97
Starch and Vegetable Fats and Oils Manufacturing	0.46	0.45	0.31
Breakfast Cereal Manufacturing	0.25	0.25	0.07
Tortilla Manufacturing	0.13	0.07	0.06
Neither Threat or Opportunity			
Ice Cream and Frozen Dessert Manufacturing	0.77	-0.34	0.43
Seafood Product Preparation and Packaging	0.04	-0.01	0.03

Figure 8a Wisconsin Food Processing Cluster Analysis

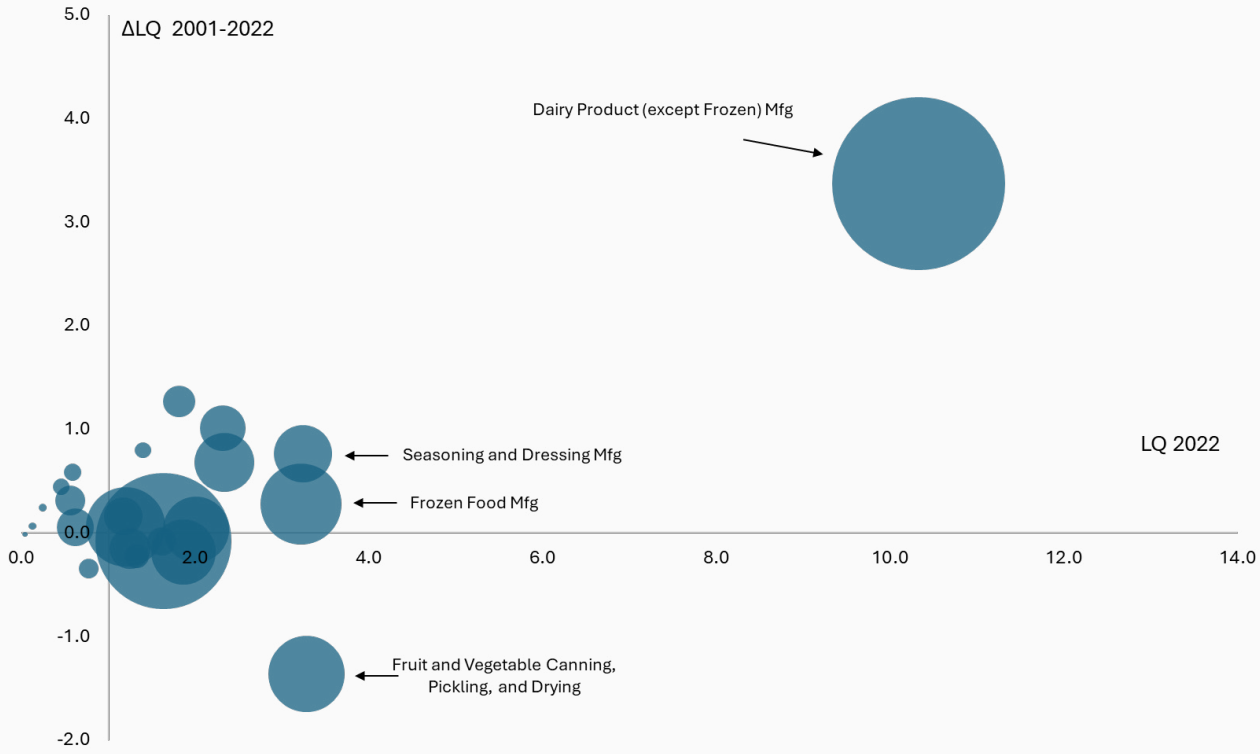
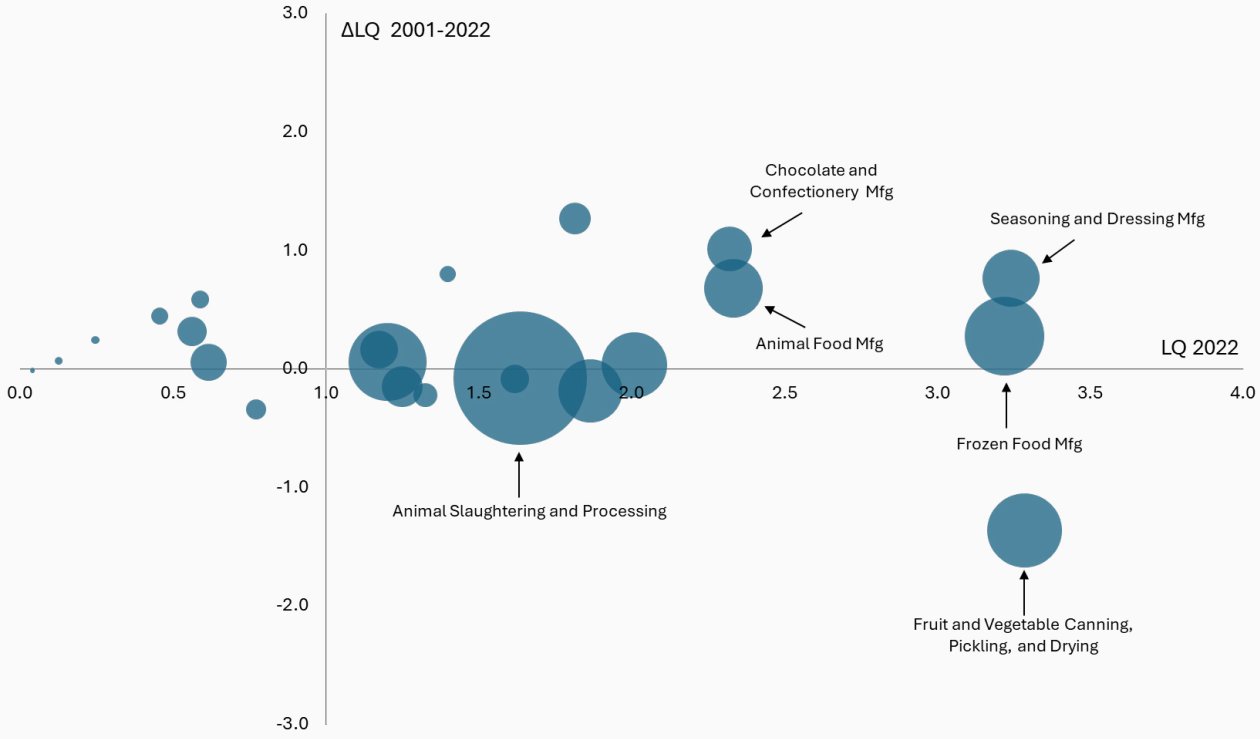


Figure 8b Wisconsin Food Processing Cluster Analysis



A Simple Review of Methods and Definitions of Terms

In each of the previous Contribution of Agriculture to the Wisconsin Economy studies, we relied on regional input-output economic models of Wisconsin using the IMPLAN Modeling System. As discussed in more detail in Appendix 2, input-output analyses are an advantageous tool to track how small changes in one part of the economy resonate throughout the entire economy. For example, the expansion of dairy farms in the local economy introduces new or additional levels of spending in the local economy. This new spending causes a ripple, or multiplier effect, throughout the economy. Using input-output analysis, we can track and measure this ripple effect.

Continuing with the dairy farms example, the impact of an expansion of dairy farms is composed of three parts: direct, indirect, and induced. The direct effect captures the event that caused the initial change in the economy. For example, an entry of a new dairy or an existing dairy operation expanding. The dairy farm contributes directly to the local economy by selling farm products, paying employees' wages, and generating proprietor income for the farmer. The new dairy farm has two types of expenditures that can illustrate the second two parts of the impact or multiplier. The first is business-to-business transactions, such as the purchase of feed from other farms or feed suppliers, fertilizer, seed, chemicals, veterinary services, trucking services to haul milk and livestock, electric and other utilities, insurance, interest and other financial services, land rent, farm and equipment repairs and maintenance, and many others. These business-to-business transactions are captured in the model through the indirect effect. In this situation, a grain farmer uses the proceeds from feed sales to dairy farmers to pay his or her own farm's operating expenses, make investments, or buy new equipment.

The second type of expenditure dairy farms introduce into the local economy is wages and salaries paid to employees and to the farmers themselves. Spending this income in the local economy is captured by the induced effect. Dairy farmers and their employees spend their income at local grocery stores, movie theaters, restaurants, and other retail outlets. The theater owner, then, uses part of the dairy farmer's ticket sales to pay theater employees, and the cycle continues.

The combination of the direct, indirect, and induced effects tells us any industry's complete impact on or contribution to the whole economy. By looking at the indirect and induced impacts, we can gain insights into how an industry of interest is connected or integrated into the local economy. Industries that are labor-intensive and offer high wages tend to have larger induced effects on the local economy. Industries that are more capital-intensive or offer lower wages tend to have larger indirect effects. We can also gain additional insights into the make-up of the local economy by examining the relative size of the multiplier effects. Smaller economies tend to have smaller multiplier or ripple effects than larger economies. This is because the "leakages" out of the local economy occur faster in smaller economies. Larger economies have greater opportunities to keep those dollars within the local economy for a longer period (i.e. larger multiplier effects). Some smaller, rural communities pursuing tourism development have used multiplier analysis to learn that simply bringing more tourists to the community is insufficient. The communities must also have a place for those tourists to spend their money.

For this study, we use four measures of economic activity: employment, labor income, total income, and industrial revenues/sales. Employment is simply the number of jobs and is not a full-time equivalent. For example, two part-time jobs created in any sector are considered two jobs, while one full-time job in any sector is considered one job.

Labor income is the return to labor and includes wages, salaries, and proprietor income. As noted in the trend analysis above, most labor income comes through wages and salaries. In agriculture, though, many farmers take income via proprietor income. Proprietor income is the farmer's return on labor input into the farm. Total income includes labor income and other sources of income such as dividends, interest, and rental payments as well as transfer payments such as social security payments. For our purposes, total income is akin to gross domestic product, explored in the trend analysis. Industry sales or revenues are simply total revenues flowing to an industry.

Consider a dairy farmer who has $1 million in sales/revenues and two hired workers who are each paid $25,000. The farmer has structured the business to draw a $50,000 salary. Also, suppose that the farm turns a $10,000 "profit" that the farmer takes as proprietor income. In this example, industry sales/revenue is $1 million, employment is three (two workers plus the farmer), and labor income is $110,000. Suppose that this farmer has crop acreage that is rented to a neighboring farmer for which the farmer receives $5,000 in rental income. Here, total income would be $115,000.

Economic Contribution Analysis

In this study, we update previous estimates of the contribution of agriculture to the Wisconsin economy (Deller, 2004, 2014, 2017; Deller and Williams 2009, 2011). In addition to providing state-wide estimates, we provide estimated contributions for the nine sub-regions within Wisconsin which correspond to the National Agricultural Statistics Service's (NASS) grouping of counties. The results of the state-wide analysis are provided in Tables 3a and 3b. In 2022, all agricultural activities, both on-farm and food processing, contributed $116.28 billion to the Wisconsin economy using industrial revenues (or sales) as the economic metric. This represented an increase of $11.5 billion over the 2017 estimates, or about an 11.0% increase. All of agriculture contributed almost 354,000 jobs (9.5% of Wisconsin's total employment), $21.2 billion in labor income (8.7% of the state total), and $37.8 billion in total income (9.4% of the state total). The employment estimates were about 81,800 jobs lower in 2022 than in 2017 (18.8% decline) and total labor income attributable to Wisconsin agriculture was $1.2 billion lower than in 2017 (5.5% decline), but total income increased by $143.0 million (0.4%) over 2017 levels.

As in prior years, the bulk of the economic contribution came from food processing. In 2022, food processing contributed $107.0 billion to total industrial revenues (sales), 298,400 jobs, $18.7 billion to labor income, and $32.4 billion to total income. This compares to $30.5 billion in industrial revenues for on-farm activities, 143,700 jobs, $6.4 billion in labor income, and $13.7 billion in total income. There were two primary reasons why the contribution of food processing dominates on-farm activities. First, in terms of simple industrial revenues, food processing accounted for $28.37 billion (before the multiplier effects are accounted for), and on-farm revenues accounted for $18.96 billion (again, before the multiplier effects are accounted for). Further, the income flowing to workers (labor income) was much higher in food processing than on-farm activities. Industry-wide averages, the typical job in food processing, had an income of $82,070 compared to $35,500 in on-farm activity. Because the stronger "purchasing power" of the typical food processing worker was higher than the typical on-farm worker, the resulting "induced effects" embedded in the multiplier (i.e., the impact of workers spending income in the regional economy) was larger for food processing.

The second reason is how the economic multiplier reflects the impacts of the input supply chain and as such could be described as "backwards looking". For farm operations, this would include inputs to the farm along with farm

labor spending income in the local community. For food processors, a sizeable part of input supply chains includes the farm operators. Consider a vegetable processing facility (canning) compared to a vegetable farmer. Here the vegetable farmer's major expenditures are on labor (including returns to the farmer), support activities for agricultural production, real estate services (e.g., land rental), pesticides and other agricultural chemicals, and agricultural-related wholesale trade, among others. For canning processors (vegetables and fruits) the major expenses are on labor (including returns to the business), trucking services, metal cans, paperboard containers, and raw vegetables (and fruits), among others. The fact that the basic vegetable commodities are in the supply chain means that the multiplier captures a significant portion of the vegetable farming sector itself. Thus, the contribution analysis of food processing captures a large proportion of on-farm operations, and for this reason, the contribution of food processing dominates on-farm activities.

