

CHAPTER 5 : NATURAL, AGRICULTURAL AND CULTURAL RESOURCES

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INTRODUCTION

This section provides an inventory of the existing natural, agricultural and cultural resource features found in Oconto County. The inventory provides an understanding of the physical characteristics of the county. Because they are major determinants of future development options, it is important to understand where these resources are located and how they relate to one another. Inventorying and defining them will help limit unnecessary public expenditures and minimize the negative impacts to these valued resources as development occurs.

NATURAL RESOURCES

Natural resources are materials that occur in nature and are essential or useful to humans such as water, air, land, trees, animals, plants, soil and minerals. Some are replaceable; others are not. Trees and fish are renewable resources and can be replaced. Nonrenewable resources that include clean groundwater and natural gas are not replaceable once they have been consumed.

Natural resources are often a defining feature for local communities. People depend on natural resources to provide a clean and abundant supply of groundwater; assure good air quality; and provide natural landscapes that are fundamental to a healthy and diverse biological community. Despite their importance, Wisconsin's natural resources are currently facing significant threats due to increasing human demands by a growing population. Direct impacts of current and projected development patterns include habitat loss and fragmentation, threats to water quality, and changes in climate. Therefore, it is important that communities plan appropriately in order to preserve their important natural features.

The following text describes the types and locations of Oconto County's many resources and briefly discusses the importance of them when planning for future growth of the county.

Geology

Quaternary (glacial) and bedrock geology characterize the terrestrial appearance and function of the county. Glacial geology refers primarily to the effects continental glaciations have had on the land over the past 20,000 years, and to a lesser extent, the surface effects of more recent erosion and deposition activities. Bedrock geology refers to the much older, solid rock layers that lie beneath glacial sediments.

The geology that lies beneath the county has important implications for land use. Bedrock type, overlying soil composition and depth to bedrock affects excavation; foundations; location and effectiveness of site wastewater treatment systems; residential and industrial development locations; and cost effectiveness of construction and maintenance of highways and streets. The soil composition and depth to bedrock can also have an impact on the natural infiltration of surface waters. In addition, the type of bedrock will determine whether an effective pathway will be available for groundwater recharge as well as its susceptibility to contaminants, including those that naturally occur in the bedrock.

Bedrock

The bedrock underlying Oconto County is made up of seven distinct types from three geologic eras. As a result, the county can be split into three distinct regions based on the age of the bedrock.

- Bedrock in the Northern Highland Region, which lies in the northwestern portion of the county, is made up primarily of granite and mixtures of igneous and metamorphic rocks that are Precambrian (600 million years ago) in their origin.
- To the southeast of the Precambrian formation is the Central Plain Region. This region is characterized by the Cambrian (between 570 and 500 million years ago) group which consists of a variety of sandstones.
- As the bedrock continues southeast, the formations found are of the Ordovician Era (between 488 and 443 million years ago). This region is known as the Eastern Ridges and Lowlands. These formations include the Prairie du Chien group consisting of dolomite, the Saint Peter sandstone and the Platteville-Galena group consisting of dolomite and limestone.

In addition to these distinct regions, along the northern border of Oconto county is a narrow formation of quartzite, slate and iron.

Bedrock has not presented any significant development problems. Bedrock may impact development when found near the surface. Bedrock near the surface may hinder excavation therefore considerably increasing the cost of construction. In addition, conventional on-site septic systems cannot function properly where bedrock is near the surface.

Glacial

Glacial deposits within Oconto County consist of both till and glaciofluvial sediment. Till, or unstratified drift, is a mixture deposited directly by the glacier that consists of clay, sand, gravel and boulders intermingled in any proportion. Glaciofluvial deposits are moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, deltas, kame eskers, and kame terraces. These deposits consist of course to medium-grained sand and gravel with numerous cobbles, boulders and portions of till.

- The glacial drift in Oconto County consists primarily of clayey till. Glaciofluvial sediments in the form of an outwash plain, comprised of lake silt and clay, are located in areas adjacent to major water features and through the central portion of the county. The soils may be less than five feet thick in some areas and up to 200 feet in depth above the bedrock.
- Map 5.1 illustrates the glacial “Pleistocene” geology of Oconto County, while Map 5.2 illustrates soil depth to Bedrock within the county.

Topography

Glacial events occurring in Wisconsin, along with the type of underlying bedrock, have split Oconto County into three distinct regions.

- The Northern Highlands Region of Oconto County, which includes Mountain, Doty, Lakewood, Riverview, Townsend and parts of Brazeau, was once a mountainous area.

Centuries of erosion and smothering have removed the mountains, leaving behind a number of outcrops which can be seen in the Town of Mountain and the Town of Riverview near Crooked Lake. Some of the highest elevations in the state can be observed in this region as well. Thunder Mountain, located near the Oconto County-Marinette County border, rises 1,375 feet above sea level. McCaslin Mountain, located near the junction of Forest, Marinette and Oconto Counties, has been measured at 1,625 feet above sea level.

- The Central Plain Region of Oconto County includes Gillett, Maple Valley, Spruce, Underhill and portions of Brazeau. This area is covered by a hilly, undulating end moraine. A series of low ridges can also be found in the northeastern part of the central region.
- In southeast Oconto County the end moraine of the Central Plain Region eventually merges with the Eastern Ridges and Lowlands Region of the county with a broad, undulating ground moraine that slopes to the east. The entire ground moraine encompasses a number of depressions and basins and is scattered with lake and outwash plains.

In addition to the varying topography of these regions, there are also areas of steep slope that exist within Oconto County. Steep slopes are considered areas with a slope equal to or greater than 12 percent. These steep slope areas are more susceptible to soil erosion and may require special building and construction restraints such as retaining walls, major grading efforts and specialized erosion control measures. Certain soil types are characteristic of steep slope areas based on their composition.

- Map 5.3 illustrates potential areas of steep slope within the county based on soils characteristics.

Soils

The Natural Resources Conservation Service (NRCS) provides a detailed study of all soils in Oconto County in the *Soil Survey of Oconto County, Wisconsin* which was completed in 1985. The survey provides information on the suitability and limitations of soils for a variety of natural resource and engineering uses. Listed below are descriptions of the general soil types within Oconto County.

Soils Description

Soils are grouped into general soil associations that have similar patterns of relief and drainage. These associations typically consist of one or more major soils and some minor soils.

Northern Oconto, which is considered part of the Northern Highlands Region, is generally comprised of Menahga-Rousseau, Padus-Pena, and Lennan-Keweenaw soils that are well drained and nearly level to very steep. The Padus-Pena soils are the most commonly found type in the Northern Highlands.

Onaway-Solona-Seelyeville soils comprise the majority of the soils in the Central Plains Region located in the central portion of Oconto County. These soils are nearly level to very steep, well drained to somewhat poorly drained or very poorly drained, loamy and mucky soils on uplands.

Solona-Onaway-Iosco is the predominate soil of the Eastern Ridges and Lowlands of eastern Oconto County. These soils are nearly level to gently sloping, well drained to somewhat poorly drained, loamy and sandy soils on uplands.

Soil Limitations

Because certain limitations exist for various soil types, the composition and properties of soils should be evaluated prior to any development taking place. By utilizing the information provided by the *Soil Survey of Oconto County, Wisconsin* soil-related failures in various land uses can likely be avoided.

