CHAPTER 2 – NATURAL, AGRICULTURAL, AND CULTURAL RESOURCES

INTRODUCTION

The purpose of this element is to provide background information on a wide variety of agricultural, natural, and cultural resources in the County. This information will help the County recognize and identify important resources that need to be protected and/or efficiently managed. It will also identify if there is anything that may limit the development potential in the County. Each municipality's plan has addressed their individual natural, agricultural, and cultural resources. There are some common resources throughout the County, such as Lake Michigan, the Kettle Moraine State Forest, and agricultural lands. Natural resources are vital to Sheboygan County's economy, whether it be for the tourism revenues, enhanced property values, agricultural practices, recreational opportunities, or the raw materials available.

According to the 2002 land use windshield survey[1] completed by Bay-Lake Regional Planning Commission, the County had about 58 percent of its land in agricultural related uses in 2002. More than likely this number has decreased since 2002, as some new development occurs on agricultural lands. In the 2008 Community Survey, nearly two-thirds of respondents stated they would be willing to increase their property taxes to protect our natural resources. This shows how strongly residents feel about protecting these resources. Sheboygan County has 26.3 miles of Lake Michigan shoreline, which provides an opportunity for tourism, recreation, commercial fishing, and other businesses. This also provides challenges in balancing tourists' desires, and residents' desires as well as ensuring the quality of the Lake remains unchanged.

Although Sheboygan County has recognized the importance of planning for agricultural resources, as evidenced by its farmland preservation plan, particular emphasis has not been placed on ensuring its integration with other planning efforts. This can result in lost opportunities in agriculture preservation and inefficiencies for growth and development. Another important reason for a comprehensive approach to agricultural planning is agriculture's strong influence on quality of life issues and the character of the community. Sheboygan County is proud of its agricultural heritage and needs to plan to preserve these lands. Preserving these lands will also help sustain an important industry in the County as well as Wisconsin.

As the population of Sheboygan County continues to grow, some of the agricultural, natural, and cultural resource lands may be used for residential, commercial, or industrial purposes. Land development patterns are directly linked to the natural, agricultural, and cultural resource bases of each community. Therefore, these features need to be considered before making any decisions concerning future development within the community. If development on agricultural lands is unplanned or uncontrolled, development may leapfrog and lead to inefficient extensions of utilities and roads, in addition this type of development can also cause existing land uses to become inefficient. If farmers have segmented fields, it can increase transportation costs for proper manure spreading, plowing, planting, and harvesting, as well as cause a greater incidence of land use conflicts. Planning helps to reduce these conflicts, while at the same time, preserving the character for future generations.

[1] A Land Use windshield survey is when staff of Bay-Lake Regional Planning Commission drove around the County and assessed the land use on a parcel by parcel basis. The land use was then mapped.

Land development patterns are directly linked to the natural, agricultural, and cultural resource bases of each community. Therefore, these features need to be considered before making any decisions concerning future development within the community. Future development must be carefully adjusted to coincide with the ability of the agricultural, natural and cultural resource base to support the various forms of urban and rural development. This balance must be maintained to prevent the deterioration of that underlying and sustaining base because these resources make each community and Sheboygan County unique. It is important when planning for future land use, each of these resources is taken into consideration. The County's agricultural, natural, and cultural resources contribute greatly to the quality of life.

Sheboygan County understands the importance of planning wisely, with the sheer number of cultural and natural resources located within the County. Sheboygan County has recognized their importance by inventorying, identifying, protecting and preserving natural and cultural resources, as is shown in the *County's Natural Areas and Critical Resources Plan.* This plan helps to identify the natural resources of Sheboygan County including the lakes, woodlands, wetlands, geology, along with many other resources. Recommendations were then developed to preserve, protect, and educate the public about natural and cultural resources in Sheboygan County. Some of the tourism to the County is based on making sure these resources are protected, preserved, and maintained. The freshwater lakes, woodlands, wetlands, and other natural features are all important. This chapter will identify and explore these agricultural, cultural, and natural resources Sheboygan County has to offer. Sheboygan County municipality's plans will also be used in the development of this chapter. Finally, this chapter will combine the data and recommendations set forth in the *Farmland Preservation Plan* and the *Natural Areas and Critical Resources Plan*, as well as new recommendations that have been developed through the Citizen Survey and the Smart Growth Implementation Committee.