Now consider the contribution of dairy, the dominant agricultural sector in Wisconsin. In 2022 the dairy industry (on-farm and processing) contributed $52.8 billion to total industrial revenues, or 6.5% of the state total, 120,700 jobs (3.3% of the state total employment), $7.9 billion to labor income (3.2% of the state total), and $13.7 billion to total income (3.4% of state total). Compared to the contribution of dairy in 2017, this represented a 16.0% increase in total industrial revenues (sales), but a decline in employment (23.2%), labor income (12.5%), and total income (9.0%). Looking more closely at farm activity, dairy farms contributed $15.2 billion to industrial revenues, 48,800 jobs, $2.6 billion to labor income, and $5.2 billion to total income. As expected, dairy processing had a much larger contribution to the Wisconsin economy because of the relatively larger share of employment and the inclusion of dairy farms in the input supply chain of dairy processors. If we remove the feedback effects of dairy processing on dairy farms, the dairy processing sector contributed $37.1 billion to industrial revenues (about 70% of the total contribution of all dairy), 70,200 jobs (58.1% of all dairy contribution), $5.1 billion to labor income (65.2% of all dairy contribution) and $8.3 billion to total income (60.7% of all dairy contribution).

In addition to supporting industrial revenues, employment, and income, the economic activity associated with agriculture also generates tax revenues for all levels of government. For example, workers pay income, sales, and property taxes, and businesses pay a range of taxes as part of their operations. In addition, there are taxes generated through the multiplier effects. In 2022, all agricultural activity generated $7.8 billion in tax revenues, with 64.7% ($5.1 billion) flowing to the federal government, 22.6% ($1.8 billion) to state government, and 12.7% ($997.2 million) to local governments. Given federal income taxes, contributions to Social Security and Medicare/Medicaid taxes (i.e., FICA taxes), and the federal unemployment tax, federal tax revenue expectedly dominated state and local income and sales taxes. Dairy generated about $3.0 billion in total tax revenues, and a majority came from dairy processing-related activities. Dairy also contributed $704.2 million to state government revenues and $430.0 million to local government revenues.

Table 3a Contribution of Agriculture to the Wisconsin Economy: 2022

	Employment	Labor Income (MM$)	Total Income (MM$)	Industry Revenues (MM$)
All On Farm	143,690	$6,374.30	$13,691.63	$30,464.91
Food Processing	298,433	$18,708.93	$32,408.44	$106,978.01
All of Agriculture	353,932	$21,219.38	$37,782.56	$116,279.26
Dairy On Farm	48,786	$2,648.65	$5,203.21	$15,228.73
Dairy Processing	118,954	$7,792.03	$13,527.50	$52,291.36
All Dairy	120,708	$7,887.28	$13,714.64	$52,838.87
Forestry and Fishing	7,445	$332.44	$488.11	$793.65

Table 3b Contribution of Agriculture to the Wisconsin Economy: 2022

	Employment	Labor Income	Total Income	Industry Revenues
All On Farm (%)	3.9	2.6	3.4	3.7
Food Processing (%)	8.1	7.7	8.1	13.1
All of Agriculture (%)	9.5	8.7	9.4	14.3
Dairy On Farm (%)	1.3	1.1	1.3	1.9
Dairy Processing (%)	3.2	3.2	3.4	6.4
All Dairy (%)	3.3	3.2	3.4	6.5
Forestry and Fishing (%)	0.20	0.1	0.1	0.1

Table 4 Fiscal Impacts on Government

	Local Govt (MM$)	State Govt (MM$)	Federal Govt (MM$)	Total (MM$)
All On Farm	$332.24	$621.75	$1,557.56	$2,511.55
Food Processing	$918.78	$1,578.70	$4,479.95	$6,977.43
All Agriculture	$997.24	$1,778.51	$5,084.91	$7,860.66
Dairy On Farm	$212.48	$309.85	$640.27	$1,162.61
Dairy Processing	$422.40	$693.02	$1,868.70	$2,984.12
All Dairy	$430.05	$704.17	$1,891.72	$3,025.94
Forestry-Fishing	$16.25	$26.48	$72.26	$114.99

Sub-State Analysis

To gain further insights into this regional variation separate economic models (input-output) were generated for nine sub-regions of the state as defined by the National Agricultural Statistical Agency Agricultural activity, whether on-farm or food processing, is not evenly distributed across Wisconsin. Prior analysis of the contribution of agriculture consistently revealed that some parts of Wisconsin were more dependent upon farm activities, while others were more dependent on food processing. In two regions, the North Central[8] and the Southwest,[9] agriculture and food processing contributed more than one-fifth of total regional economic activity (Table 5a and 5b). For the Southwest, 27.4% of total industrial revenues depend on agricultural activity. In terms of total economic activity, the largest contribution of agriculture to industrial revenues was in the East Central[10] with a total contribution of $25.87 billion (15.7% of the regional total). The source of the contributions varied across these three regions with food processing dominating in the East Central and North Central regions, but on-farm activity made up a larger share in the Southwest region. This regional variation is evident in a simple mapping of the aggregate contribution to industrial revenues in Figures 9a-9c. The three other measures of economic activity – employment, labor income, and total income – followed similar patterns across Wisconsin.

When compared to the 2017-focused analysis, there are mixed messages. On the one hand, seven of the nine regions experienced a modest increase in the total contribution to industrial sales. The two exceptions, the Southeast and South Central, experienced modest declines. On the other hand, agriculture's share of total economic activity in eight of the nine regions declined. Only the North Central experienced an increase (21.8% in 2017 and 22.6% in 2022). In summary, the size of the non-agricultural sectors in these regional economies grew at a faster rate than agriculture.

Narrowing our focus on dairy, the East Central region was the largest contributor (Figure 10a) with a total impact of $13.3 billion accounting for 8.1% of total economic activity. As with all agricultural activity, the Southwest region of Wisconsin was the most heavily dependent upon dairy, which accounts for 18.1% of total economic activity. Similar to the statewide analysis, the bulk of the contribution of dairy to each regional economy was from dairy processing, which was dominated by cheese production. Compared to the 2017 dairy contribution analysis, five of the nine regions experienced an increase in the total contribution to industrial revenues, but four experienced a decline. Most of the changes were relatively modest. The Northwest[11] region, for example, declined from $1.79 billion in 2017 to $1.69 billion in 2022. But a handful experienced a meaningful increase. The East Central region went from $11.37 billion in 2017 to $13.31 billion in 2022, and the North Central region went from $4.66 billion in 2017 to $7.09 billion in 2022. Examining changes in the percent of total economic activity attributed to all dairy activity, we see a similar pattern with all of agriculture: For much of Wisconsin, the growth in dairy was more modest than non-agricultural growth in the economy, and, therefore, the percentage shares tended to decline.

8 The North Central region is composed of Ashland, Clark, Iron, Lincoln, Marathon, Oneida, Price, Taylor andVilas counties.
9 The South West region is composed of Crawford, Grant, Iowa, Lafayette, Richland, Sauk and Vernoncounties.
10 The East Central region is composed of Brown, Calumet, Door, Kewaunee, Fond Du Lac, Manitowoc, Outagamie, Sheboygan, and Winnebago counties.
11 The North West region is composed of Barron, Bayfield, Burnett, Chippewa, Douglas, Polk, Rusk, Sawyerand Washburn counties.

Table 5a Contribution of Agriculture to the Wisconsin Economy: Substate Regional Analysis

	South East	East Central	North East	North Central	Central	North West	West Central	South West	South Central
Industry Revenues (MM$)									
On-Farm	$1,257.63	$4,707.32	$1,285.90	$2,291.42	$2,195.57	$1,577.72	$3,452.60	$3,134.77	$3,997.43
Food Processing	$12,370.01	$22,758.92	$1,773.10	$8,911.53	$4,617.43	$3,949.54	$8,999.38	$5,441.90	$13,968.74
All Agriculture	$13,432.84	$25,874.81	$2,757.30	$9,904.42	$6,302.86	$5,001.74	$11,528.55	$7,401.17	$16,912.51
On-Farm Dairy	$397.66	$2,976.67	$730.20	$1,439.36	$738.22	$713.17	$1,340.39	$1,327.13	$1,672.38
Dairy Processing	$1,321.26	$11,555.31	$997.60	$6,776.60	$1,647.41	$1,391.73	$4,898.39	$4,609.53	$5,587.50
All Dairy	$1,607.88	$13,311.97	$1,493.90	$7,086.97	$2,027.19	$1,696.00	$5,676.56	$4,875.99	$6,264.75
Employment									
On-Farm	6,786	20,556	6,254	11,643	11,182	9,870	18,340	17,116	19,166
Food Processing	30,140	48,340	4,130	18,748	11,131	9,409	22,009	11,725	32,707
All Agriculture	36,190	63,597	9,386	25,357	20,106	17,086	36,214	24,374	47,318
On-Farm Dairy	1,168	9,062	2,282	4,544	2,207	2,682	4,329	4,346	5,052
Dairy Processing	2,259	19,433	1,825	12,057	3,068	2,971	8,869	8,510	10,028
All Dairy	3,084	24,833	3,385	13,068	4,084	4,124	11,393	9,414	11,966
Labor Income (MM$)									
On-Farm	$242.11	$953.23	$262.50	$494.94	$395.45	$302.52	$591.46	$611.53	$818.72
Food Processing	$2,178.34	$3,424.07	$225.80	$1,134.58	$627.42	$498.49	$1,384.52	$606.01	$2,098.75
All Agriculture	$2,401.28	$4,104.84	$450.90	$1,423.97	$951.22	$741.06	$1,857.23	$1,059.73	$2,761.45
On-Farm Dairy	$52.59	$489.26	$111.60	$238.69	$89.84	$99.65	$171.31	$185.58	$243.54
Dairy Processing	$159.19	$1,446.16	$106.60	$783.43	$165.58	$151.59	$606.49	$469.88	$643.69
All Dairy	$196.83	$1,741.49	$184.50	$831.53	$206.78	$196.67	$709.08	$506.74	$744.01
Total Income (MM$)									
On-Farm	$630.18	$1,921.06	$525.20	$960.46	$1,052.81	$686.16	$1,496.97	$1,419.18	$1,824.23
Food Processing	$3,637.13	$5,353.00	$383.10	$1,912.06	$1,136.41	$866.36	$2,411.56	$1,118.93	$3,632.38
All Agriculture	$4,193.00	$6,734.00	$810.30	$2,440.57	$2,012.28	$1,387.78	$3,589.30	$2,170.43	$5,162.00
On-Farm Dairy	$120.48	$904.39	$213.20	$451.92	$216.40	$211.29	$402.99	$396.47	$533.11
Dairy Processing	$286.35	$2,294.65	$179.80	$1,358.33	$310.85	$266.71	$1,083.54	$868.66	$1,072.23
All Dairy	$372.11	$2,834.27	$326.50	$1,452.10	$420.66	$357.53	$1,318.68	$949.89	$1,296.03

Table 5b Contribution of Agriculture to the Wisconsin Economy as a Share of Region Total: Substate Regional Analysis

	South East	East Central	North East	North Central	Central	North West	West Central	South West	South Central
Industry Revenues (%)									
On-Farm	0.5	2.9	8.6	5.2	6.5	4.6	5.2	11.6	2.6
Food Processing	4.4	13.8	11.9	20.4	13.7	11.6	13.6	20.2	9.2
All Agriculture	4.8	15.7	18.5	22.6	18.7	14.7	17.4	27.4	11.1
On-Farm Dairy	0.1	1.8	4.9	3.3	2.2	2.1	2	4.9	1.1
Dairy Processing	0.5	7	6.7	15.5	4.9	4.1	7.4	17.1	3.7
All Dairy	0.6	8.1	10	16.2	6	5	8.6	18.1	4.1
Employment (%)									
On-Farm	0.5	3	8.4	6	7	6.5	5.5	12.8	2.8
Food Processing	2.3	7.1	5.5	9.7	7	6.2	6.7	8.8	4.8
All Agriculture	2.8	9.4	12.6	13.1	12.7	11.2	11	18.3	6.9
On-Farm Dairy	0.1	1.3	3.1	2.4	1.4	1.8	1.3	3.3	0.7
Dairy Processing	0.2	2.9	2.4	6.2	1.9	2	2.7	6.4	1.5
All Dairy	0.2	3.7	4.5	6.8	2.6	2.7	3.4	7.1	1.8
Labor Income (%)									
On-Farm	0.3	2.1	6.8	4.4	4.4	3.8	3	8.4	1.7
Food Processing	2.4	7.7	5.9	10.2	7	6.2	7.1	8.3	4.3
All Agriculture	2.6	9.3	11.7	12.8	10.6	9.2	9.5	14.6	5.7
On-Farm Dairy	0.1	1.1	2.9	2.1	1	1.2	0.9	2.6	0.5
Dairy Processing	0.2	3.3	2.8	7	1.8	1.9	3.1	6.5	1.3
All Dairy	0.2	3.9	4.8	7.5	2.3	2.4	3.6	7	1.5
Total Income (%)									
On-Farm	0.4	2.6	8.1	5.2	6.8	4.8	4.7	11.5	2.3
Food Processing	2.5	7.3	5.9	10.3	7.3	6.1	7.5	9.1	4.5
All Agriculture	2.8	9.2	12.5	13.1	12.9	9.7	11.2	17.6	6.4
On-Farm Dairy	0.1	1.2	3.3	2.4	1.4	1.5	1.3	3.2	0.7
Dairy Processing	0.2	3.1	2.8	7.3	2	1.9	3.4	7	1.3
All Dairy	0.3	3.9	5.1	7.8	2.7	2.5	4.1	7.7	1.6