Private Sewage Systems

Private on-site wastewater treatment systems (POWTS) are systems that discharge effluent to groundwater through a subsurface infiltration system. Success of these on-site systems (i.e., drain-fields or mounds) is based on the depth and permeability of the soils where they are installed.

The *Soil Survey of Oconto County, Wisconsin*, provides information on the limitations of each type of soil for these sanitary facilities. Soil ratings are based on soil properties, site features and observed performance of the soils. There are three classes of limitations:

- A. *Severe limitations* mean soil properties or site features are so unfavorable or so difficult to overcome that these systems may require a special design that results in a significant increase in construction costs or possibly costly ongoing maintenance.
- B. *Moderate limitations* mean soil properties or site features are not favorable for the indicated use and too may require special planning, design, or maintenance to overcome or minimize these limitations.
- C. *Slight limitations* mean soil properties and site features are generally favorable for the indicated use and limitations are minor and therefore easily overcome.

As a way to mitigate these limitations, the revised COMM 83 health and safety code allows new technologies for private sewage systems. The code allows the use of soil absorption systems on sites with at least six inches of suitable native soil. The revised code gives property owners the opportunity and flexibility to meet environmental performance standards with several treatment technologies.

The current code will allow for infill development where it was not permitted previously by the former plumbing code as interpreted by the Department of Industry, Labor and Human Relations (DILHR). Housing and population density will increase in some areas due to the revised COMM 83 code. This in turn may increase the need for land use planning and integrations of environmental corridors to address the adverse impacts related to development. Planning along with land use controls (e.g. zoning) will assist in achieving more efficient development patterns.

Basements

The *Soil Survey of Oconto County, Wisconsin* also provides information on the limitations of each soil for building site development including the construction of dwellings with basements. These limitations are also based on soil properties, site features and observed performance of the soils.

- Most of the severe limitation soils found in the county occur in wetland areas and locations adjacent to surface water features.

Nonmetallic Mineral Resources

Sand, gravel, and crushed stone are the primary minerals mined in the county. They are needed for constructing the sub-base for roads and are also the primary components in concrete that is used for the building of foundations, basement walls and sidewalks.

- There are several mining sites in Oconto County and surrounding area that extract sand, gravel and/or crushed stone. The *Soil Survey of Oconto County, Wisconsin* identifies soils that would be the best sources for quality sand, gravel, and crushed stone. These minerals are primarily found near river and stream channels, outwash plains, dunes, and eskers.

As Oconto County and other surrounding areas experience continued growth and development, the demand for sand, gravel and crushed stone will increase. As a result, these nonmetallic mineral resources should be identified and conserved for future mining consideration. However, residential development can also threaten the existence of these resources as competition for land increases. Therefore, it is important that land use controls are utilized to ensure the preservation of these resources so that future demands can be met.

Mining operations should also show that they have little negative impact on the neighboring properties or the surrounding areas. This not only includes noise and odors but also adverse affects on groundwater and significant wear on local roads.

Nonmetallic Mining Reclamation (NR 135)

Any new mines need to have a permit granted by the Wisconsin Department of Natural Resources (WDNR) and are subject to the requirements of NR 135.

- A. The reclamation plan is a detailed technical document with goals to successfully reclaim the area as well as limit any long-term negative impacts to the environment once the mine is abandoned.
- B. The WDNR defines successful reclamation as “the restoration of all areas disturbed by mining activities including aspects of the mine itself, waste disposal areas, buildings, roads and utility corridors.”
- C. Restoration is defined as “returning of the site to a condition that minimizes erosion and sedimentation, supports productive and diverse plants and animal communities, and allows for the desired post-mining land use.”

Depleted mining sites can be reclaimed as parkland, wildlife habitat, recreational land or other uses.

NR 135 also allows landowners to register marketable nonmetallic mineral deposits as a way to prevent future development that would interfere with the extraction of those deposits. As a result, registered sites are protected from local zoning or other decisions that permanently interfere with mining on the site for at least 20 years.

Water Resources

Watersheds

Oconto County consists of ten watersheds which are part of the larger Lake Michigan Basin. All of these watersheds drain indirectly into Lake Michigan through Green Bay or one of the county’s major rivers.

- Map 5.4 displays the location of each watershed. Additionally, a description of each watershed can be found in Appendix x.

Priority and Non-Priority Watersheds

Point source pollution can be defined as that which originates from a single point such as pipes, ditches, wells, and containers, while nonpoint source pollution can not be traced to one definitive source. Although exact sources of nonpoint source pollution can be difficult to identify, activities such as farming, construction and mining are known to produce pollution that can be carried away by runoff into local watersheds. While rules can easily be put into place to regulate point source pollution, it is much more difficult to control nonpoint source pollution.

As a way to protect the state’s watersheds from nonpoint source pollution, the Wisconsin Nonpoint Source Water Pollution Abatement Program (NPS Program) was created in 1978 by the State Legislature and is managed by the WDNR. This program selected priority watersheds based on numerous factors, including but not limited to, the potential for unique species to respond positively to nonpoint source controls and sensitivity to phosphorus loading. The program has provided financial and technical assistance to landowners and local governments to reduce nonpoint source pollution by addressing land management activities that contribute to urban and rural runoff.

- Table 5.1 lists each of the watersheds within Oconto County as well as their designation through this program (as of January 2004).

Table 5.1: Oconto County Watersheds

Classification	Watershed
Priority Watersheds	Little River Watershed
	Middle Peshtigo River and Thunder Rivers Watershed
	Pensaukee River Watershed
Non-Priority Watersheds	Little Peshtigo River Watershed
	Lower North Branch Oconto River Watershed
	Lower Oconto River Watershed
	Lower Peshtigo River Watershed
	South Branch Oconto River Watershed
	Suamico and Little Suamico River Watershed
Upper Peshtigo River Watershed	

Source: Wisconsin Department of Natural Resources, 2004; Bay-Lake Regional Planning Commission, 2005.

Regardless of their designation, nonpoint source pollution can have negative impacts on all of the county’s watersheds. It is important to evaluate any new developments and land activities to determine their potential impacts on the applicable watershed. Many of these activities may not occur in the county; however, the activities undertaken upstream in adjacent communities can

adversely impact the water quality in the area and pose a threat to the environment, economy and health of the county and its communities.

Surface Water

The surface waters in Oconto County primarily flow southeast to Green Bay. The major river systems within the county consist of the Little Suamico, Oconto, Little and Pensaukee Rivers. Oconto County has many lakes and streams that provide an abundant supply of surface water. The surface waters of the county provide quality habitat for waterfowl and wildlife in addition to recreational opportunities.

- Overall, Oconto County has 200 named lakes totaling 10,486 acres and 179 unnamed lakes totaling 567 acres. Additionally, the county contains 1,073 miles of streams which cover 12,814 surface acres. Tables 5.2 and 5.3 list the major surface water features in Oconto County including lakes and ponds greater than 100 surface acres and the major rivers and their tributaries. Maps 5.5 and 5.6 highlight their locations within the county. Additionally, a complete list of all surface waters found in Oconto County can be found in Appendix x.