NATURAL RESOURCES

Climate

Western Sheboygan County typically experiences continental weather with some slight microclimate variations on the hilltops and in the valleys of the Kettle Moraine area. Figures 2-1, 2-2, and 2-3 are climate data from the Plymouth weather station. There is also a weather station in Sheboygan, but Plymouth's data is shown because it is a more central location. The climate data from the Sheboygan weather station varies slightly, but overall the average temperature is warmer in Sheboygan, the average annual precipitation is less, as well as the annual average snowfall. This may be due to the proximity to Lake Michigan. Another possible explanation for the difference may be that the Plymouth weather station is 834 feet above sea level and the Sheboygan weather station is 648 feet above sea level.

Sheboygan County experiences a lake-effect climate. Due to the proximity to Lake Michigan, temperatures in the summer tend to be cooler near the lake. This is because bodies of water take a longer time warming up or cooling off compared to the land. This means in summer and spring that there could be a 10 to 15 degrees Fahrenheit drop in temperature from eastern Sheboygan County to western Sheboygan County. The lake-effect climate also means that in winter the temperatures may be 10 to 15 degrees warmer closer to the Lake, than temperatures 20 miles from the Lake. Communities closer to the Lake will see warmer temperatures in winter.

About two-thirds of the annual precipitation falls during the growing season. It is normally adequate for vegetation, although drought is occasionally reported. The climate is most favorable for dairy farming; the primary crops are corn, small grains, hay, and vegetables.

The growing season averages 126 to 165 days. The average date of the last spring freeze varies from the first week to the last week of May, with a median date of last frost of May 10. The first autumn freezes occur in early to mid-October, with a median date of first frost of October 7. The mean date of first snowfall of consequence, an inch or more, occurs in early November. The snow cover acts as protective insulation for grasses, autumn seeded grains, and other vegetation.

While a detailed site assessment for Sheboygan County has never been done, Wisconsin Division of Energy computerized models indicate wind speeds average 10-12 miles per hour at a height of 30 meters, which is a typical height for small private wind generators (in general, winds exceeding 11 mph are required for cost-effective installations). Computerized models indicate wind speeds average 13-15 miles per hour at a height of 60 meters, which is a typical height for large commercial wind turbines (in general, winds exceeding 13 mph are required for financially feasible projects).

City of Plymouth Climate Station Data
Figure 2-1: Average Monthly Temperature

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Max °F	25.4	30.0	40.4	53.6	66.9	76.5	81.0	78.5	70.4	58.3	43.1	30.4	54.5
Min °F	9.0	13.0	23.0	34.2	45.0	54.6	60.1	58.5	49.8	39.5	28.0	16.1	35.9
Mean °F	17.2	21.5	31.7	43.9	56.0	65.6	70.6	68.5	60.1	48.9	35.6	23.3	45.2

Figure 2-2: Average Monthly Precipitation

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Inches	1.40	1.25	2.42	3.47	3.67	3.93	3.94	4.55	4.02	2.93	2.85	1.87	36.30

Figure 2-3: Average Monthly Snowfall

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Inches	16.1	11.6	10.4	3.6	0.2	0.0	0.0	0.0	0.0	0.2	5.5	13.8	61.4

Source: Wisconsin State Climatology Office. Based on historical data from1971-2000 from the weather station at Plymouth, Wis., latitude 43°44' N, longitude 87°58' W, elevation 834 ft.