Figure 9 All Agriculture Contribution to Industrial Revenues (MM$)

Figure 9a All Agriculture Contribution to Industrial Revenues (MM$)

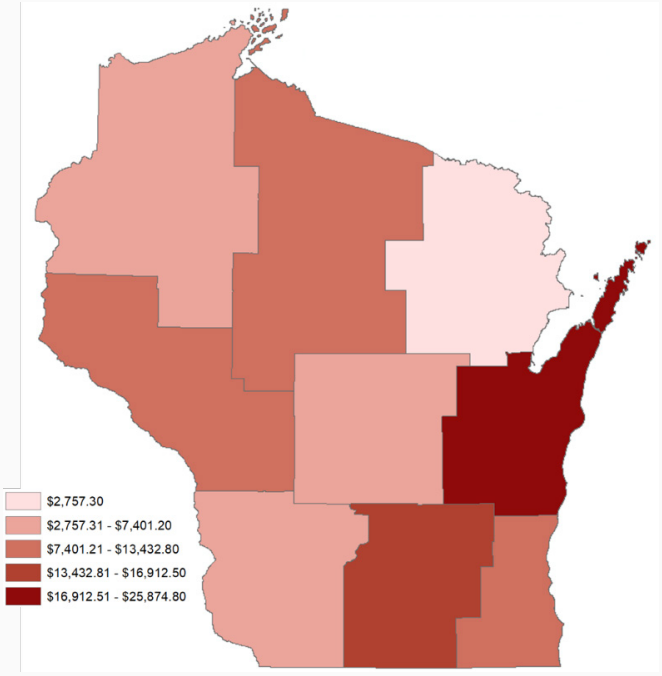


Figure 9b On Farm Contribution to Industrial Revenues (MM$)

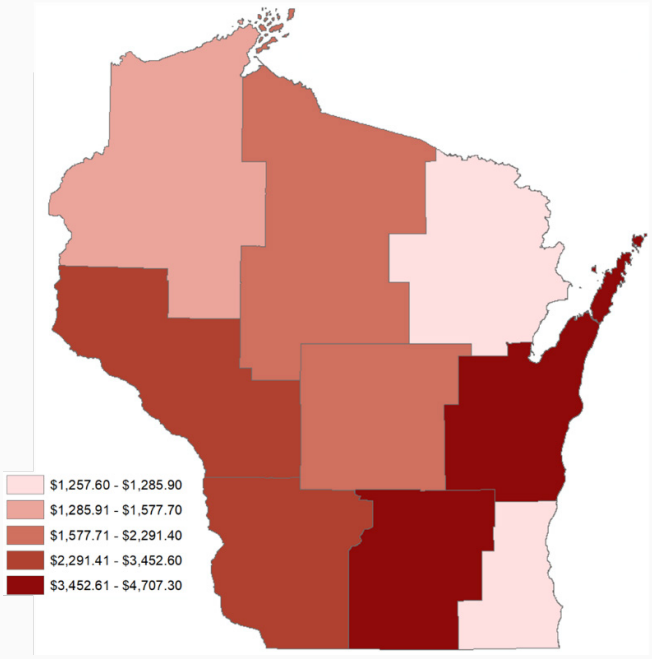


Figure 9c Food Processing Contribution to Industrial Revenues (MM$)

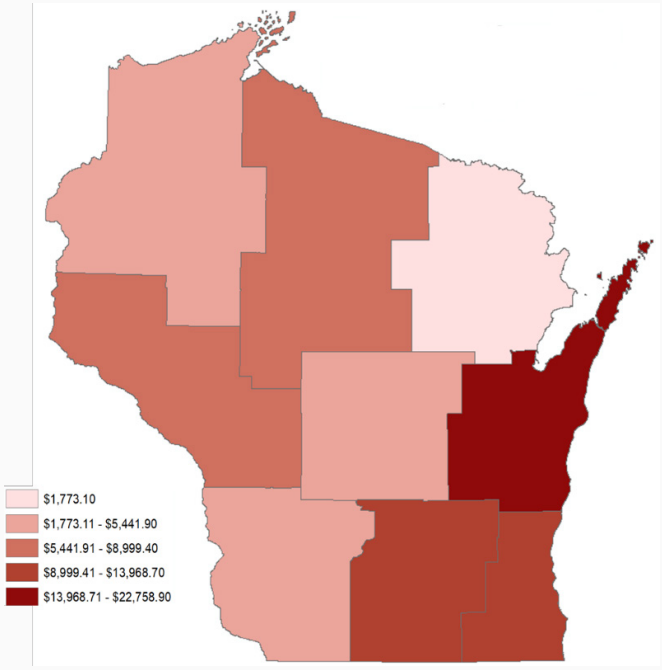


Figure 10 Dairy Processing Contribution to Industrial Revenues (MM$)

Figure 10a All Dairy Contribution to Industrial Revenues (MM$)

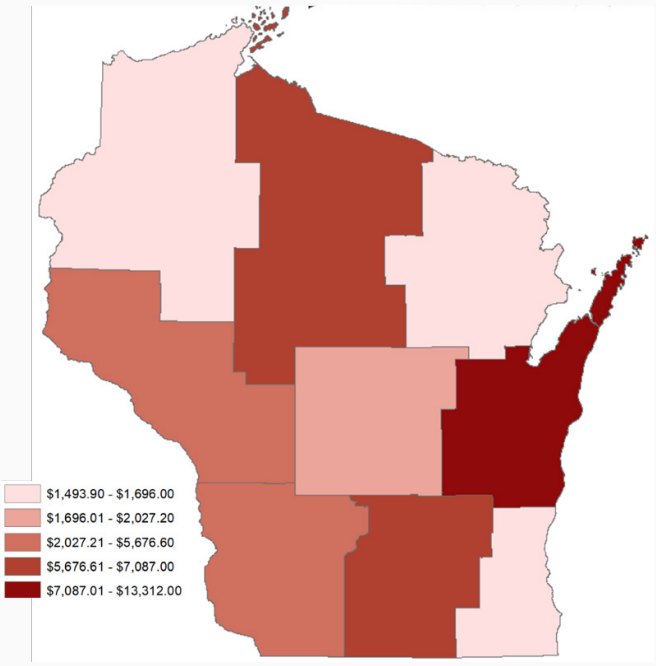


Figure 10b Dairy on Farm Contribution to Industrial Revenues (MM$)

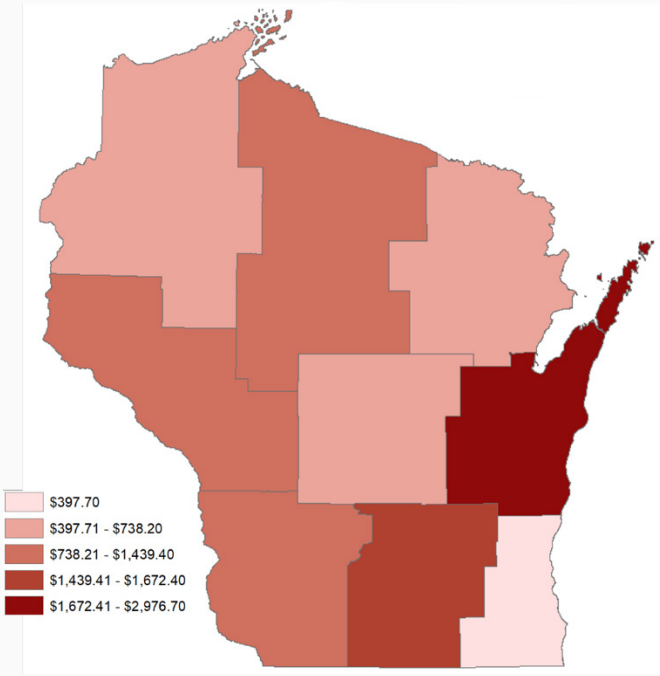
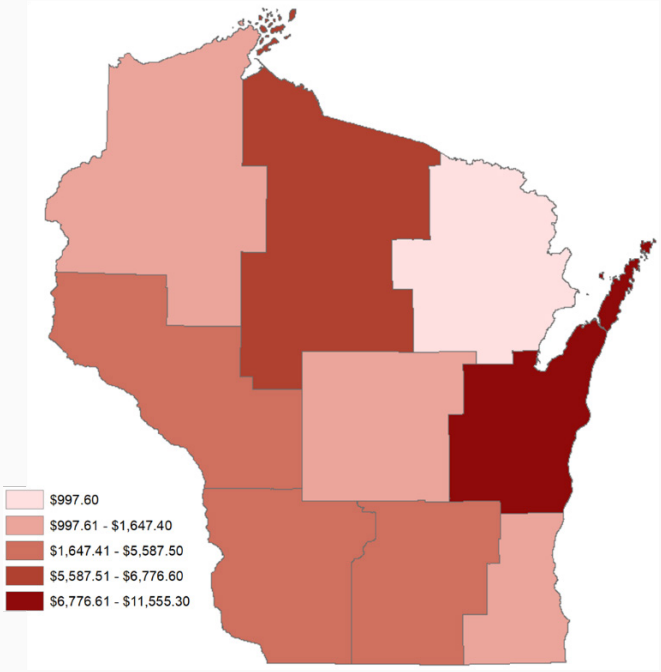


Figure 10c Dairy Processing Contribution to Industrial Revenues (MM$)



Environmental Impacts

As highlighted thus far, Wisconsin agriculture plays a pivotal role in the State's economy, contributing a significant share of the State's GDP and earnings. It is important to recognize that with the size of the industry, there are also consequences for the State's natural resources. Increasingly, agricultural and food businesses and public entities are expected to maintain a detailed accounting of environmental contributions at every stage of their supply chain, including the production of raw agricultural commodities. While some of the shifts in agri-environmental policy and regulations may carry costly implications for Wisconsin agriculture, farms and food processors that reduce their environmental footprints can leverage new policies and markets to add value in non-traditional ways to their operations. Thus, having a baseline understanding of the environmental contributions of the State's agricultural sector can be informative to the economic opportunities that lie ahead. The goal of this section is to provide a brief discussion about the environmental implications of agriculture in Wisconsin based on similar methods used by federal agencies to track industrial emissions.

We will focus on three key measures of environmental impact: Greenhouse Gas Emissions (in millions of metric tons of carbon dioxide equivalent), Nitrogen and Phosphorus Releases (in metric tons), and Water Withdrawals (in acre-feet of water). The methodology in this section mirrors the economic contributions using IMPLAN's input-output framework.

We report both on-farm and food-processing environmental impacts from the agricultural industry to be consistent with the contribution analysis. These results also account for direct, indirect, and induced (see appendix for definitions) activities so that the economic and environmental impacts are interpreted on equal footing. In that regard, it is worthwhile clarifying that our reported environmental contributions may exceed traditional values (i.e. direct only) reported by some agencies. The same logic applies to the economic contributions: The total industry revenue we report above exceeds typical annual cash receipts statistics because this analysis incorporates downstream impacts of the industry's expansion.

Table 6 reports the state-level summary of these measures. In what follows, we will discuss each environmental metric separately and their implications for the industry moving forward. We will discuss contributions from the direct and indirect channels for each of the measures and disaggregate the impacts regionally and between the dairy and non-dairy sectors. Where a good industry comparison exists, we will compare agriculture's environmental impact with several other sectors of Wisconsin industry to provide context for the measures. Note that because agricultural processing has feedback effects on farm activity, we can not simply add the separate farm and processing impacts together for the total environmental impacts as those feedback effects would result in double counting.

12 A caveat worth noting in this framework is that the coefficients of per unit (e.g. per dollar of revenue) impact are based on nationwide estimates. If Wisconsin is more/less environmentally efficient atproducing a given unit of product than other states, this analysis will understate/overstate the actual environmental impact. In the future, IMPLAN and the EPA hope to have state-specific coefficients of environmental efficiency for a more accurate environmental impact.