Table 5.2: Oconto County Lakes and Ponds Greater than 100 Surface Acres

Name	Location	Map 5.6 Number
Anderson Lake	T30N, R17E, Section 3	1
Archibald Lake	T32N, R15E, Section 2	2
Bass Lake	T32N, R15E, Section 4	3
Berry Lake	T28N, R17E, Section 19	4
Boot Lake	T32N, R15E, Section 9	5
Boulder Lake	T31N, R15E, Section 21	6
Christie Lake	T28N, R18E, Section 19	7
Chute Pond	T31N, R16E, Section 36	8
Crooked Lake	T32N, R17E, Section 22	9
Horn Lake	T33N, R15E, Section 21	10
Kelly Lake	T29N, R19E, Section 6	11
Lake John	T33N, R16E, Section 16	12
Leigh Flowage	T30N, R19E, Section 30	13
Lower Wheeler Pond/Townsend Flowage	T33N, R15E, Section 22	14
Machickanee Flowage	T28N, R20E, Section 34	15
Maiden Lake	T32N, R16E, Section 7	16
Oconto Falls Pond	T28N, R19E, Section 26	17
Paya Lake	T32N, R16E, Section 10	18
Pickarel Lake	T33N, R15E, Section 11	19
Reservoir Pond and Explosion Lake	T33N, R15E, Section 28	20
Upper Wheeler Pond	T33N, R15E, Section 15	21
Waubee Lake	T33N, R16E, Section 13	22
Wheeler Lake	T33N, R16E, Section 22	23
White Potato Lake	T31N, R18E, Section 23	24

Source: "Surface Water Resources of Oconto County"
 Wisconsin Conservation Department, 1977; Bay-Lake Regional
 Planning Commission, 2006.

Table 5.3: Oconto County Major Rivers

Name	Location	Map 5.7 Number
First South Branch Oconto River	T31N, R16E, Section 31	25
Kelly Brook	T29N, R20E, Section 12	26
Little River	T28N, R21E, Section 30	27
Little Suamico River	T26N, R21E, Section 29	28
North Branch Little River	T28N, R21E, Section 30	29
North Branch Oconto River	T29N, R17E, Section 12	30
Oconto River	T29N, R22E, Section 16	31
Pensaukee River	T27N, R21E, Section 12	32
Peshtigo Brook	T29N, R17E, Section 12	33
South Branch Oconto River	T29N, R17E, Section 12	34

Source: “Surface Water Resources of Oconto County”
 Wisconsin Conservation Department, 1966; Bay-Lake
 Regional Planning Commission, 2006.

Wisconsin’s Outstanding and Exceptional Resource Waters

Wisconsin’s “Outstanding and Exceptional Resource Water Program” was designated by the state to maintain water quality in Wisconsin’s cleanest waters. Outstanding and Exceptional Resource Waters have been designated as such in NR 102.10 and NR 102.11 of the Wisconsin Administrative Code, Water Quality Standards for Wisconsin Surface Waters. An Outstanding Resource Water is a lake or stream having excellent water quality, high recreational and aesthetic value, high quality fishing, and free from point/nonpoint source pollution. An Exceptional Resource Water is a lake or stream exhibiting the same high quality resource values as an Outstanding Resource Water, but it may be impacted by nonpoint sources of pollution or have the potential for receiving a wastewater discharge from a non-sewered community in the future.

- Within Oconto County there are nine named bodies of water that are classified as Outstanding Resource Waters and an additional 34 that are classified as Exceptional Resource Waters. A complete list of these waters can be found in Appendix x. In addition, Oconto County contains 68 unnamed creeks that are also classified as Exceptional Resource Waters.

Wisconsin’s Impaired Waters

Section 303(d) of the Federal Clean Water Act requires each state to periodically submit to the U.S. Environmental Protection Agency (EPA) a list of impaired waters. Impaired waters are those that are not meeting the state’s water quality standards. The DNR last submitted an updated list to EPA in April 2004 and received approval in September 2004.

- Oconto County waters listed on the 303(d) impaired waters list are affected by air borne contamination, primarily mercury. The following bodies of water in Oconto County were included on the 2004 approved list of impaired waters:
 - Green Bay, which includes the Oconto River tributary from its mouth to the first dam;
 - Maiden Lake;
 - Oconto River Machickanee Flowage; and
 - Reservoir Pond.

Shorelands

Shorelands are land areas within the following distances from the ordinary high water mark of navigable waters:

- A. 1,000 feet from a lake, pond or flowage; and
- B. 300 feet from a river or stream or to the landward side of the floodplain, whichever distance is greater.

Shorelands are viewed as valuable environmental resources both in rural and urbanized areas. As a result, the State of Wisconsin requires counties and incorporated communities to adopt shoreland/floodplain regulations to address the problems associated with development in shoreland and floodplain areas. Even though development within shoreland areas is generally permitted, specific design techniques must be taken into consideration. In more environmentally sensitive locations, any alteration of the shoreland is strictly regulated, and in some cases, not permitted under any circumstances.

The authority to enact and enforce shoreland and other zoning provisions is set forth in Chapter 59.692 of the Wisconsin Statutes and Wisconsin Administrative Codes NR 115,116, and 117. Chapter 14.5000 of the *Oconto County Zoning Ordinance* establishes zoning standards for the use of all shorelands in the county located along navigable waters. See Chapter 11 of this document or a copy of the Oconto County Shoreland Ordinance for more information.

- Oconto County contains approximately 25 miles of Lake Michigan and Green Bay shoreline as illustrated by Map 5.7.

Coastal Resources

The Lake Michigan coastline offers a variety of natural resources (e.g., bluffs, beaches, wetlands, etc.); living resources (i.e., flora and fauna and unique habitats of the coast); and cultural resources (e.g., history, recreation and agriculture). It is important to protect these valuable assets as development in coastal areas typically leads to greater land disturbance, runoff, and pollutants.

Coastal development can affect the shape and use of the shoreline. Several issues to consider when planning include shoreline/bluff erosion, impacts to coastal wetlands, fluctuating lake levels, increased non-point pollution, economic impacts, wildlife habitats, and the unique historic and archeological resources of the area.

The preservation of coastal resources will go a long way in maintaining/improving community health and safety, aesthetics and economic viability (e.g., tourism, clean parks and beaches, recreational fishing) of the county.

Floodplains

Floodplains are normally defined as those areas, excluding the stream channel, subject to inundation by the 100-year recurrence interval flood event. This event has a one percent chance of occurring in any given year. Floodplains, as identified by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), provide for storm water retention, groundwater recharge, habitat for various types of waterfowl and wildlife and are considered a valuable recreational resource. Furthermore, floodplains serve to provide flood and erosion

control by storing floodwaters, reducing flood velocities, diminishing flood peaks and reducing sedimentation.

When buildings are constructed in the floodplain, the floodplain's storage capacity becomes reduced and other functions of the floodplain can be adversely affected. This could cause future flood events to be of higher intensity and allow the flood to overwhelm areas outside of the historic floodplain. As a way to protect floodplains, Section 87.30(1) of the Wisconsin Statutes and Wisconsin Administrative Code NR 116 require counties, cities and villages to adopt floodplain zoning ordinances to address the problems associated with development in floodplain areas.