Air Quality Issues

Over the past several decades, citizens in eastern Wisconsin have been suffering from exposure to unacceptable levels of ozone. Environmental Protection Agency (EPA) designated nonattainment areas in southeastern Wisconsin shortly after developing the first ozone standard in 1979. As the ozone monitoring network grew and measured unacceptable ozone concentrations in other locations, additional counties along the Lake Michigan shoreline were added to the list of nonattainment counties.

In 1997, EPA revised the ozone standard, replacing the previous 1-hour standard with the current 8-hour standard (meaning that ozone levels are averaged over an 8-hour period). In April 2004, EPA designated 10 counties in Wisconsin as nonattainment areas for the 8-hour standard, one of these counties is Sheboygan. In 2008, the EPA redesignated Kewaunee County as attainment for 8-hour standard. Sheboygan continues to be among nine counties designated as non-attainment of the ozone standard. Also in 2008, the EPA revised the 8-hour standard to a lower standard of 75 parts per billion.

Geology

Two different types of geologic settings, Quaternary geology and bedrock geology, characterize Sheboygan County. Quaternary geology refers primarily to the effects that continental glaciations have had on the region within the last 20,000 years, and to a lesser extent, the surface effects of more recent erosion and deposition. Bedrock geology refers to the much older, solid rock layers that lie beneath Quaternary sediments.

Bedrock geology

The bedrock units, which underlie Sheboygan County, range in age from Precambrain at depth, to Silurian at the surface. The oldest are impermeable crystalline rock of Precambrian age at depths that average more than 1,500 feet below the land surface.

Silurian dolomite, often referred to as Niagara, is the uppermost bedrock in Sheboygan County and reaches thicknesses up to 580 feet. Rocks underlying the Niagara dolomite are not visible in the County. Below the Niagara dolomite is a shale formation known as Maquoketa. It reaches a maximum thickness of 450 feet. The Maquoketa Shale overlies a dolomite formation, termed Platteville-Galena, which is approximately 500 feet in thickness. This rock formation, in turn, overlies Cambrian sandstones, which are 450 feet thick. All of these sedimentary rock formations overlie Precambrian igneous rocks. Map 2-1 shows the bedrock geology of Sheboygan County.

Quaternary Geology

The last glacial ice of Quaternary glaciation, which left the planning area approximately 10,000 years ago, modified the bedrock surface by scouring highlands and depositing material in low lands created by ore-glacial erosion. Four types of Quaternary deposits are recognized within the region, including till, glaciofluvial sediments, shoreline deposits and organic deposits.

Till or unstratified drift is a mixture of unsorted, angular-to round-shaped sediments ranging in size from clay to boulders. Tills ice-contact deposits originating directly from glacial ice. Unlike till, glaciofluvial sediments are sorted by particle size that delineates the stratification.

[Map 2-1: Bedrock Geology]

Glaciofluvial sediments were deposited in a fluvioglacial environment involving glacial meltwater flow. Each individual layer of glaciofluvial sediments are characterized by a given grain size, ranging from pebbles and cobbles to sand or finer.

Ground and end moraines are two types of topographic landforms found in the region that consist primarily of till. A ground moraine is an irregular surface of till deposited by a receding glacier. The steeper slope points in the direction from which the glacier advanced. An end moraine is an accumulation of earth, stones, and other debris deposited at a glacier's end stage.

At least one type of topographic landform consisting of glaciofluvial sediments occurs in some areas of the County. This type of topographic feature is an outwash plain, which is an apron of well sorted, stratified sand and gravel deposited by glacial meltwater. Glaciofluvial deposits, which contained large ice blocks that eventually melted, were pitted with depressions known as kettles. Glaciofluvial deposits of sand and gravel surround many drumlins; but these are often covered with a thin silt cap. Map 2-2 shows the Pleistocene Geology of Sheboygan County.

The most prominent ancient shoreline in the area is that of the Nipissing Great Lakes phase, which usually occurs at an elevation of 600-605 feet above sea level. The highest ancient shoreline in the area is that of the Algonquin phase, which occurs at elevations between 620 and 658 feet above sea level.