Table 6 Contribution of Wisconsin Agriculture to Environmental Resources: 2022

	GHG MMTCO2e	Nitrogen and Phosphorus Million Lbs	Water Use Millions AF
All On Farm	8.22	179.91	4.54
Food Processing	14.13	87.7	2.68
All Agriculture	17.78	179.91	4.78
Dairy On Farm	3.49	25.83	0.59
Dairy Processing	6.88	25.28	0.66
All Dairy	7	26.21	0.68
Forestry-Fishing	0.14	0.15	0.01

Greenhouse Gas Emissions

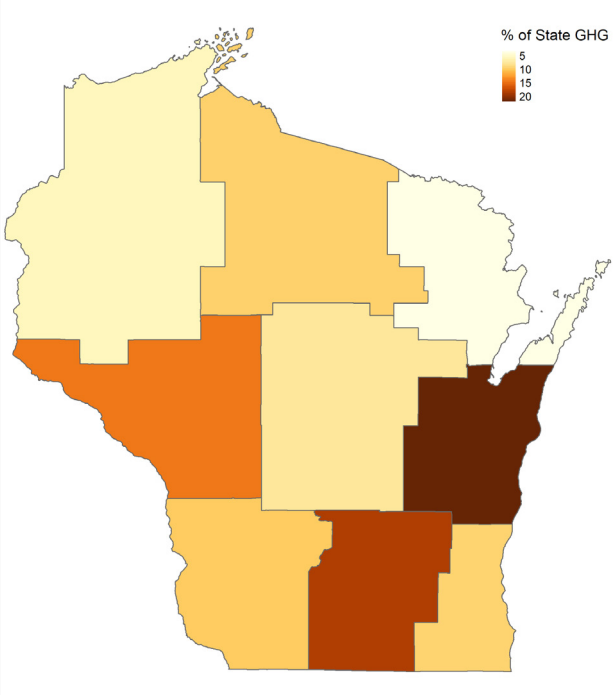
Reducing global greenhouse gas emissions (GHGs) is one of the most highly discussed and controversial environmental challenges of our time. Almost all countries have implemented climate or carbon policies in the last decade to limit the impacts of climate change. These policies include subsidies for renewable energy generation, cap and trade systems, and carbon taxation. While agriculture is only a part of the contributor to global greenhouse gas emissions (estimates range from 10-26%; e.g. see U.S. EPA, 2024 and Ritchie, 2019), agriculture plays a critical role in reaching local and global greenhouse gas reduction targets. In this section, we develop a baseline for Wisconsin agriculture's greenhouse gas contributions and which channels and regions are the largest contributors.

The EPA estimates that all industries in the state of Wisconsin annually emit about 122.5 million metric tons of carbon dioxide equivalent (MMTCO2e) (U.S. EPA, 2024). As shown in Table 6, we report that agriculture contributes 17.7 MMTCO2e or 14% of the state total. This number includes both the direct and indirect effects of agricultural production. The direct effect – which is driven by the cultivation of soils, enteric emissions from ruminant livestock, nitrous oxide from synthetic fertilizers and manure, and carbon dioxide from machinery -- accounts for about 95% of the GHG impact from agricultural activity. While the indirect effect -- which largely results from agriculture's demand for energy and transportation -- accounts for the other 5%. For comparison, the entire transportation sector in the state contributes 18.7 MMTCO2e or 15% of the State's total. It is also important to note that agriculture and forestry also have the potential to sequester carbon, which may partially offset these impacts, but agriculture as a whole is still a net positive emitter of greenhouse gases.

Of the agricultural total, grain farming, dairy, and beef are the leading contributors to GHG emissions in agriculture in that order, which is unsurprising given that these are also the three leading commodities in terms of sales. We give special attention to the dairy sector. Dairy and dairy processing contribute 7 MMTCO2e from direct and indirect activities. A subregional breakdown of the State's aggregate GHG emissions is provided in Figure 11, with the East Central region contributing the most at 21%, driven by the heavy share dairy and dairy processing in the region.

These physical contributions can be converted to monetary values for the sake of cost-benefit analyses of policy abatement options. The social cost of carbon measures the monetary value of damages from every ton of carbon emitted. Most of the U.S. government uses a social cost of carbon estimates that range from $51 to $190 per ton of CO2e. Given these values and the physical carbon emissions from agriculture, we can roughly calculate that Wisconsin agriculture contributes between $902 million and $3.3 billion worth of greenhouse gas-related damages annually. A key question for policy is whether changes to agricultural practices, technology, land use, and supply chains can reduce or sequester carbon in a cost-effective manner.

Figure 11 Greenhouse Gas Emissions from Agriculture by Region

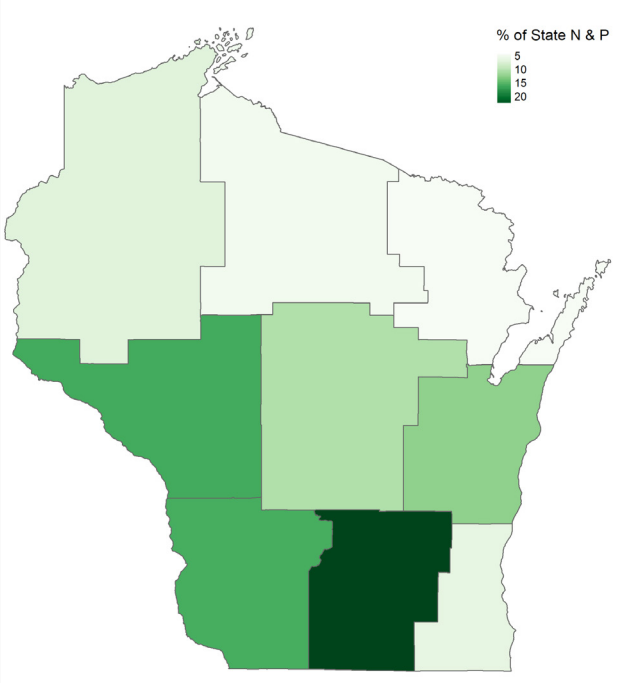


Nitrogen and Phosphorus

Wisconsin's water resources are an important amenity for the livability of the state and play an important role in many industries. As many Wisconsin residents are all too aware, water quality degradation threatens human health, property values, safe drinking water, aquatic life, and outdoor recreation. Much, but certainly not all, of water pollution in the state results from nitrogen and phosphorus fertilizers used for agriculture. This has led to a renewed focus from the state legislature to reduce nonpoint source pollution on-farm and optimize fertilizer application, like the Producer-Led Watershed Grant Program, the Nitrogen Optimization Pilot Program, the Crop Insurance Rebates for Planting Cover Crop, among others. These programs are founded on the belief that implementing best management practices on-farm can meaningfully and sustainably reduce nitrogen and phosphorus leaching and runoff.

In total, all of agriculture emits 179 million lbs of nitrogen and phosphorus annually. The vast majority of this (89%) results from grain and oilseed farming. It is important to note that this methodology only tracks nitrogen and phosphorus from agricultural sources, and does not account for releases from other sectors, like municipal and wastewater treatment. The subregional contributions of nitrogen and phosphorus from agriculture are detailed in Figure 12. The pattern here largely matches row-crop production patterns in the state, with the South-Central region contributing the most in aggregate.

Figure 12 Nitrogen and Phosphorus Releases from Agriculture by Region

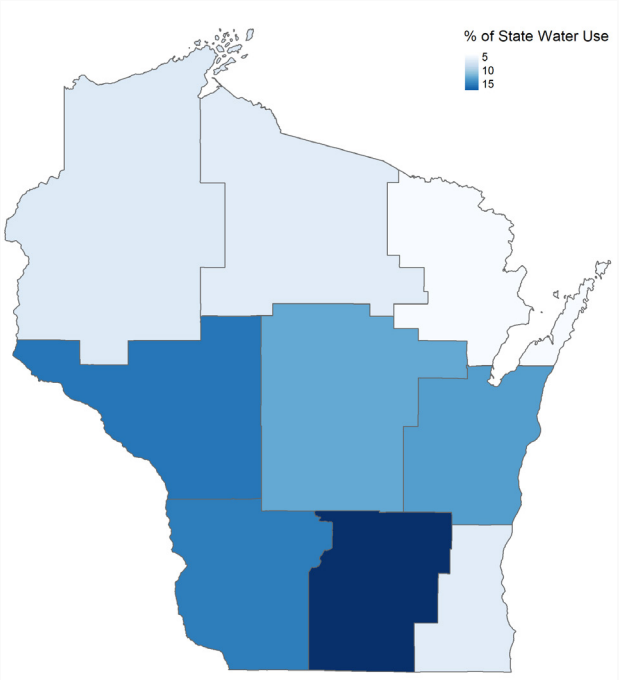


Water Withdrawals

Most of Wisconsin agriculture is dryland. According to the 2022 Ag Census, only about 475,000 acres of Wisconsin's total ag acreage is irrigated (about 3.5%). However, irrigation still serves a critical economic role in the Central Sands for high-value potatoes and processed vegetables. About 75% of those acres belong to operations with over $1 million in annual sales. Almost all of Wisconsin's irrigation water is sourced from groundwater aquifers (Hrozencik and Aillery, 2021). While precipitation is typically sufficient to recharge groundwater levels in the state, interannual fluctuations and drought can impose challenges to water access in some years, including interplays between ground and surface water. Wisconsin also has seen an uptick in irrigated acreage in the last two decades, meaning that agricultural water use may increasingly be important to monitor, especially in extreme years.

Like before, the subregion analysis for water use may not directly match traditional patterns of raw water use from the USDA census. In general, grain farming leads commodities in water withdrawals, and like Nitrogen and Phosphorus, the subregion breakdown largely matches grain farming. While the Central part of the state may use water more intensively (on a per acre basis), in aggregate, agriculture in the South Central part of the state contributes the most to water use.

Figure 13 Water Withdrawals from Agriculture by Region



Summary and Concluding Observations

Agriculture, both on-farm and food processing, remains an important part of Wisconsin's culture and economy. The state has a considerable comparative advantage in several agricultural sectors, including dairy, grain farming, and vegetable farming. These sectors are strengths of the state, in part, due to the complex network of infrastructure and supporting industries that work in tandem to support the industry as a whole and the economies of Wisconsin's rural communities. We also outline several key challenges that have defined the changing nature of the industry. In particular, on-farm economic activities are declining in general, and as a result, the contribution of on-farm agriculture to the State's economy is subsiding. With this trend, income from on-farm activity has grown smaller and more people have transitioned out of the industry. But at the same time, food processing in its many unique forms has grown in economic importance and created new opportunities for adding value to food production. Looking forward, a central challenge is identifying these opportunities to capitalize on this shift and discovering ways for both on-farm activities and food processing to best complement each other.

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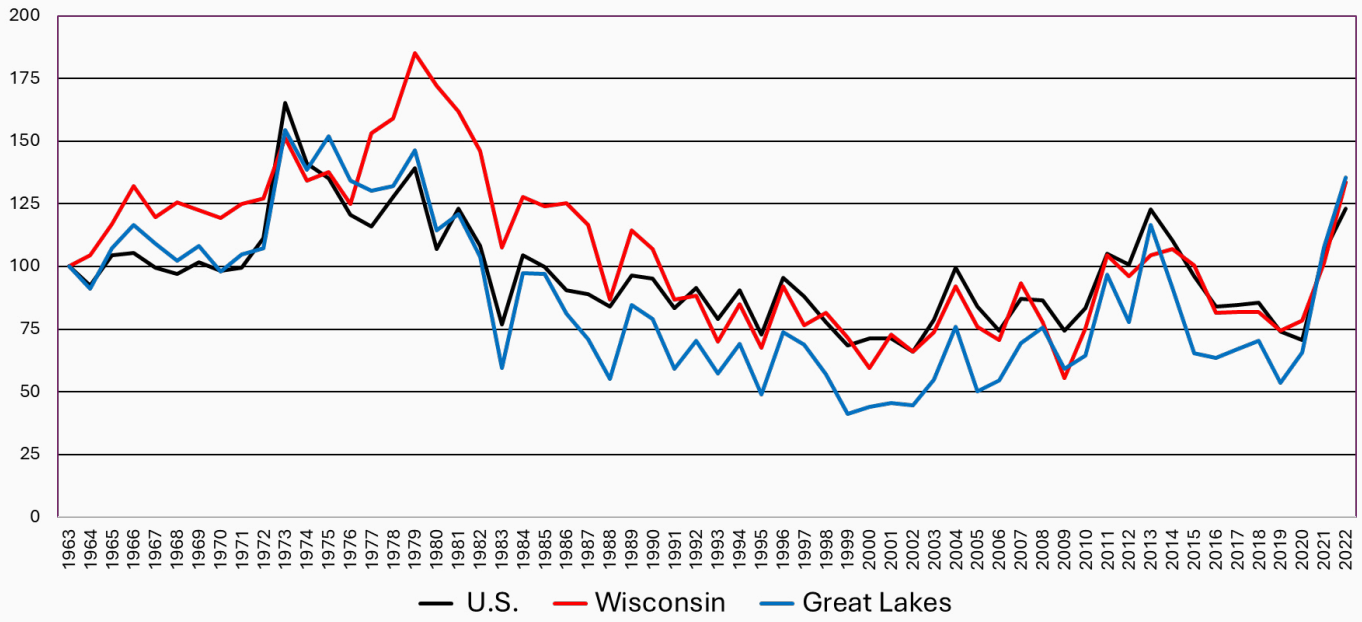
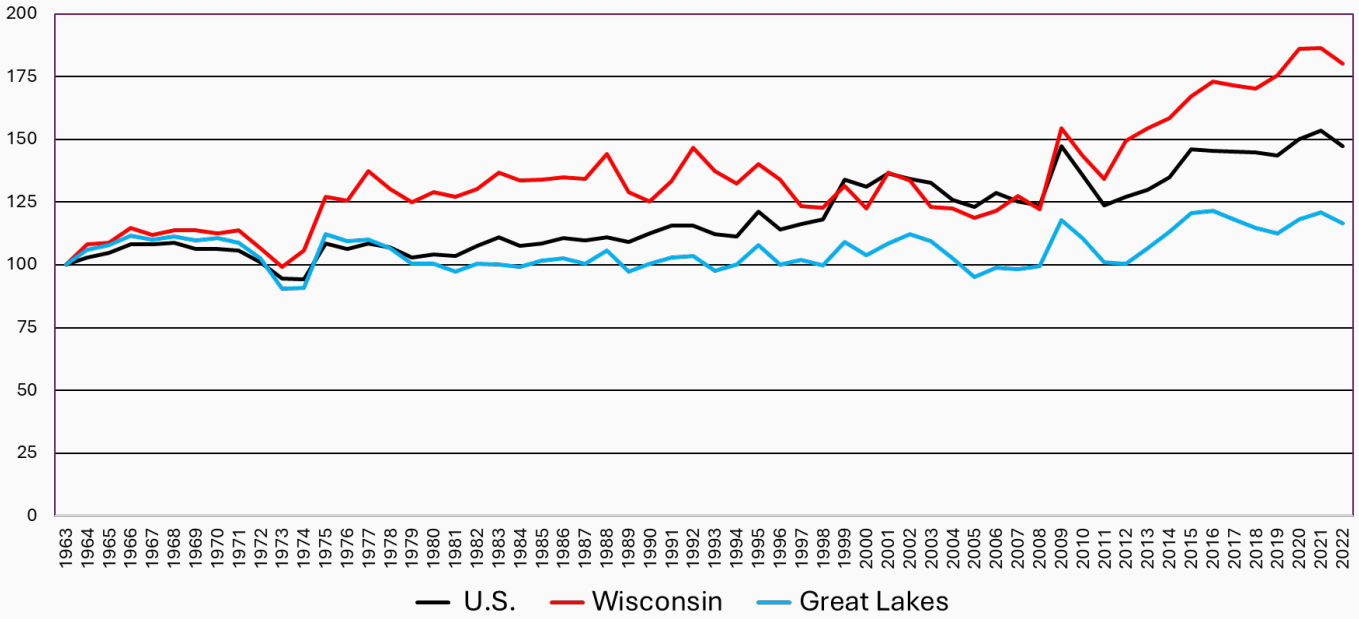
Appendix 1: Wisconsin, U.S., and Great Lakes States Historical Trends