The Oconto County Floodplain Zoning Ordinance was adopted to promote public health, safety, and general welfare, and to minimize flood losses in areas subject to flood hazards. The ordinance regulates residential development, storage of hazardous materials, uses which may be detrimental to permitted uses in adjoining districts, sewage disposal, wells for drinking water, and wastewater ponds or facilities, except those permitted under Wisconsin Administrative Code (NR 110.15) within the FEMA designated floodplain area. In addition to state and county regulations, a number of local governments have adopted floodplain ordinances to address specific concerns within their communities.

- Floodplains in the county are generally located adjacent to the shorelines of Green Bay, major rivers and other surface waters located throughout the county. The floodplains within Oconto County are noted on Map 5.8.

Wetlands

According to the WDNR, wetlands are areas where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophilic vegetation. Other common names for wetlands are swamps, bogs, and marshes. Wetlands act to provide scenic open spaces; act as natural pollution filters for lakes, streams and drinking water; act as groundwater discharge areas, and retain floodwaters; and provide valuable and irreplaceable habitat for many plants and animals.

Because of their importance, there are strict regulations regarding wetlands. Wisconsin Administrative Codes fall under the jurisdiction of the WDNR and mandate that shoreland wetlands be protected in both the rural and urban areas of the state. Wetlands not in the shoreland zone are protected from development by the federal government through Section 404 of the Clean Water Act and Wisconsin Administrative Code NR 103. It should be noted that all wetlands, no matter how small, are subject to WDNR and possible federal regulations, if they meet the state definition.

- **Oconto County contains ___ acres of wetlands.** Map 5.9 illustrates the WDNR inventoried wetlands greater than two acres. Prominent wetlands in the county include Christie Lake, Morgan Marsh, Jamison Marsh, Lena Swamp, Wolf Marsh, Brazeau Swamp, Peshtigo Brook Wetlands, County Line Swamp, West Shore Rivers Wetlands, Wesco Creek Swamp, and others adjoining the many lakes and streams of the county.

Coastal Wetlands

Oconto County has a number of extensive wetland complexes, with the majority being located within 25 miles of the Green Bay shoreline. Wetlands located within close proximity to the coast provide rich habitat for plants and animals and greatly influence the larger ecosystem processes of the Great Lakes Ecosystem. As transition zones between land and water, coastal wetlands are often rich in species diversity and provide critical habitat for migratory and nesting birds, spawning fish, and rare plants.

Due to the role these lands play in improving and maintaining the health of Green Bay, Lake Michigan and the entire Great Lakes Ecosystem, the WDNR has identified ecologically Significant Coastal Wetlands along Lake Michigan as a way to guide future planning efforts.

- As a result of this project the Oconto Marsh, County Line Swamp, Pensaukee River Wetland Complex, Charles Pond, and Mud Creek Wetland were all designated Significant Coastal Wetlands. Further information pertaining to the Significant Coastal Wetland project can be found in the Significant Natural Features section of this chapter and the WDNR website, while site specific descriptions of each of these areas can be found in Appendix x.

Groundwater

Groundwater is the water that occupies spaces between soil particles and rocks located below the earth's surface. Groundwater, lakes, and rivers are all connected as water commonly flows between them. Groundwater is also connected to the surface of the land by rain and melted snow which carry substances from the surface down to the groundwater and nearby wells.

Groundwater is stored in porous and permeable strata, more commonly known as aquifers. Oconto County's groundwater source is part of a large aquifer system called the Cambrian-Ordovician aquifer system. It is the second largest source of groundwater for public, agricultural, and industrial use in the northern segment, which consists of Wisconsin, Michigan, Minnesota, and Iowa. This aquifer is a complex multi-aquifer system with several aquifers separated by leaky confining units.

One hundred percent of water used by municipalities and in homes in Oconto County comes from groundwater. Industrial water users in Oconto County use surface water and groundwater. Drinking water is supplied via municipal or private wells. As illustrated by Table 5.4, five municipalities in the county have 15 municipal wells that provide drinking water to 26 percent of county residents. In addition to municipal well, there have been over 12,000 private wells constructed in Oconto County.

Table 5.4: Municipal Drinking Water Systems in Oconto County

Municipality	Number of Wells	Aquifer Type	Population Served
City of Gillett*	3	Sand and gravel	1,356
Village of Lena	2	Bedrock	585
City of Oconto	3	Bedrock	4,505
City of Oconto Falls	3	Bedrock	2,892
Village of Suring	2	Gravel	601
	1	Sandstone	
Total	15		9,939

*City of Gillett planning 1 additional well in sand and gravel

Source: *Draft Oconto County Groundwater Information for Comprehensive Planning, 2006*

Fertilizers, manure, land application of sewage, pesticides, on-site sewage disposal systems, chemical spills, leaking underground storage tanks, landfills, existing land uses, and landowner practices are all potential pollutants for drinking water wells. The susceptibility of groundwater to contamination from these activities can be highly variable depending on location. Depth to bedrock, aquifer type, soil type, and depth to groundwater are all factors thought to influence susceptibility. Considering these factors, it can be concluded that groundwater is most susceptible to contamination in the northwest part of Oconto County where the sand and gravel aquifer is present and less susceptible in the south-central portion of the county where clay materials overlie the deeper bedrock aquifers.

Groundwater Management

In order to provide protection for groundwater resources, the WDNR has adopted maximum contaminant level (MCL) standards that apply to all public water supplies in the state. The standards regulate concentrations of pollutants in public water supplies (NR 809) and nitrate removal from public drinking water (NR 122).

Under Wisconsin’s Groundwater Standards Law (NR 160), state programs for landfills, hazardous wastes, spills, wastewater, septic tanks, salt storage, fertilizer storage, pesticides, and underground storage tanks must comply with the established standards. In addition, Wisconsin Administrative Code chapters NR 140, 141, and 142 regulate groundwater quality, groundwater monitoring, well requirements and water management and conservation.

As development in the area continues to increase, so does the amount of impervious surfaces such as roofs and parking lots. It is important to understand that the amount of water that infiltrates to the groundwater depends on such factors as vegetation cover, slope, soil composition, and depth to the water table. Therefore, wise land use decisions, particularly in critical groundwater recharge areas and areas of shallow soils, could maintain the amount of water being recharged by the aquifers as well as limit contamination.

It is especially important to ensure protection of groundwater within the county from construction and agricultural runoff events. These events can lead to contamination of private wells, fish kills, and an influx of nutrients into surface waters which cause harmful algal blooms. Methods to protect groundwater resources include utilizing local planning and zoning tools, advocating for best management practices, implementing wellhead protection programs, and strictly enforcing regulations on private sewage systems.

Wellhead Protection Planning

Wellhead protection plans can be an effective method of protecting groundwater quality and quantity. These plans are developed to achieve groundwater pollution prevention measures within public water supply wellhead areas. As of January 2007, only the Village of Suring has a wellhead protection plan in place. The City of Gillett, Village of Lena, and City of Oconto Falls were either in the development phase of plan to begin development of a plan soon.

A wellhead protection ordinance is a zoning ordinance that implements the wellhead protection plan by controlling land uses in the wellhead protection area. As of January 2007, the Village of Suring is the only municipality to implement a wellhead protection ordinance.