Topography

Sheboygan County is attractive, in part, due to a variety of topographic features. The general topography of the County is characterized by a gently rolling landscape broken by areas of steep slope. Western Sheboygan County has greater areas with steep slope due to the glacial land formations. Map 2-3 shows all the soils with slopes greater than 12 percent in Sheboygan County.

Landforms in the County are glacial in origin, including drumlins, esker-like ridges, kames, stagnate-ice features, kettles and wetlands. These are unique landforms. The Kettle Moraine State Forest, located partially in western Sheboygan County, is an Interlobate Moraine that was formed when it was squeezed between two advancing glaciers. An interlobate moraine is a moraine with numerous kettles, formed between two lobes of ice. The Northern Kettle Interlobate Moraine contains a variety of glacial features, some of which were among the first in the country to be well described. This area is highly studied and mostly preserved by the Kettle Moraine State Forest-Northern Unit. Kettles are fluvioglacial landforms that occur as the result of blocks of ice calving from the front of a receding glacier and becoming partially to wholly buried by glacial outwash. These are shallow, sediment-filled bodies of water that are formed due to the retreating glaciers. Elkhart Lake is the largest kettle lake in the County.

Soils

Soil is composed of varying proportions of sand, gravel, silt, clay, and organic material. The composition of a soil affects the specific properties of that soil. The properties must be evaluated prior to any development.

[Map 2-2: Pleistocene Geology]

[Map 2-3: Steep Slope]

General Soils Description

The general characteristics of soils are largely the result of various glacial depositional processes. Outwash soils were formed from glacial deposits that were derived from local bedrock formations. Organic soils developed under a forest cover consisting mainly of conifers and hardwoods in the north, in a cool and relatively moist climate. Sandy soils were formed from parent materials derived from sandstone bedrock pulverized by glacial ice.

Soils, in part, determine how much rainfall or snowmelt directly flows into the rivers, lakes, and wetlands, and how much infiltrates the ground. Water that infiltrates the ground replenishes soil moisture and recharges the groundwater system. Soils are grouped into general soil associations that have similar patterns or relief and drainage. These associations typically consist of one or more major soils and some minor soils. The general soil types can be divided into three broad categories: areas dominated by soils formed in glacial till; areas dominated by soils formed in glacial outwash and till; and areas dominated by organic soils.

The soils in Sheboygan County are diverse ranging from sandy loam to loam or shallow silt loam, and from poorly drained to well drained. In some areas, lacustrine sands are found overlying clays or bedrock within only a few feet of the surface. Poorly drained sands are common in the lake plain or in depressions between dunes and beach ridges. Important soils in the County include clays, loams, sands, and gravels. Map 2-4 shows the general soils in Sheboygan County. The dominant associations found in Sheboygan County include the Houghton, Boots, Casco, Coloma, Oakville, Theresa, Kewaunee, Manawa, and Hochheim soils.

The Houghton and Boots series soils are nearly level, poorly drained soils that were formed in herbaceous organic matter greater than 51 inches thick. These soils are typically found in depressions of old glacial lake areas. The native vegetation of these soils included ground cover of marsh grasses, sedges, and cattails and trees included tamarack, white cedar, and alders. The organic layer of these soils is very thick, measuring 60 inches or greater, with the top 14 inches typically black muck. Permeability of these soils is moderately rapid and available water capacity is very high; natural fertility is very low. The root zone of these soils is limited by the water table, which is frequently at or near the surface in areas that have not been drained by artificial means. The Houghton-Boots association is located in the marsh lands of Sheboygan County (Broughton Sheboygan Marsh Park and Wildlife Area and Kiel Marsh State Wildlife Area).

The Casco soils are found in nearly level to very steep areas. Casco soils are well drained and are underlain by stratified sand and gravel outwash. These soils are typically found on outwash plains, stream terraces, and the convex side of slopes of glacial moraines. Areas containing Casco soils have complex slopes. Native vegetation on these soils consisted mainly of oak and hickory trees. Permeability of these soils is moderate until approximately 17-inches below the surface where permeability becomes rapid. Available water capacity is low in Casco soils. Organic-matter content is moderate and natural fertility is low. The root zone of vegetation is limited by underlying sand and gravel. Areas where slopes are not too steep typically support corn, small grain, legumes, and other crops commonly grown in Sheboygan County.