Figure 1A On-Farm Gross Domestic Product Growth Index (in 2022 dollars)



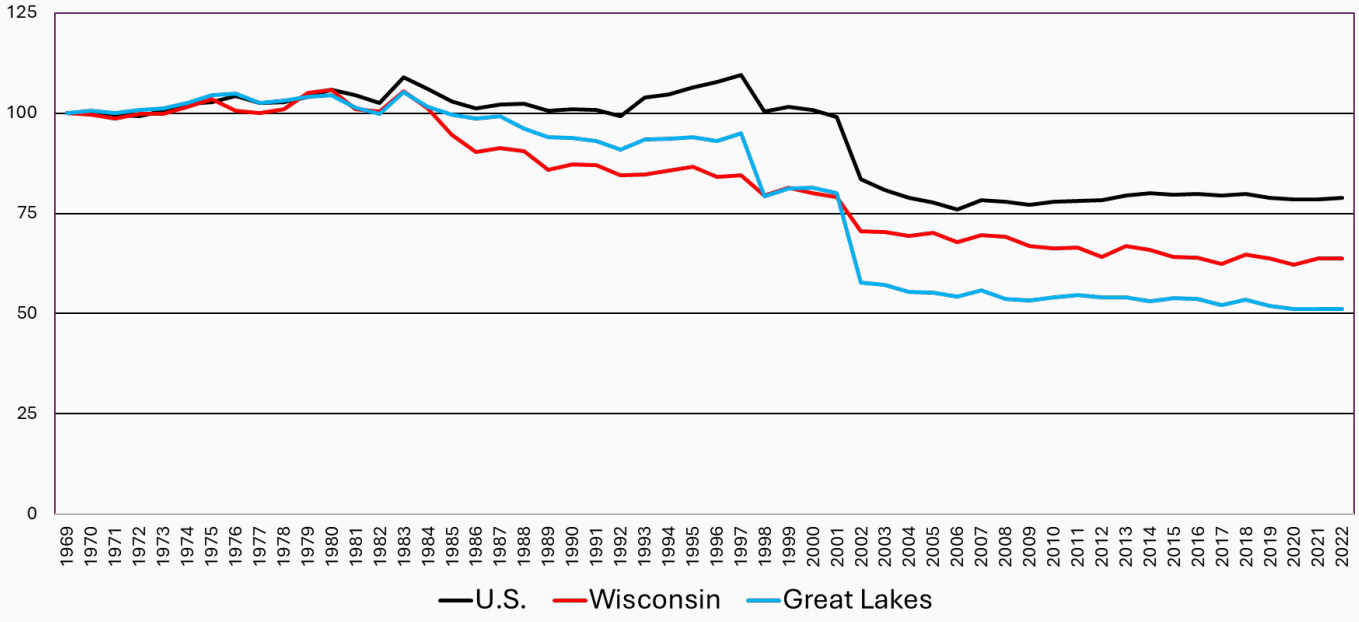
Source: BEA-REIS, calculations by the authors.

Figure 1B Food Processing Gross Domestic Product Growth Index (in 2022 dollars)



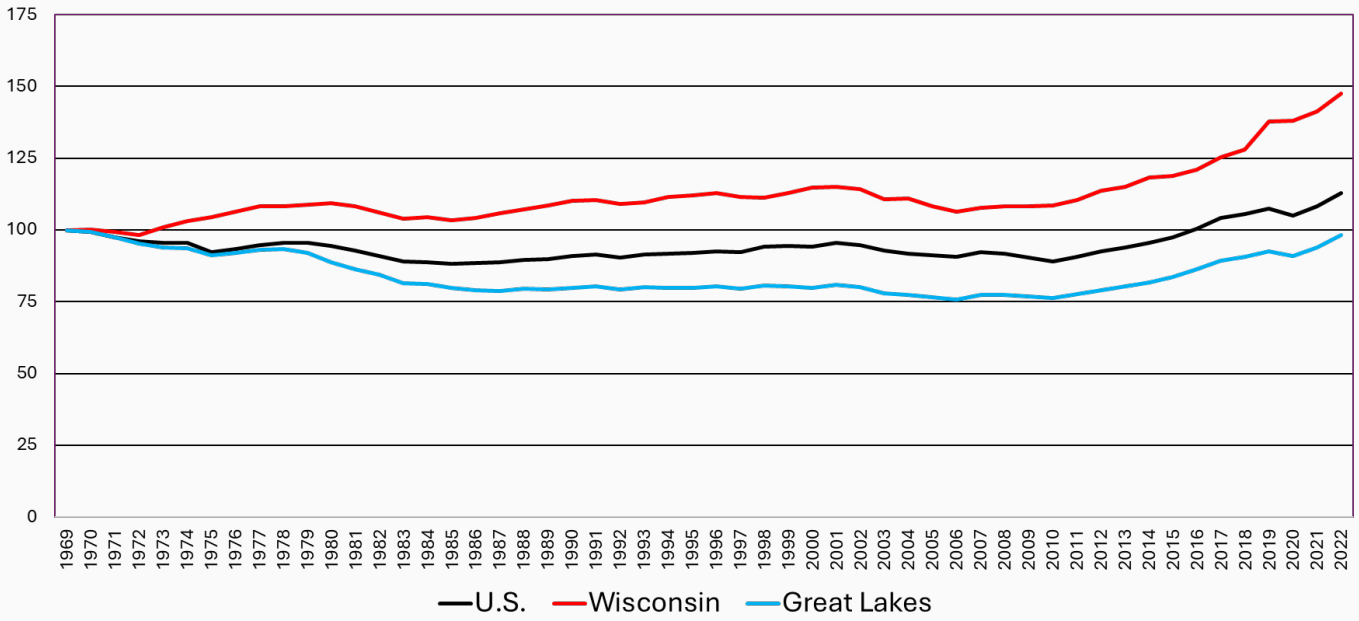
Source: BEA-REIS, calculations by the authors.

Figure 1C On-Farm Employment Growth Index



Source: BEA-REIS, calculations by the authors.

Figure 1D Food Processing Employment Growth Index



Source: BEA-REIS, calculations by the authors.

Appendix 2: Input-Output Modeling and Multipliers

Basics of Input-Output Modeling: We present a simple non-technical discussion of the formulation of input-output (IO) modeling in this section. An example of similar descriptive treatments would be Shaffer, Deller and Marcouiller (2004). An example of a more advanced discussion of input-output would be Miernyk (1965), and Miller and Blair (1985). As a descriptive tool, IO analysis represents a method for expressing the economy as a series of accounting transactions within and between the producing and consuming sectors. As an analytical tool, IO analysis expresses the economy as an interaction between the supply and demand for commodities. Given these interpretations, the IO model may be used to assess the impacts of alternative scenarios on the region's economy.

Transactions Table: A central concept of IO modeling is the interrelationship between the producing sectors of the region (e.g., manufacturing firms), the consuming sectors (e.g., households) and the rest of the world (i.e., regional imports and exports). The simplest way to express this interaction is through a regional transactions table (Table A1). The transactions table shows the flow of all goods and services produced (or purchased) by sectors in the region. The key to understanding this table is realizing that one firm's purchases are another firm's sales and that producing more of one output requires the production or purchase of more of the inputs needed to produce that product.

Table A1 Illustrative Transaction Table

Processing Sectors (Sellers/Supply)	Purchasing Sectors (Buyers/Demand)			Final Demand		Output
	Agr	Mfg	Serv	HH (labor)	Exports	
Agr	10	6	2	20	12	50
Mfg	4	4	3	24	14	49
Serv	6	2	1	34	10	53
HH (labor)	16	25	38	1	52	132
Imports	14	12	9	53	0	88
Inputs	50	49	53	132	88	372

The transactions table may be read from two perspectives: reading down a column gives the purchases by the sector named at the top of the column from each of the sectors named at the left. Reading across a row gives the sales of the sector named at the left of the row to those named at the top. In the illustrative transaction table for a fictitious regional economy (Table 1), reading down the first column shows that the agricultural firms buy $10 worth of their inputs from other agricultural firms. The sector also buys $4 worth of inputs from manufacturing firms and $6 worth from the service industry. Note that agricultural firms also made purchases from non-processing sectors of the economy, such as the household sector ($16) and imports from other regions ($14). Purchases from the household sector represent value added, or income to people in the form of wages and investment returns. In this example, agricultural firms purchased a total of $50 worth of inputs.

Reading across the first row shows that agriculture sold $10 worth of its output to agriculture, $6 worth to manufacturing, $2 worth to the service sector. The remaining $32 worth of agricultural output was sold to households or exported out of the region. In this case $20 worth of agricultural output was sold to households within the region and the remaining $12 was sold to firms or households outside the region. In the terminology of IO modeling, $18 (=$10+$6+$2) worth of agricultural output was sold for intermediate consumption, and the remaining $32 (=$20+$12) worth was sold to final demand. Note that the transactions table is balanced: total agricultural output (the sum of the row) is exactly equal to agricultural purchases (the sum of the column). In an economic sense, total outlays (column sum, $50) equal total income (row sum, $50), or supply exactly equals supply. This is true for each sector.

The transactions table is important because it provides a comprehensive picture of the region's economy. Not only does it show the total output of each sector, but it also shows the interdependencies between sectors. It also indicates the sectors from which the region's residents earn income as well as the degree of openness of the region through imports and exports. In this example, households' total income, or value added for the region is $132 (note total household income equals total household expenditure), and total regional imports is $88 (note regional imports equals regional exports). More open economies will have a larger percentage of total expenditures devoted to imports. As discussed below, the "openness" of the economy has a direct and important impact on the size of economic multipliers. Specifically, more open economies have a greater share of purchases, both intermediate and final consumption purchases, taking the form of imports. As new dollars are introduced (injected from exports) into the economy they leave the economy more rapidly through leakages (imports).

Direct Requirements Table: Important production relationships in the regional economy can be further examined if the patterns of expenditures made by a sector are stated in terms of proportions. This means that the proportions of all inputs needed to produce one dollar of output in a given sector can be used to identify linear production relationships. This is accomplished by dividing the dollar value of inputs purchased from each sector by total expenditures. Or, each transaction in a column is divided by the column sum. The resulting table is called the direct requirements table (Table A2).