Oconto County Manure Management Ordinance

In order to protect its groundwater and surface water resources, Oconto County has adopted an Animal Waste Management Ordinance. The intent of the ordinance is to provide protection to these resources by regulating permitting of storage facilities; nutrient management practices; permitting of new and expanding feedlots; and required removal of feed piles. The ordinance also regulates the enforcement of prohibitions including no overflow manure storage structures; no unconfined manure stacking (piling) within water quality management areas; no direct runoff from feedlots or stored manure to waters of the state; and no unlimited livestock access to waters of the state where high concentrations of animals prevent adequate sod cover maintenance.

Runoff/Stormwater Management

Runoff refers to water from precipitation (stormwater), irrigation, or other sources, such as overwatering of lawns, that moves over and through the ground. These waters generally flow over impervious surfaces such as rooftops, driveways, sidewalks, streets and parking lots. As the water flows over these impervious surfaces it picks up and carries away natural and man-made pollutants, eventually depositing them into lakes, rivers, wetlands, coastal waters and groundwater supplies. The polluted run-off can destroy lake and river ecosystems, contaminate drinking water, and clog drainage ways with sediment thereby increasing the likelihood of flooding.

In October 2002, the State of Wisconsin established Run-off Management Administrative Rules to address uncontrolled run-off from urban and rural land use activities. These administrative rules establish a variety of best management practices, performance standards, regulations and permit requirements that farms, cities and construction sites are required follow as a way to reduce polluted runoff.

The following are the eight rules written by the WDNR and one by the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) that are intended to reduce the affects of runoff:

NR 120	Priority Watershed and Priority Lake Program
NR 151	Runoff Management (Performance Standards and Prohibitions)
NR 152	Model Ordinances for Construction Site Erosion Control and Post-Construction Storm Water Management
NR 153	Targeted Runoff Management Grant Program
NR 154	Best Management Practices and Cost-Share Conditions
NR 155	Urban Nonpoint Source Water Pollution Abatement and Storm Water Management Grant Program
NR 216	Storm Water Discharge Permits
NR 243	Animal Feeding Operations
ATCP 50	Soil and Water Resource Management Program

These rules have a direct impact on private actions and on local government activities. They require that certain local governments take specific action to control storm water. As more impervious surfaces are created, causing a decrease in the amount of land that is available for filtration, these rules may require local governments to construct costly stormwater diversion and storage facilities. Furthermore, construction and agricultural activities within the community can contribute heavily to pollution issues if these requirements are not followed properly. Therefore, it is important that these requirements are addressed through local planning activities by promoting and utilizing best management practices. These practices will help to preserve the quality of the groundwater supply, protect surface waters from pollution, and safeguard significant aquatic habitats. For more information regarding best management practices and nonpoint source pollution control, visit the WDNR's runoff management website.

- General nonpoint water pollution issues that have been identified as concerns in the county include:
 - Erosion of cropland soil in the middle and southern townships;
 - Erosion of soils on construction sites, particularly those along the shorelines;
 - Erosion of streambanks in agricultural areas;
 - Management of animal waste, particularly among medium-sized and expanding dairy operations;
 - Stormwater runoff in rural subdivisions located in the northern and southern part of the county; and
 - Pesticide and fertilizer runoff from agricultural and residential areas.

Woodlands (RESERVED FOR COUNTY LAND USE)

There are a total of _____ acres of woodlands within Oconto County. Map 5.10 illustrates the upland woodlands and lowland woodlands (i.e., woodlands within wetlands). Upland woodlands constitute approximately _____ acres and the lowland woodlands cover _____ acres of land.

When planning future development, keep in mind that woodlands provide aesthetic views, wildlife habitat, and offer multiple recreational choices. Woodlands also maintain watershed cover, provide shade, serve as a windbreak, help reduce soil erosion, act as a noise barrier, and screen unsightly developments.

Wildlife Habitat

Wildlife habitat can be defined as areas that provide the arrangement of food, water, cover and space required to meet the biological needs of an animal. Different wildlife species have different requirements and these requirements vary over the course of a year. Also, different plants provide fruit and food in different seasons. Maintaining a variety of habitats generally benefits a much desired diverse wildlife. Woodlands, wetlands, floodplains and the water features within the county provide habitat for many species of wildlife. White-tailed deer, turkey, grouse, rabbits, gray squirrel, and chipmunks are some of the more well known species found in the county. The inland surface waters of the county also provide habitat for fish and migratory fowl that frequent the area.

Connectivity is essential for the survival of numerous wildlife species. Many wildlife populations are unable to flourish, and countless ecological processes will not function if natural connections are severed. A planned connection of natural landscape features and stream corridors – parks, State Natural Areas, riparian areas, wetlands, woodlands, and other green spaces – is critical to maintain fundamental ecological processes and services, and to maintain the health of wildlife populations and water quality.

Federal Land

Numerous valuable wildlife areas exist on the 138,000 acres of Nicolet National Forest in Oconto County. The U.S. Forest Service maintains the wildlife areas and creates new habitat through proper harvesting of wood products. Many new openings have been created, trails seeded, and certain tree species have been managed for wildlife food and cover. The same methods are used in the Oconto County Forest system.

State Land

Many State natural, scientific and wildlife and fishery areas exist in Oconto County. These areas are dedicated to the preservation of certain plant and animal species. Further information regarding these areas can be found in the Significant Natural Features portion of this chapter.

Oconto County Land

Several significant wildlife areas exist on Oconto County public land, such as the Brazeau Swamp, Machickanee forest, Peshtigo Brook, and the county Line Swamp. The future of Oconto County forestland as a valuable wildlife habitat for deer and ruffed grouse is contingent upon maintaining aspen as a viable species, according to the management policy stated in the *Oconto County Forest Comprehensive Land Use Plan*.

Private Land

Many areas on private lands have a unique character that makes them attractive to wildlife. The creation and preservation of such areas are important to many wildlife species.

Rare, Threatened, and Endangered Species

Oconto County is an ecologically rich county; made evident by the fact that over 133 rare mammals, birds, fish, turtles, herptiles, butterflies, invertebrates, plants, and communities occur within the county, including three federally listed species. Oconto County also has 33 state

endangered or threatened species and one species of special concern. Many of the species found in Oconto County are considered rare because their populations and habitat are declining throughout their range. These species are of aesthetic, ecological, cultural, educational, historical, medicinal, recreational, and/or scientific importance to the land and people.

- Table 5.4 lists all state and federal endangered or threatened plants and animals in Oconto County. Appendix x lists all the rare animals, plants and natural communities in Oconto County that have been identified by the Wisconsin DNR Natural Heritage Inventory.