Coloma-Oakville soils are found along the coast of Lake Michigan, typically in the areas south of the City of Sheboygan. These are very well drained soils located on nearly level to sloping

[Map 2-4: General Soils]

areas of old glacial lake plains, old beach ridges, and stabilized sand dunes. The native vegetation consisted of mixed deciduous and coniferous trees. The surface layer of the Oakville soils is dark brown, loamy fine sand approximately 8 inches thick. Permeability of these soils is very rapid and available water capacity as well as organic-matter content and natural fertility are very low. Most of the acreage consisting of these soils is used for woodlands. Some areas are used for pasturing and crops.

Theresa soils are nearly level to sloping; well-drained soils that are underlain by gravelly sandy loam or gravelly loam glacial till and are typically found on glacial till plains. The native vegetation in the area of these soils included deciduous forests mainly of maple, oak, basswood, beach, and hickory trees. Permeability of these soils is moderate and available water capacity is high. Organic-matter content and fertility is moderate. The majority of acreage consisting of these soils is used for crops. Some of the acreage is used for pasture and woodlands in areas where slopes are steeper.

Kewaunee soils are found on nearly level to moderately steep slopes, are well drained and moderately well drained, and are often formed in silty clay loam glacial till. These soils are found on glacial till plains. The native vegetation on these soils was forests consisting mainly of oak, maple, beech, basswood, and white pine. Permeability of Kewaunee soils is moderately slow and available water capacity is moderate. The organic-matter content of these soils is moderately low and natural fertility is medium. Areas with these soils typically are used for crops and pasture, but frequently remain was woodlands.

Boyer soils are found along Lake Michigan north of the City of Sheboygan. Boyer soils consist of gently sloping and sloping, well drained soils that are underlain by stratified sand and gravel. The native vegetation was a deciduous forest mainly of oak and hickory. Permeability is moderately rapid to a depth of about 26 inches and very rapid below that. Some of these soils are used for cropland, pasture, or woodland.

The Manawa series consists of nearly level and gently sloping, somewhat poorly drained soils formed in silty clay loam glacial till. These soils are in drainageways and depressions on till plains and old glacial lake basins. The native vegetation was forests of mainly maple, oak, beech, ash, and which pine. Permeability is slow, and available water capacity is moderate. The organic-matter content of these soils is also moderate and natural fertility is medium. These soils are located a mile off of Lake Michigan and cover most of the eastern half of the county.

Hochheim soils are found on nearly level to steep slopes, are well drained and underlain by gravelly sandy loam or gravelly loam glacial till. These soils are found on glacial till plains and on the sides and tops of drumlins that were formed during the last glaciation process. Permeability and available water capacity are moderate and organic matter content is moderately low; natural fertility is medium. Areas with these soils on slopes less than 15% are typically used for crops; in areas where slopes are steeper are frequently used for pasture and woodlands.

Suitability for Dwellings with Basements

Within the *Soil Survey of Sheboygan County*, the Natural Resources Conservation Service (NRCS) provides information on the suitability and limitations of soils for a variety of natural resources and engineering uses. In particular, the soil survey provides information on the

limitations of each soil for building site development, including the construction of dwellings with basements. Dwellings are considered to be structures built on shallow excavations on undisturbed soil with a load limit the same as for a single-family dwelling no higher than three stories. The ratings are based on soil properties, site features, and observed performance of the soils.

According to the NRCS, *severe limitations* mean soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. *Moderate limitations* mean soil properties or site features that are not favorable for the indicated use and may require special planning, design, or maintenance to overcome or minimize limitation. *Slight limitations* mean soil properties and site features are generally favorable for the indicated use; the limitations are minor and easily able to be overcome. Refer to the Soil Survey for additional information regarding soil limitations for building site development. Map 2-5 shows soil suitability for dwellings with basements in Sheboygan County. This map is based on generalized data and is not a substitute for on-site soil testing.