The direct requirements table, as opposed to the transactions table, can only be read down each column. Each cell represents the dollar amount of inputs required from the industry named at the left to produce one dollar's worth of output from the sector named at the top. Each column essentially represents a `production recipe' for a dollar's worth of output. Given this latter interpretation, the upper part of the table (above households) is often referred to as the matrix of technical coefficients. In this example, for every dollar of sales by the agricultural sector, 20 cents worth of additional output from itself, 8 cents of output from manufacturing, 12 cents of output from services, and 32 cents from households will be required. In the example region, an additional dollar of output by the agricultural sector requires firms in agriculture to purchase a total of 40 cents from other firms located in the region. If a product or service required in the production process is not available from within the region, the product must be imported. In the agricultural sector, 28 cents worth of inputs are imported for each dollar of output. It is important to note that in IO analysis, this production formula, or technology (the column of direct requirement coefficients), is assumed to be constant and the same for all establishments within a sector. This assumption holds regardless of input prices or production levels.

Table A2 Illustrative Direct Requirements Table

	Purchasing Sectors (Buyers/Demand)		
Processing Sectors (Sellers/Supply)	**Agr**	**Mfg**	**Serv**
Agr	**0.20**	**0.12**	**0.04**
Mfg	**0.08**	**0.08**	**0.06**
Serv	**0.12**	**0.04**	**0.02**
HH (labor)	**0.32**	**0.51**	**0.72**
Imports	**0.28**	**0.24**	**0.02**
Inputs	**1.00**	**1.00**	**1.00**

Assuming the direct requirements table also represents spending patterns necessary for additional production, the effects of a change in final demand of the output on the other of sectors can be predicted. For example, assume that export demand for the region's agricultural products increases by $100,000. From Table 2, it can be seen that any new final demand for agriculture will require purchases from the other sectors in the economy. The amounts shown in the first column are multiplied by the change in final demand to give the following figures: $20,000 from agriculture, $8,000 from manufacturing,

and $12,000 from services. These are called the direct effects and, in this example, they amount to a total impact on the economy of $140,000 (the initial change [$100,000] plus the total direct effects [$40,000]). For many studies of economic impact the direct and initial effects are treated as the same although there are subtle differences.

The strength of input-output modeling is that it does not stop at this point, but also measures the indirect effects of an increase in agricultural exports. In this example, the agricultural sector increased purchases of manufactured goods by $8,000. To supply agriculture's new need for manufacturing products, the manufacturing sector must increase production. To accomplish this, manufacturing firms must purchase additional inputs from the other regional sectors.

Continuing our $100,000 increase in export demand for a region's agricultural products, for every dollar increase in output, manufacturing must purchase an additional 12 cents of agricultural goods ($8,000 x .12 = $960), 8 cents from itself ($8,000 x .08 = $640), and 4 cents from the service sector ($8,000 x .04 = $320). Thus, the impact on the economy from an increase in agricultural exports will be more than the $140,000 identified previously. The total impact will be $140,000 plus the indirect effect on manufacturing totaling $1,920 ($960 + $640 + $320), or $141,920. A similar process examining the service sector increases the total impact yet again by $1,440 ([$12,000 x .04] + [$12,000 x .06] + [$12,000 x .02] = $1,440).

The cycle does not stop, however, after only two rounds of impacts. To supply the manufacturing sectors with the newly required inputs, agriculture must increase output again, leading to an increase in manufacturing and service sector outputs. This process continues until the additional increases drop to an insignificant amount. The total impact on the regional economy, then, is the sum of a series of direct and indirect impacts. Fortunately, the sum of these direct and indirect effects can be more efficiently calculated by mathematical methods. The methodology was developed by the Noble winning economist Wassily Leontief and is easily accomplished using computerized models.

Total Requirements Table: Typically, the result of the direct and indirect effects is presented as a total requirements table, or the Leontief inverse table (Table A3). Each cell in Table 3 indicates the dollar value of output from the sector named at the left that will be required in total (i.e., direct plus indirect) for a one dollar increase in final demand for the output from the sector named at the top of the column. For example, the element in the first row of the first column indicates the total dollar increase in output of agricultural production that results from a $1 increase in final demand for agricultural products is $1.28. Here the agricultural multiplier is 1.28: for every dollar of direct agricultural sales there will be an additional 28 cents of economic activity as measured by industry sales.

Table A3 Illustrative Total Requirements Table

	Purchasing Sectors (Buyers/Demand)		
Processing Sectors (Sellers/Supply)	**Agr**	**Mfg**	**Serv**
Agr	**1.28**	**0.17**	**0.06**
Mfg	**0.12**	**1.11**	**0.07**
Serv	**0.16**	**0.07**	**1.03**
Inputs	**1.56**	**1.35**	**1.16**

An additional interpretation of the transactions table, as well as the direct requirements and total requirements tables, is the measure of economic linkages within the economy. For example, the element in the second row of the first column indicates the total increase in manufacturing output due to a dollar increase in the demand for agricultural products is 12 cents. This allows the analyst to not only estimate the total economic impact but also provide insights into which sectors will be impacted and to what level.

Highly linked regional economies tend to be more self-sufficient in production and rely less on outside sources for inputs. More open economies, however, are often faced with the requirement of importing production inputs into the region. The degree of openness can be obtained from the direct requirements table (Table 2) by reading across the imports row. The higher these proportions are, the more open the economy. As imports increase, the values of the direct requirement coefficients must, by definition, decline. It follows then that the values making up the total requirements table, or the multipliers, will be smaller. In other words, more open economies have smaller multipliers due to larger imports. The degree of linkage can be obtained by analyzing the values of the off- diagonal elements (those elements in the table with a value of less than one) in the total requirements table. Generally, larger values indicate a tightly linked economy, whereas smaller values indicate a looser or more open economy.

Basics of Input-Output Multipliers: Through the discussion of the total requirements table, the notion of external changes in final demand rippling throughout the economy was introduced. The total requirements table can be used to compute the total impact a change in final demand for one sector will have on the entire economy. Specifically, the sum of each column shows the total increase in regional output resulting from a $1 increase in final demand for the column heading sector. Retaining the agricultural example, an increase of $1 in the demand for agricultural output will yield a total increase in regional output equal to $1.56 (Table 3). This figure represents the initial dollar increase plus 56 cents in direct and indirect effects. The column totals are often referred to as output multipliers.

The use of these multipliers for policy analysis can prove insightful. These multipliers can be used in preliminary policy analysis to estimate the economic impact of alternative policies or changes in the local economy. In addition, multipliers can be used to identify the degree of structural interdependence between each sector and the rest of the economy. For example, in the illustrative region, a change in the agriculture sector would influence the local economy to the greatest extent, while changes in the service sector would produce the smallest change. The output multiplier described here is perhaps the simplest input-output multiplier available. The construction of the transactions table and its associated direct and total requirements tables creates a set of multipliers ranging from output to employment multipliers. Input-output analysis specifies this economic change, most commonly, as a change in final demand for some product. Economists sometimes might refer to this as the "exogenous shock" applied to the system. Simply stated, this is the way we attempt to introduce an economic change.

The complete set includes:

Type	Definition
1. Output Multiplier	The output multiplier for industry i measures the sum of direct and indirect requirements from all sectors needed to deliver one additional dollar unit of output of i to final demand.
2. Income Multiplier	The income multiplier measures the total change in income throughout the economy from a dollar unit change in final demand for any given sector.
3. Employment Multiplier	The employment multiplier measures the total change in employment due to a one-unit change in the employed labor force of a particular sector.

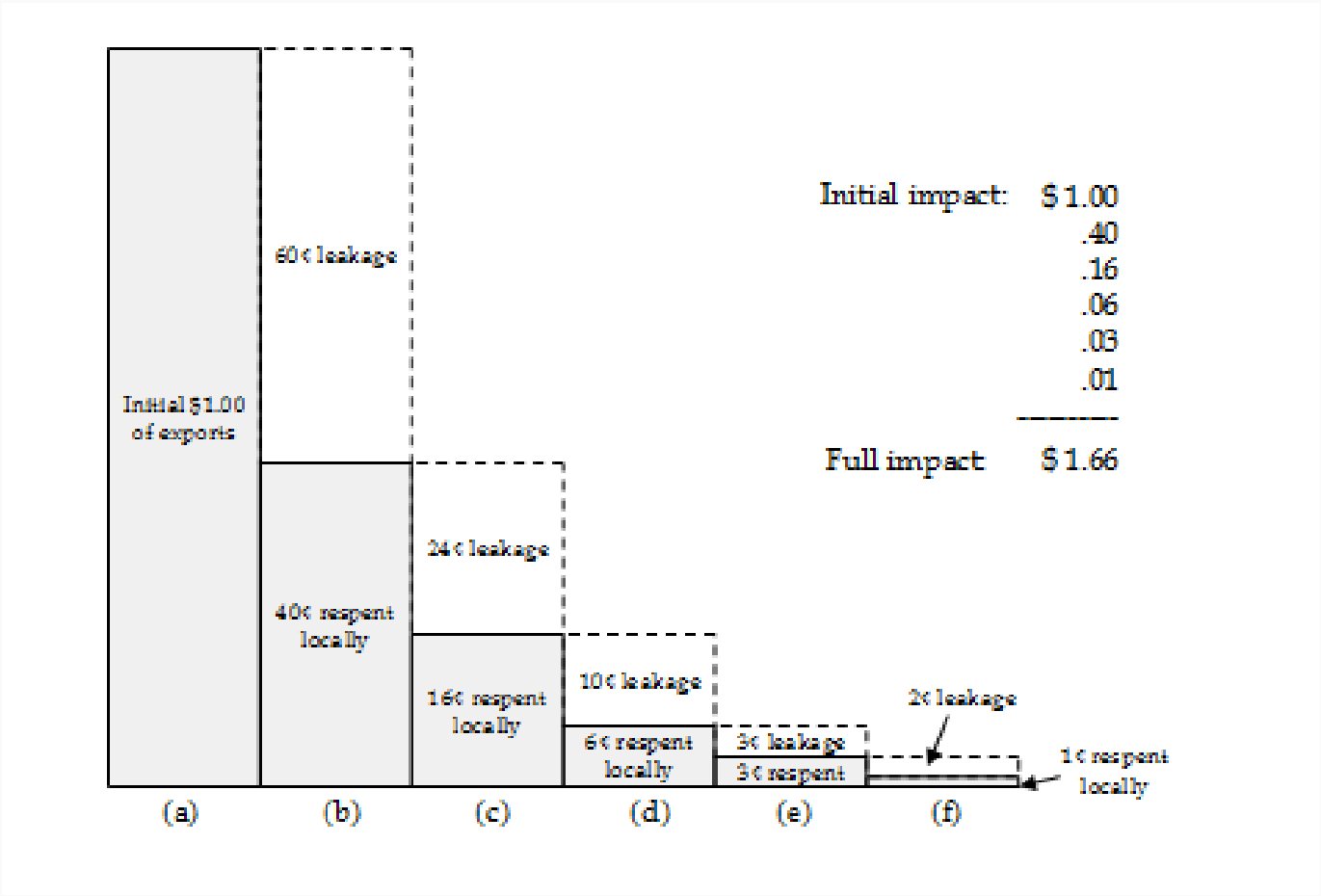
The income multiplier represents a change in total income (employee compensation plus proprietary income plus other property income plus indirect business taxes) for every dollar change in income for any given sector. The employment multiplier represents the total change in employment resulting from the change in employment in any given sector. Thus, we have three ways that we can describe the change in final demand.

Consider, for example, a dairy farm that has $1 million in sales (industry output), pays labor $100,000 inclusive of wages, salaries and retained profits, and that employs three workers, including the farm proprietor. Suppose that demand for milk produced at these farm increases 10 percent, or $100,000 dollars. We could use the traditional output multiplier to determine what the total impact on output would be. Alternatively, to produce this additional output the farmer may find that they need to hire a part-time worker. We could use the employment multiplier to examine the impact of this new hire on total employment in the economy. In addition, the income paid to labor will increase by some amount and we can use the income multiplier to see what the total impact of this additional income will have on the larger economy.

How are these income and employment multipliers derived if the IO model only looks at the flow of industry expenditures (output)? In the strictest sense, the IO does not understand changes in employment or income, only changes in final demand (sales or output). To do this we use the fact that the IO model is a "fixed proportion" representation of the underlying production technologies. This is most clear by reexamining the direct requirements table (Table 2). For every dollar of output (sales) inputs are purchased in a fixed proportion according to the production technology described by the direct requirements table. For every dollar of output there is a fixed proportion of employment required as well as income paid. In our simple dairy farm example, for every dollar of output there are .000003 (= 1,000,000 ÷ 3) jobs and $.10 (= 1,000,000 ÷ 100,000) in income. We can use these fixed proportions to convert changes in output (sales) into changes in employment and income.

Graphically, we can illustrate the round-by-round relationships modeled using input-output analysis. This is found in Figure 1. The direct effect of change is shown in the far left-hand side of the figure (the first bar (a)). For simplification, the direct effect of a $1.00 change in the level of exports, the indirect effects will spill over into other sectors and create an additional 66 cents of activity. In this example, the simple output multiplier is 1.66. A variety of multipliers can be calculated using input-output analysis.

While multipliers may be used to assess the impact of changes on the economy, it is important to note that such a practice leads to limited impact information. A more complete analysis is not based on a single multiplier, but rather, on the complete total requirements table. A general discussion of the proper and inappropriate uses of multipliers is presented in the next appendix to this text.