Table 5.5: State and Federal Threatened or Endangered Species in Oconto County

Species Classification	Common Name	State Listing	Federal Listing
Bird	Bald Eagle	Special Concern	Threatened
Bird	Common Tern	Endangered	
Bird	Forster's Tern	Endangered	
Bird	Loggerhead Shrike	Endangered	
Bird	Piping Plover	Endangered	Endangered
Bird	Red-Necked Grebe	Endangered	
Bird	Red-Shouldered Hawk	Threatened	
Bird	Yellow Rail	Threatened	
Butterfly	Karner Blue Butterfly	Endangered	Endangered
Butterfly	Northern Blue Butterfly	Endangered	
Butterfly	Swamp Metalmark	Endangered	
Fish	Greater Redhorse	Threatened	
Fish	Longear Sunfish	Threatened	
Fish	Redfin Shiner	Threatened	
Herptile	Eastern Massasauga Rattlesnake	Endangered	Future Candidate
Herptile	Western Ribbon Snake	Endangered	
Invertebrate	Pygmy Snaketail	Threatened	
Invertebrate	Slippershell Mussel	Threatened	
Mammal	Timber Wolf	Threatened	Threatened
Plant	Bog Bluegrass	Threatened	
Plant	Braun's Holly-Fern	Threatened	
Plant	Dwarf Huckleberry	Endangered	
Plant	Dwarf Milkweed	Threatened	
Plant	Fairy Slipper	Threatened	
Plant	Hert-Leaved Foam-Flower	Endangered	
Plant	Little Goblin Moonwort	Endangered	
Plant	Marsh Valerian	Threatened	
Plant	Pale Green Orchid	Threatened	
Plant	Ram's-Head Lady's-Slipper	Threatened	
Plant	Round-Leaved Orchid	Threatened	
Plant	Seaside Crowfoot	Threatened	
Turtle	Blanding's Turtle	Threatened	
Turtle	Wood Turtle	Threatened	

Source: Wisconsin Department of Natural Resources, 2006; Bay-Lake Regional Planning Commission, 2006.

Significant Natural Areas

A number of sites located within the county may be considered significant natural features. These areas may be designated as WDNR State Natural Areas, State Wildlife and Fishery Areas, Significant Coastal Wetlands, Land Legacy Places; or be included in the “Natural Areas Inventory,” conducted by the Scientific Areas Preservation Council of the WDNR.

The following text offers a brief description of the significant natural features designations.

WDNR State Natural Areas

The Wisconsin State Natural Areas program was established to designate sites that are in natural or near natural condition for scientific research, the teaching of conservation biology, and most of all, preservation of their natural values and genetic diversity for the future. These areas are not intended for intensive recreation use, but instead to serve the mission of the Natural Areas Program. Their mission is to locate and preserve a system of State Natural Areas harboring all types of biotic communities, rare species and other significant natural features native to Wisconsin. The State Natural Areas program, established in 1951 under ss. 23.27, 23.28 and 23.29 *Wis. Stats.*, is managed by the WDNR.

State Wildlife and Fishery Areas

State wildlife and fishery areas are lands that have been acquired by the WDNR in order to preserve wild lands and game for people interested in the outdoors. By managing these lands it is the intent of the WDNR to protect important habitat for wildlife while also keeping them open for public use.

Significant Coastal Wetlands

The Lake Michigan shoreline contains many significant coastal wetlands that form a complex arrangement of ecosystems supporting a diversity of natural features. The Natural Heritage Inventory Program of the WDNR – Bureau of Endangered Resources (WDNR-BER) has inventoried Significant Coastal Wetlands for the Great Lakes in Wisconsin in a report titled, *A Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes*.

Land Legacy Places

The WDNR has identified places that will play a critical role in meeting Wisconsin's conservation and outdoor recreation needs over the next 50 years in order to effectively plan for potential future conservation needs within the state. By designating an area as a “Legacy Place” the WDNR intends to guide future land use decisions about certain places. However, it does not supersede any existing state or local regulations.

Natural Areas Inventory

The “Natural Areas Inventory” (NAI) was conducted in 1976 and updated in 1980 under the direction of the Scientific Areas Preservation Council (SAPC) of the WDNR to identify natural areas along Wisconsin's Lake Michigan and Lake Superior coasts. The SAPC defined the NAI sites as “tract[s] of land or water so little modified by man's activity or sufficiently recovered that they contain intact native plant and animal communities believed to be representative of the pre-settlement landscape”. The SAPC identified NAI sites independently of the State Natural Areas program; as a result, some sites fall under both programs.

- Table 5.5 details the significant natural features in Oconto County along with their designation(s). Detailed descriptions of each significant natural area can be found in Appendix x.

Table 5.6: Significant Natural Areas, Oconto County

Significant Natural Area	Designation				
	State Natural Area	State Wildlife and Fishery Area	Significant Coastal Wetland	Land Legacy Place	Natural Area Inventory
Barney Creek	X				
Brazeau Swamp				X	
Charles Pond	X		X		
Charles Pond Unit - Green Bay West Shores		X			X
Chequamegon-Nicolet National Forests				X	
Copper Culture Cemetery					X
County Line Swamp			X		X
Glocke Lake	X				
Hagar Mountain	X				
Mud Creek Wetland			X		
Oconto County Forest					X
Oconto Marsh			X	X	
Oconto Marsh Unit - Green Bay West Shores		X			X
Oconto River				X	
Oconto River (South-Branch) Fishery Area		X			
Pecor Point Unit - Green Bay West Shores		X			X
Pensaukee Lacustrine Forest					X
Pensaukee River Wetland Complex			X		
Pensaukee Unit - Green Bay West Shores		X			X
Peshtigo Brook Wildlife Area		X			
Peshtigo Harbor Unit - Green Bay West Shores		X			X
Rush Point Unit - Green Bay West Shores		X			X
Snow Falls Creek	X				
Suamico, Little Suamico and Pensaukee Rivers				X	
Tibbett Suamico Unit - Green Bay West Shores		X			X
West Shore Green Bay Wetlands				X	

Source: Wisconsin Department of Natural Resources, 2006; Bay-Lake Regional Planning Commission, 2006.

Environmental Corridors

Environmental corridors are areas on the landscape that contain and connect natural areas, green space and scenic, historic, scientific, recreational, and cultural resources. They often lie along waterways and other natural features.

Environmental corridors are complex ecosystems that provide many ecological and human-valued services, such as a improved water quality, means for wildlife movement, protection of natural resources, groundwater recharge, recreation areas and stormwater management, to name a few. Environmental corridors are strictly an advisory tool that can be utilized in various community planning efforts as a way to promote preservation of areas with environmental significance.

When considering future development, it is important to understand that environmental corridors serve many purposes such as protecting local water quality; serving as buffers between different land uses; use as a means of controlling, moderating, and storing floodwaters while providing nutrient and sediment filtration; and providing fish and wildlife habitat and recreational opportunities.

- Map 5.11 illustrates the environmental corridors of Oconto County as defined by the Bay-Lake Regional Planning Commission (BLRPC). In order to produce this map, the BLRPC identified valuable coastal, natural and cultural resources throughout the county consistent with Wisconsin’s Comprehensive Planning legislation. These features were mapped using the Commission’s Geographic Information Systems (GIS) and include:
 - Navigable waters with a 75-foot setback;
 - Wetlands with a 50-foot buffer;
 - 100-year FEMA floodplains; and
 - Steep slopes (12 percent or greater);

Other features that can be considered part of the environmental corridor definition on an area-by-area basis include unique and isolated woodland areas, scenic viewsheds, unique geologic features, wetland mitigation sites and exceptional wildlife habitats.

Parks and Open Space

Various natural settings in the county are utilized as recreational sites by the public.

- Table 5.6 lists the federal, state, county and community park and recreation areas located in the county. For more detailed information of each of the following parks and open space areas located in the county refer to Chapter 9 and Map 9.x of this document.

Table 5.7: Parks and Recreation Areas, Oconto County

Park Name	Geographic Location	Ownership
Bass Lake Picnic Gound	Townsend	Federal
Breakwater Park	Oconto	Community
Copper Culture Mound State Park	Oconto	State
D.E. Hall County Park	Oconto	County
East Side Beach	Oconto Falls	Community
Grange County Park	Lena	County
Green Lake Picnic Ground	Mountain	Federal
North Bay Shore Recreation Area	Oconto	County
North River Road Access	Oconto	County
Oconto City Docks	Oconto	Community
Oconto City Park	Oconto	Community
Oughton Park	Townsend	Community
Patzer Park	Underhill	County
Pioneer Park	Stiles	County
Riverside County Park	Gillett	County
Riverside Memorial Park	Suring	Community
West Side Beach	Oconto Falls	Community
Wheeler Lake Picnic Ground	Lakewood	Community

Source: Oconto County, 2006; Bay-Lake Regional Planning Commission, 2006.

AGRICULTURAL RESOURCES

According to UW-Extension, Oconto County farmers own and manage the resources on 218,887 acres of land, or 34 percent of all land in the county. This includes pastures, cropland and tree farms.

Prime Agricultural Soils

The USDA, Natural Resources Conservation Service defines prime agricultural soils as lands that have the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops, with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion.

According to the NRCS, there are three classes of prime agricultural soils that cover ___ percent of Oconto County. These classes include the following:

- A. *Prime farmland* is considered land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods.
- B. *Farmland of statewide importance* is land not identified as prime farmland on a nationwide basis but is important in Wisconsin for the production of various food, feed, fiber and forage crops.
- C. *Prime farmland only where drained* are areas where soils have wetness limitations, but can be or are used effectively for agricultural production with installation of a tile drainage system.

Since agriculture plays an important role in the economic, cultural and social structure of Oconto County, it will be important to preserve these areas against future development. Once agricultural land is disturbed or replaced by another land use, it cannot be effectively returned to agricultural production.

- Map 5.12 illustrates areas in Oconto County that can be classified as prime agricultural soils based on the soil types found there.

Farm Numbers and Types

Table 5.7 lists the types of farms that exist in Oconto County according to the 2002 Census of Agriculture which was conducted by the United States Department of Agriculture (USDA) National Agricultural Statistics Service. This table illustrates the number of farms that were operating in 2002 by type, as well as the number of animals, or acres of land, that could be attributed to each particular farm type.

Table 5.8: Farm Numbers and Types in Oconto County, 2002

Livestock and Poultry		
Type	Number of Farms	Total Animals
Milk cows	252	20,525
Beef cows	213	3,429
Horses and Ponies	195	1,109
Hogs and pigs	39	1,165
Sheep and lambs	17	675
Broilers and other poultry	12	1,220
Goats (milk and angora)	5	Data unavailable
Harvested Crops		
Type	Number of Farms	Total Acreage
Forage*	636	47,867
Corn for grain	387	35,964
Corn for silage or greenchop	322	15,235
Soybeans	146	11,745
Oats	103	2,271
Vegetables harvested for sale	84	5,305
Wheat	80	5,698
Orchards	16	69
Barley	12	228

*Land used for all hay and all haylage, grass silage, and greenchop.

Source: USDA National Agricultural Statistics Service, Census of Agriculture, 2002; Bay-Lake Regional Planning Commission, 2006.

- According to the USDA, of the 1,132 farms in Oconto County in 2002 approximately 92.8 percent are owned by individuals or families, an additional five and a half percent are owned by family partnerships, and corporations account for slightly less than two percent.

Throughout Oconto County dairy farms have traditionally been the primary livestock operations. According to the *2006 Wisconsin Agricultural Statistics*:

- In 2005 Oconto County had 208 dairy farms in 2002 housing 20,200 milk cows. This is a significant decrease from 1995 when the County contained 400 farms housing 23,100 cows.
- The average size of dairy herds in Oconto County has decreased from 274 in 2000 to 208 in 2005.

Trends in Agriculture

Oconto County's close proximity to the waters of Green Bay and its vast amount of land create a unique landscape which provides for diverse agricultural opportunities. Vegetables, horticulture, maple syrup, fruits, crops, forestry, livestock and dairy production contribute to the breadth of agricultural products produced in the county.

- The 2002 Census of Agriculture indicates that the total number of farms has increased in Oconto County from 940 in 1997 to 1,132 in 2002. Furthermore, the 2002 Census also indicates that harvested cropland in Oconto County increased from 118,798 acres in 1997 to 123,549 in 2002.

The amount of agricultural land sold over a period of time is a good indicator of how much development has taken place. Table 5.8 indicates that 4,354 acres of agricultural land was sold between 2001 and 2004 in Oconto County.

- Between 2001 and 2005, 2,212 acres, or about 24 percent of the 9,201 acres of agricultural land sold in the county during that time, was converted to non-agricultural uses.
- The value of each acre diverted from agriculture to non-agriculture use has risen from \$2,607 per acre in 2001 to \$3,340 per acre in 2005.

In each of the years covered by Table 5.8 the amount of agricultural land sold and preserved as such has remained higher than the amount of land that was converted to non-agricultural uses. However, it should be noted that agricultural lands which were diverted from agricultural uses after they were sold, drew a higher market value, \$3,340 per acre in 2005, than those that continued to be used for agricultural purposes, which sold for only \$2,777 per acre in 2005. Farmers seeking to sell their land in the future may be influenced by this trend, leading to a greater conversion of agricultural land to non-agricultural uses.

Table 5.9: Oconto County Agricultural Land Sales, 2001 - 2005

Year	Acres Continuing as Agriculture Land	Average Cost per Acre	Acres Diverted from Agriculture Land	Average Cost per Acre	Total Acres Sold
2001	1,772	\$1,782	440	\$2,607	2,212
2002	1,376	\$2,118	307	\$2,169	1,683
2003	1,862	\$1,554	888	\$3,050	2,750
2004	1,979	\$1,827	577	\$2,873	2,556
2005	1,370	\$2,777	79	\$3,340	1,449
Total	6,989	\$2,012	2,212	\$2,808	9,201

Source: Wisconsin Agricultural Statistical Service, 2002 - 2006.

The cost of developing productive agricultural lands needs to be considered. For instance, farmlands provide revenues to local governments and require very few services. Conversely, residential land uses may cost communities more to provide services than gained through local property tax increases. This is evident in areas of widespread development as road maintenance, school transportation, police service and fire protection will likely increase the overall cost of services throughout the entire community.

Communities are encouraged to plan for continued growth of urbanized areas along with concentrated development of rural lands. This will help keep the cost of services down and assist with the preservation of Oconto County's valuable farmlands and rural landscape.

Environmental Impacts of Agriculture

Most of the agricultural lands within the county are interspersed with water features, wetlands, steep slopes and other natural features that makeup much of Oconto County's landscape. The integration of agriculture and natural resources can raise concerns.

Soil erosion from farm fields and surface runoff of crop nutrients and agricultural chemicals can impact the quality of streams, rivers, lakes and underground aquifers, ultimately impacting drinking water supplies. Specific crop rotations, livestock and tillage practices all affect the amount of soil erosion and nutrient losses.