Initial, Indirect and Induced Effects: The input-output model and resulting multipliers described up to this point presents only part of the story. In this construction of the total requirements table (Table 3) and the resulting multipliers, the production technology does not include labor. In the terminology of IO modeling, this is an "open" model. In this case, the multiplier captures only the initial effect (initial change in final demand or the initial shock) and the impact of industry to industry sales. This latter effect is called the indirect effect and results in a Type I multiplier. A more complete picture would include labor in the total requirements table. In the terminology of IO modeling, the model should be "closed" with respect to labor. If this is done, we have a different type of multiplier, specifically a Type II multiplier, which is composed of the initial and indirect effects as well as what is called the induced effects.

The Type II multiplier is a more comprehensive measure of economic impact because it captures industry to industry transactions (indirect) as well as the impact of labor spending income in the economy (induced effect). In the terminology of IO analysis, an "open" model where the induced effect is not captured, any labor or proprietor income that may be gained (positive shock) or lost (negative shock) is assumed to be lost to the economy. In our simple dairy farm example, any additional income (wages, salaries and profits) derived from the change in output (sales) is pocketed by labor and is not re-spent in the economy. This clearly is not the case: any additional income resulting from more labor being hired (or fired) will be spent in the economy thus generating an additional round of impacts. This second round of impacts is referred to as the induced impact.

Insights can be gained by comparing and contrasting the indirect and induced effects. For example, industries that are more labor intensive will tend to have larger induced impacts relative to indirect. In addition, industries that tend to pay higher wages and salaries will also tend to have larger induced effects. By decomposing the Type II multiplier into its induced and indirect effects, one can gain a better understanding of the industry under examination and its relationship to the larger economy.

Misuses and Evaluation of Economic Multipliers: Multipliers are often misused or misunderstood. Problems frequently encountered in applying multipliers to community change include: (1) using different multipliers interchangeably; (2) double counting; (3) pyramiding; and (4) confusing multipliers with other economic measurements such as turnover and value added. Please note that if IMPLAN is used to generate the multipliers used in the analysis, many of the concerns outlined in this appendix are resolved.

(1) Interchanging Multipliers. As mentioned earlier, multipliers can be estimated for changes in business output, household income, and employment. These different multipliers are sometimes mistakenly used interchangeably. This should not be done because the sizes of the multipliers are different and because they measure completely different types of activity.

(2) Double Counting. Unless otherwise specified, the direct effect or initial change is included in all multiplier calculations. Consider, for example, a mining business multiplier of 2.20. The 2.20 represents 1.00 for the direct effect, and 1.20 for the indirect effects. The direct effect is thus accounted for by the multiplier and should not be added into the computation (double counted). A $440,000 total impact resulting from an increase of $200,000 in outside income (using the above 2.20 multiplier) includes $200,000 direct spending, plus $240,000 for the indirect effects. The multiplier effect is sometimes thought to refer only to the indirect effect. In this case, the initial impact is added to the multiplier effect, and is thereby counted twice—yielding an inflated estimate of change.

(3) Pyramiding. A more complicated error in using multipliers is pyramiding. This occurs when a multiplier for a non-basic sector is used in addition to the appropriate basic sector multiplier.

For example, sugar beet processing has been a major contributor to exports in many western rural counties. Assume the local sugar beet processing plant was closed and local officials wanted to determine the economic effect of the closing as well as the subsequent effect upon local farmers. The multiplier for the sugar beet processing sector includes the effect upon-farms raising sugar beets because the sugar beet crop is sold to local processors and not exported. Therefore, the processing multiplier should be used to measure the impact of changes in the sugar industry on the total economy. The impact estimate would be pyramided if the multiplier for farms, whose effects had already been counted, were added to processing.

Double counting and pyramiding are particularly serious errors because they result in greatly inflated impact estimates. If inflated estimates are used in making decisions about such things as school rooms or other new facilities, the results can be very expensive, indeed.

(4) Turnover and Value Added. Economic measurements incorrectly used for multipliers also result in misleading analysis. Two such examples are turnover and value added. Turnover refers to the number of times money changes hands within the community. In Figure 1, the initial dollar "turns over" five times; however, only part of the initial dollar is re-spent each time it changes hands. Someone confusing turnover with a multiplier might say the multiplier is 5, when the multiplier is actually only 1.66.

Value added reflects the portion of a product's total value or price that was provided within the local community. The value added would consider the value of a local raw product—like wheat delivered to the mill—and subtract that from the total wholesale value of the flour, then figure the ratio between the two. With cleaning losses, labor, bagging, milling, etc., the wholesale value may represent several times the value of the raw product and may be a fairly large number.

EVALUATING MULTIPLIERS

The determination of whether a multiplier is accurate can be a complicated procedure requiring time, extensive research, and the assistance of a trained economist. On the other hand, there are several questions that anyone who uses multipliers should ask. The test of accuracy for a multiple is captured in this question: How closely does that multiplier estimate economic relationships in the community (or region) being considered?

(1) Is the multiplier based on local data, or is it an overlay? Often, multipliers are used that were not developed specifically from data for that area. These multipliers are overlaid onto the area on the assumption that they will adequately reflect relationships in the economy. An example would be using the mining multiplier from a county in northwestern Wyoming to estimate a mining impact in northeastern Nevada.

A multiplier is affected by the economy's geographic location in relation to major trade centers. Areas where the trade center is outside the local economy have smaller multipliers than similar areas containing trade centers. Geographic obstacles en route to trade centers also affect a local economy. Multipliers for small plains towns are smaller than those for apparently comparable mountain towns, since plains residents usually do not face the same travel obstacles as mountain residents.

More services will characteristically develop in the mountain area because of the difficulty in importing services; the larger services base will lead to a larger multiplier effect.

The size of the economy will also influence multiplier size. A larger area generally has more businesses. This means that a given dollar is able to circulate more times before leaking than would be the case in a smaller area. Two economies with similar population and geographic size may have quite different multipliers depending on their respective economic structures. For example, if two areas have similar manufacturing plants, but one imports raw materials and the other buys materials locally, then the manufacturing multiplier for the two areas would be quite different.

The overlaying practice, when used appropriately, can save money and time and produce very acceptable results. It is often difficult to find a similar area where impact studies have been completed so that multipliers can be borrowed readily. An area's dollar flow patterns may be so unique, for example, that overlaying will not work.

(2) Is the multiplier based on primary or secondary data? Usually, there is more confidence in a multiplier estimated from data gathered in the community than in published or already-collected data. Primary data collection, though, is expensive and time consuming. Recent research has indicated that in some cases, there is little difference between multipliers estimated by primary or secondary data. In fact, primary data multipliers are not necessarily better than secondary data multipliers. While the type of secondary data needed for estimating multipliers may be available from existing sources, the format and/or units of measurement may not permit some multipliers to be estimated. The resulting adjustments made to use the existing data may cause errors. If secondary data is used, it may be advisable to consult individuals familiar with the data regarding its use.

(3) Aggregate versus disaggregate multipliers. As mentioned earlier in this publication, disaggregate multipliers are much more specific and therefore generally more trustworthy than aggregate multipliers. The accuracy required, and the time and money available most likely will determine whether the model will be aggregate or disaggregate. In many cases, an aggregated rough estimate may be sufficient.

(4) If you are dealing with an employment multiplier, is it based on number of jobs or full-time equivalent (FTE)? Employment multipliers are often considered to be the most important multipliers used in impact analysis. This is because changes in employment can be transmitted to changes in population, which in turn affect social service needs and tax base requirements. Employment multipliers can be calculated on the basis of number of jobs or on FTE. One FTE equals one person working full-time for one year. When multipliers are calculated on a number-of-jobs basis, comparisons between industries are difficult because of different definitions of part-time workers. For example, part-time work in one industry might be four hours per day, while in another it might be ten hours per week. If calculations were based on number of jobs, a comparison of multipliers would be misleading. The conversion of jobs to FTE also helps adjust for seasonal employment in industries such as agriculture, recreation, and forestry.

(5) What is the base year on which the economic model was formulated? Inflation can affect multipliers in two ways: (1) through changes in the prices of industry inputs, and (2) through changes in the purchasing patterns produced by inflation. Each input-output multiplier assumes that price relationships between sectors remain constant over time (at least for the period under consideration). In other words, the studies estimating multipliers assume that costs change proportionally: utility prices change at nearly the same rate as the cost of food, steel, and other commodities. If some prices change drastically in relation to others, then purchasing patterns and multipliers will likely change.

Marketing patterns change slowly, however, and while they must be considered, they usually do not present a major problem unless the multiplier is several years old. The rate of growth in the local area will influence the period of use for the multipliers.

(6) What can a multiplier do? As are most multipliers encountered by local decision makers, the multipliers discussed here are static in nature. Static means that a multiplier can be used in "if/then" situations; they do not project the future. For example, if a new mine that employs 500 people comes into the country, then the total employment increase would be the employment multiplier times 500. A static model cannot be used to make projections about the time needed for an impact to run its course, or about the distribution of the impact over time. Static multipliers only indicate that if X happens, then Y will eventually occur.

(7) How large is the impact in relation to the size of the affected industry on which the multiplier is based? Dramatic changes in an industry's scale will usually alter markets, service requirements, and other components of an industry's spending patterns. Assume a mining sector employment multiplier of 2.0 had been developed in a rural economy having 132 FTE. If a mine were proposed several years later with an estimated 300 FTE, the multiplier of 2.0 would probably not accurately reflect the change in employment because of the scale of the project relative to the industry existing when the multiplier was developed. In essence, the new industry would probably change the existing economic structure in the local area.

(8) Who calculated the multiplier—and did the person or agency doing the calculation have a vested interest in the result? Multipliers are calculated by people using statistics, and as such, there is always the opportunity to adjust the size of the multiplier intentionally. Before accepting the results of a given multiplier, take time to assess the origin of the data. Studies conducted by individuals or firms having a vested interest in the study's results deserve careful examination.

(9) Is household income included as a sector similar to the business sectors in the local economic model? The decision to include household income in the model depends upon whether or not the household sector is expected to react similarly to other sectors when the economy changes, or whether personal income is largely produced by outside forces. Discussion of this issue is too lengthy for this publication, but the important point is that multipliers from models that include household sectors are likely to be larger than those from models without household sectors.

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Appendix E

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Appendix F

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Appendix G

TOWN OF BERLIN

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4A
Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

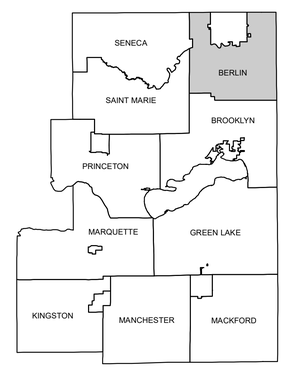
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



N W E S

0 2,000 Feet

Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF BERLIN

Green Lake County, WI
Land Use Planning & Zoning

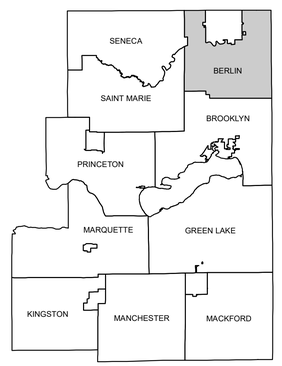
Zoning Ordinance Map Districts

- A1 Farmland Preservation
- A2 General Agriculture
- C1 General Commercial
- C2 Extensive Commercial
- I Industrial
- M1 Mineral Extraction
- M2 Sanitary Landfill
- NRC Natural Resource Conservancy
- R1 Single Family Residence
- R2 Single Family Mobile Home Residence
- R3 Multiple Family Residence
- R4 Rural Residential
- RC Recreation
- AO Adult Orientated Establishment
- UNZ Unzoned
- MUN Municipality
- SPLIT Split Zoning
- PEND Map Update Pending

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



N W E S

0 2,000 Feet

Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF BROOKLYN

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4B Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

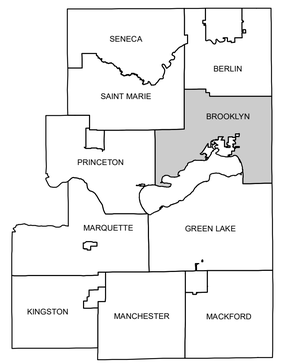
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF BROOKLYN

Green Lake County, WI
Land Use Planning & Zoning

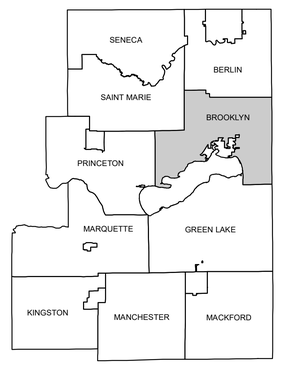
Zoning Ordinance Map Districts

- A1 Farmland Preservation
- A2 General Agriculture
- C1 General Commercial
- C2 Extensive Commercial
- I Industrial
- M1 Mineral Extraction
- M2 Sanitary Landfill
- NRC Natural Resource Conservancy
- R1 Single Family Residence
- R2 Single Family Mobile Home Residence
- R3 Multiple Family Residence
- R4 Rural Residential
- RC Recreation
- AO Adult Orientated Establishment
- UNZ Unzoned
- MUN Municipality
- SPLIT Split Zoning
- PEND Map Update Pending

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF GREEN LAKE

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4C Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

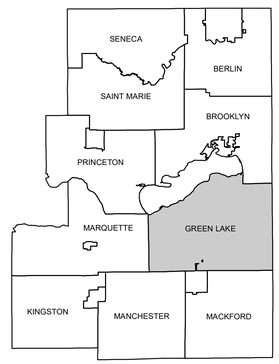
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF GREEN LAKE

Green Lake County, WI
Land Use Planning & Zoning

Zoning Ordinance Map Districts

- A1 Farmland Preservation
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- C1 General Commercial
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- M2 Sanitary Landfill
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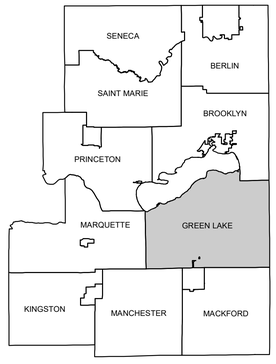
- AO Adult Orientated Establishment
- UNZ Unzoned
- MUN Municipality
- SPLIT Split Zoning
- PEND Map Update Pending

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF KINGSTON

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4D
Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

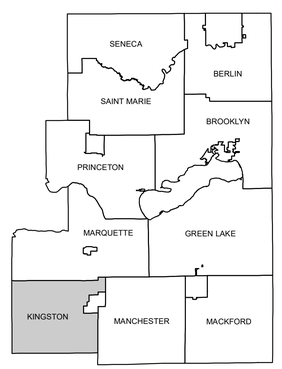
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF KINGSTON

Green Lake County, WI
Land Use Planning & Zoning

Zoning Ordinance Map Districts

- A1 Farmland Preservation
- A2 General Agriculture
- C1 General Commercial
- C2 Extensive Commercial
- I Industrial
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- M2 Sanitary Landfill
- NRC Natural Resource Conservancy
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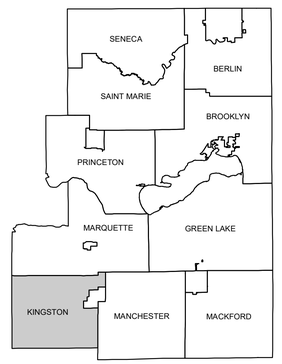
- R3 Multiple Family Residence
- R4 Rural Residential
- RC Recreation
- AO Adult Orientated Establishment
- UNZ Unzoned
- MUN Municipality
- SPLIT Split Zoning
- PEND Map Update Pending

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF MACKFORD

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4E
Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

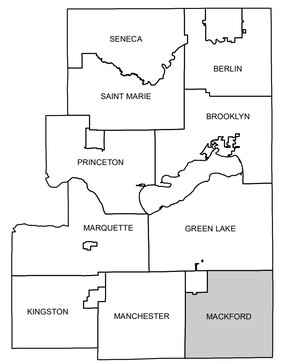
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF MACKFORD

Green Lake County, WI
Land Use Planning & Zoning

Zoning Ordinance Map Districts

- A1 Farmland Preservation
- A2 General Agriculture
- C1 General Commercial
- C2 Extensive Commercial
- I Industrial
- M1 Mineral Extraction
- M2 Sanitary Landfill
- NRC Natural Resource Conservancy
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- R2 Single Family Mobile Home Residence
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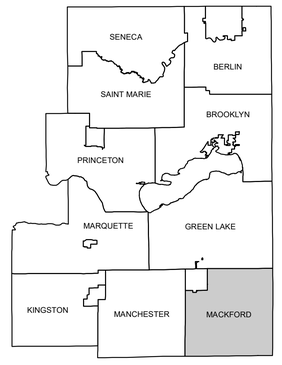
- UNZ Unzoned
- MUN Municipality
- SPLIT Split Zoning
- PEND Map Update Pending

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF MANCHESTER

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4F Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

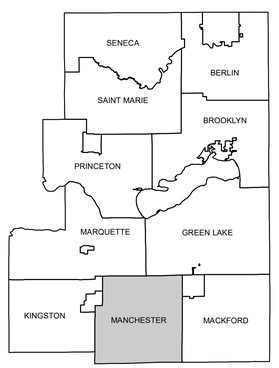
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF MANCHESTER

Green Lake County, WI
Land Use Planning & Zoning

Zoning Ordinance Map Districts

- A1 Farmland Preservation
- A2 General Agriculture
- C1 General Commercial
- C2 Extensive Commercial
- I Industrial
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- M2 Sanitary Landfill
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- MUN Municipality
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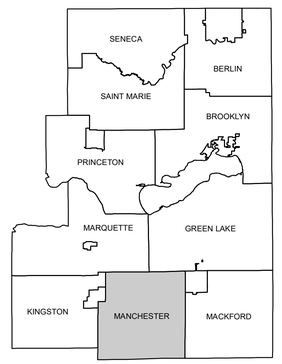
- PEND Map Update Pending

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF MARQUETTE

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4G
Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

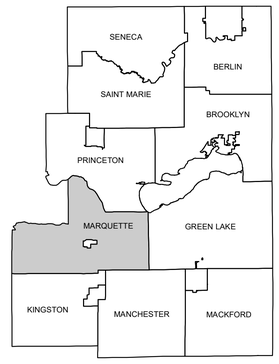
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF MARQUETTE

Green Lake County, WI
Land Use Planning & Zoning

Zoning Ordinance Map Districts

- A1 Farmland Preservation
- A2 General Agriculture
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Roads

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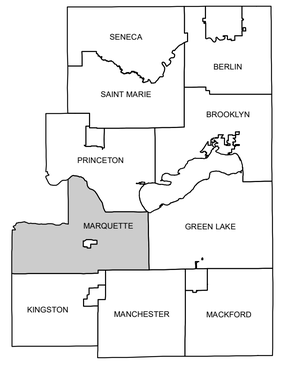
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF PRINCETON

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4H Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

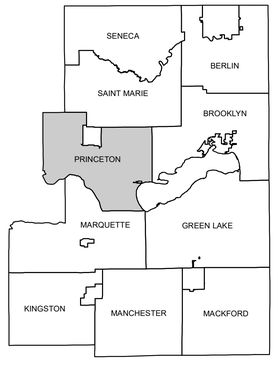
Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
- City Street, Village Street, or Township Road
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF PRINCETON

Green Lake County, WI
Land Use Planning & Zoning

Zoning Ordinance Map Districts

- A1 Farmland Preservation
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- SPLIT Split Zoning
- PEND Map Update Pending

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- Railroad

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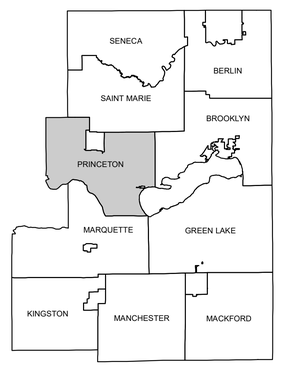

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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF SAINT MARIE

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4l
Areas

Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

- State Road
- County Road
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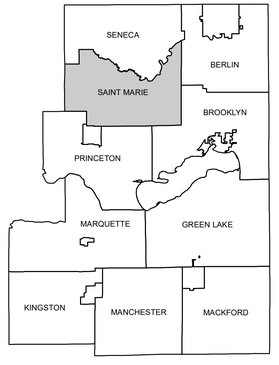
- Private Road
- Railroad

- Municipal Boundary
- Parcel
- Section
- Waterbody
- Public Land



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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF SAINT MARIE

Green Lake County, WI
Land Use Planning & Zoning

Zoning Ordinance Map Districts

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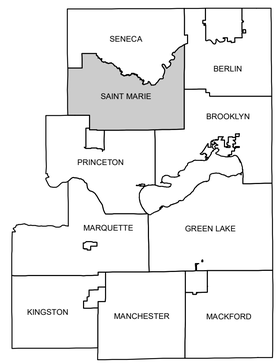

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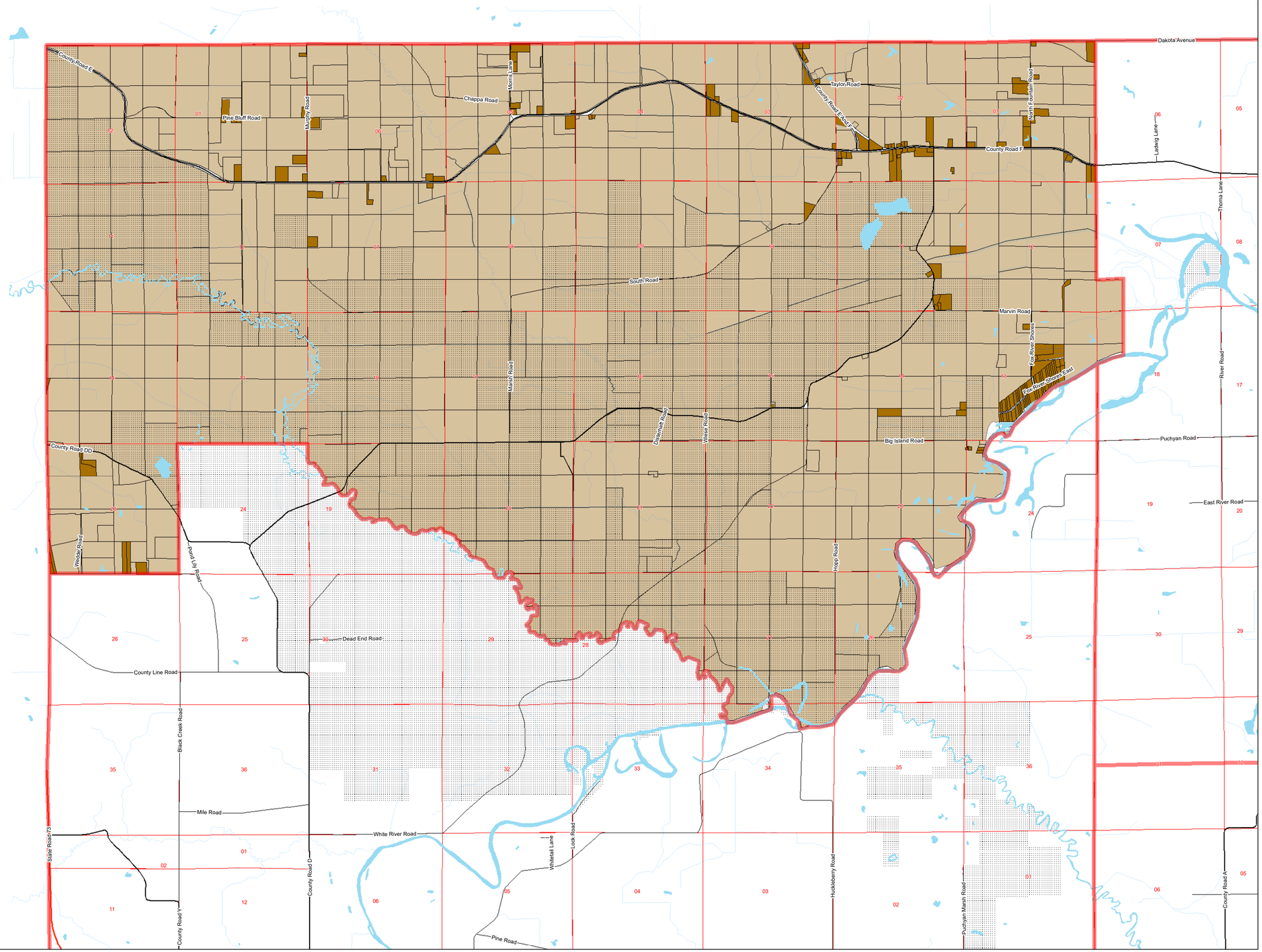
Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF SENECA

Green Lake County, WI
Land Use Planning & Zoning

Farmland Preservation Plan Map 4J Areas



Farmland Preservation Areas

Areas of Agricultural Use and Agriculture Related Use

Nonagricultural Development Areas

Areas of Nonagricultural Development

Roads

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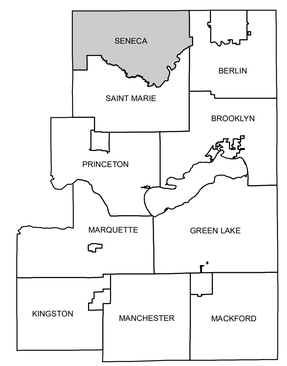

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Map by Green Lake County GIS on 3/5/2024
WI Administrative Code Chapter ATCP 49 Farmland Preservation

TOWN OF SENECA

Green Lake County, WI
Land Use Planning & Zoning

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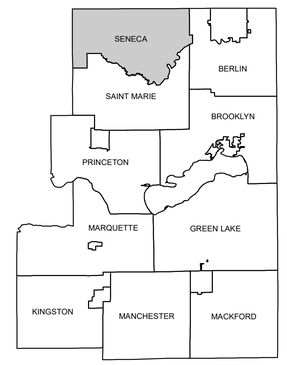

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Map by Green Lake County GIS on 3/5/2024
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