As a result, farm operators are encouraged to work with their local land conservation and UW-Extension staff to identify and implement specific resource conservation practices to better protect the environmental features in and around farms.

If properly managed, agricultural lands and those areas not cropped such as woodlots and stream corridors have a positive impact on a community. These lands provide balanced habitat for wildlife and waterfowl, in addition to providing open space lands.

Economic Impacts of Agriculture

Agriculture is an important economic element in Oconto County. It includes hundreds of family-owned farms as well as agriculture related businesses and industries that provide equipment, services and other products farmers need to process, market and deliver food to consumers. The production, sales and processing of Oconto County's farm products generate employment, economic activity, income and tax revenue.

- According to UW-Extension, agriculture in Oconto County accounts for nearly \$317.9 million, or 25 percent, of the county's total economic activity. Furthermore, economic activity associated with Oconto County's farms and agriculture-related businesses generates \$7.8 million in local and state taxes.

For more information on Oconto County's agricultural industry, refer to the Economic Development element (Chapter 7) of this document.

CULTURAL RESOURCES

Cultural resources are typically sites, structures, features and/or objects of some importance to a culture or community for scientific, aesthetic, traditional, educational, religious, archaeological, architectural or historic reasons.

Historic and Archeological Sites

The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures and objects that are significant in American history, architecture, archeology, engineering and culture.

- Table 5.9 is a listing of sites in the county that appear on the National Register of Historic Places as well as those that were identified by the Oconto County Historical Society as important historical and archeological sites.

Other structures of historic significance in the county that are not on the State and/or National Register, but are listed in the state's AHI inventory consist of the county courthouse, churches, hotels, historic homes, historic markers, etc. There is a possibility that several structures or sites may not be listed, and some of the listed structures may have been torn down. A comprehensive listing of AHI sites in Oconto County can be found on the Wisconsin Historical Society Website.

Preservation of historical and archeological sites located within the county can be important in retaining the character of the area. These sites help to educate the public about the history of the county while also providing tourism and recreation opportunities.

Table 5.10: Historic Places in Oconto County.

Name	Location	Structure Age
National Register of Historic Places		
Beyer Home Museum	City of Oconto	1868
Boulder Lake Site	Town of Doty	
Daniel E. Krause Stone Barn	Town of Chase	1903
First Church of Christ, Scientist	City of Oconto	1886
Governer Edward Scofield House	City of Oconto	1869
Holt and Balcom Logging Camp No.1	Town of Lakewood	1880
Holt-Balcom Lumber Company Office	City of Oconto	1854
Huff Jones House	City of Oconto	1851
John G. Campbell House	City of Oconto	1892
Mathey Building	Village of Lena	1916
Mountain School	Town of Mountain	1908
Oconto County Courthouse	City of Oconto	ca 1877 & 1891
Oconto Main Post Office	City of Oconto	1922
Oconto Site: Copper Culture State Park	City of Oconto	3000 - 4000 BC
Smyth Road Bridge	Town of Lakewood	
St. Mark's Episcopal Guild Hall and Vicarage	City of Oconto	1866 & 1871
St. Peter's and St. Joseph's Catholic Churches	City of Oconto	1899/1870
Weber Lake Picnic Ground Shelter	Town of Mountain	
West Main Street Historic District	City of Oconto	1860 - 1929
White Potato Lake Garden Beds Site	Town of Brazeau	ca 1200 - 1600 AD
Other Oconto County Historic and Archeological Sites		
Allouez Historical Marker	City of Oconto	
Arndt's Little Suamico Sawmill Complex	Town of Little Suamico	ca 1835
Arndt's Pensaukee Mill	Town of Pensaukee	1827
Bedora Mound Group	Town of Brazeau	ca 100 AD
E.A. Taylor's Pensaukee Stage Coach Stop and Hotel	Town of Pensaukee	ca 1855 & ca 1871
Fire Lookout Tower	Town of Mountain	1934
Fort Howard to Menominee Road	Town of Pensaukee	1855
Gardner's Sawmill and Grand Hotel	Town of Pensaukee	ca 1850 and 1872
Green Lake Picnic Ground Shelter	Town of Mountain	1937
Grosse Family Cemetary	Town of Little Suamico	ca 1850
Hauser Dental Office (former Bank Building)	City of Gillett	ca 1904
Indian School and Farm	Town of Stiles	ca 1870
Lena Museum and Log Cabin	Village of Lena	
Living Oak Trail Marker Tree	Oak Orchard	
Mercier Hotel	City of Oconto Falls	1895
Mountain CCC Camp	Town of Mountain	1930s
Mountain Log House	Town of Mountain	ca 1880
Murphy Saw Mill	Town of Lakewood	
Oconto Falls Tissue	City of Oconto Falls	1845
Paxkinano Village Site	Town of Oconto	
Spruce Elementary School	Town of Spruce	
St. Mark's Lutheran Church and Cemetary	Town of Spruce	1892
Stiles Dam and Iron Bridge	Town of Stiles	ca 1925 & ca 1920
Suzie's Hill and Rapids	City of Oconto	
Swamp Hotel	Town of Little River	ca 1912
Thomaston Fishing Settlement	Town of Little River	ca 1855 - 1871
Volk's Family Cemetary	City of Oconto Falls	ca 1855

Source: Wisconsin Historical Society, 2006; Oconto County Historical Society, 2006; and Bay-Lake Regional Planning Commission, 2006.

Community Design

Community design (character) deals with the large-scale organization and design of the county. An evaluation of community design is often subjective and requires personal judgment. In an effort to remove this subjectivity, the community design resources of the county have been inventoried that represent the building blocks and language of community design:

Landmarks

Landmarks are important reference points that represent a prominent feature of the landscape and have the ability to distinguish a locality, mark the boundary of a piece of land, or symbolize an important event or turning point in the history of the county.

Pathways

Pathways are linear features that represent both vehicular and pedestrian movement. Pathways provide connections between places, as well as along them. Whether a major arterial, local street, or undefined woodland trail, pathways are hierarchical and represent a degree of usage. The following pathways should be considered important aspects of the county's character.

Edges

Like pathways, edges are linear. Edges are important organizing elements that represent boundaries that can be soft or hard, real or perceived. They become increasingly important as a community grows so as to visually distinguish the edges of the county. These edges do not necessarily coincide with jurisdictional boundaries.

Districts

Districts encompass areas of commonality. These areas represent buildings and spaces where clearly defined and separate types of activities take place.

Nodes

Nodes are specific points of recognition. They are destinations and very often represent the core or center of a district. In addition, nodes are closely associated with pathways as they provide access to and from districts.

- There are a large number of landmarks, pathways, edges, districts and nodes located throughout Oconto County. Chapter 4 provides further detail on these features.

Map 5.1: Pleistocene Geology

Map 5.2: Depth to Bedrock

Map 5.3: Steep Slope

Map 5.4: Watersheds/Sub-watersheds

Map 5.5: Lakes and Ponds Greater than 100 Surface Acres

Map 5.6: Major Rivers and Creeks

Map 5.7: Shorelands

Map 5.8: Floodplains

Map 5.9: Wetlands

Map 5.10: Woodlands (RESERVED FOR COUNTY LAND USE)

Map 5.11: Environmental Corridors

Map 5.12: Prime Agricultural Soils