Suitability for Septic Systems

Municipalities in Sheboygan County use both private sewage systems and public sanitary sewer systems for the treatment and disposal of domestic wastewater. When building it is important to consider the properties of soils because without this, the private system may require expensive and frequent maintenance or result in premature failure of the system. Factors that are considered when evaluating soils for on-site waste systems include a high or fluctuating water table, depth to bedrock, soil permeability, and flooding frequency.

The Wisconsin Department of Commerce most recently updated its administrative code (COMM 83) on Private Onsite Wastewater Treatment Systems (POWTS) in July 2007. New technologies for private sewage systems are allowed under comprehensive revisions that were made to COMM 83 health and safety code in July of 2000. These new technologies give property owners the opportunity and flexibility to meet environmental performance standards with several pretreatment technologies that when incorporated into the system design, allows the use of soil absorption systems on sites with at least six inches of suitable native soil. The code allows for infill development where it was not permitted previously by the former plumbing code as interpreted by the now defunct Department of Industry, Labor and Human Relations. Housing and population density may increase in some areas due to the revisions of COMM 83; this in turn may increase the need for land use planning and integration of environmental corridors to address the adverse impacts related to development. Planning, along with land use controls, such as zoning, will help achieve more efficient development patterns.

Sheboygan County's Sanitary Ordinance (70) reflects the provisions required in COMM 83 as well as some additional requirements for POWTS. Buildings and dwellings unable to connect to a public sanitary sewer system need a private sanitary system; the County Sanitary Ordinance was adopted to promote and protect public health and safety by assuring the proper siting, design, installation, inspection, management, and maintenance of private sewage systems.

There are over 8,900 private septic systems in Sheboygan County. The Sheboygan County Planning Department administers the 3-year maintenance program required by the State

[Map 2-5: Soil Suitability for Dwellings with Basements]

Administrative Code for these septic systems. This means that once every three years the septic system needs to be visually inspected and, if necessary, pumped by a certified septage servicing operator. This does not apply to the 700 holding tanks in the County, which are pumped on an as needed basis. The Sheboygan County Planning Department is also in charge of inspections at various stages in the siting, installation, and maintenance of these systems.

Metallic and Nonmetallic Mineral Resources

Metallic mining in Wisconsin has occurred since the time of early settlement. Metals mined in the state include copper, lead, iron, and zinc, none of which are mined in Sheboygan County. There are also nonmetallic mining operations. Any new mines need to have a permit granted by the WDNR, which includes a reclamation plan. State Statute Chapter 295 requires that nonmetallic mining operations have a reclamation plan. This plan needs to describe what will be done with the land once mining operations cease. The State Statute then gives the power to the WDNR, who crated Wisconsin State Administrative Code NR135, which gave this authority to the counties; Sheboygan County has enacted a non-metallic mining program. The reclamation plan is a detailed technical document designed to meet the goals that will lead to successful reclamation and will help reduce the negative effects to the environment once the mine is abandoned. There is one mine in the Town of Rhine that has been recently reclaimed.

The Land and Water Conservation Department (LWCD) is in charge of issuing the permits for nonmetallic operations. According to the LWCD, there were approximately 17 active nonmetallic mining sites in Sheboygan County in July 2008. Two sites in the Town of Rhine recently became inactive. Sheboygan County operates five of the active mining sites. By looking at Map 2-6 one can see that western Sheboygan County has more potential gravel sources than the eastern portion of the County, which is why 16 of the 17 active non-metallic mining operations are concentrated in six towns. The Town of Plymouth has four active gravel pits (three of them County-owned), the Towns of Greenbush and Scott each have three, while three other towns each have two active gravel pits. The active gravel pits are also shown in Map 2-6.

Water Resources

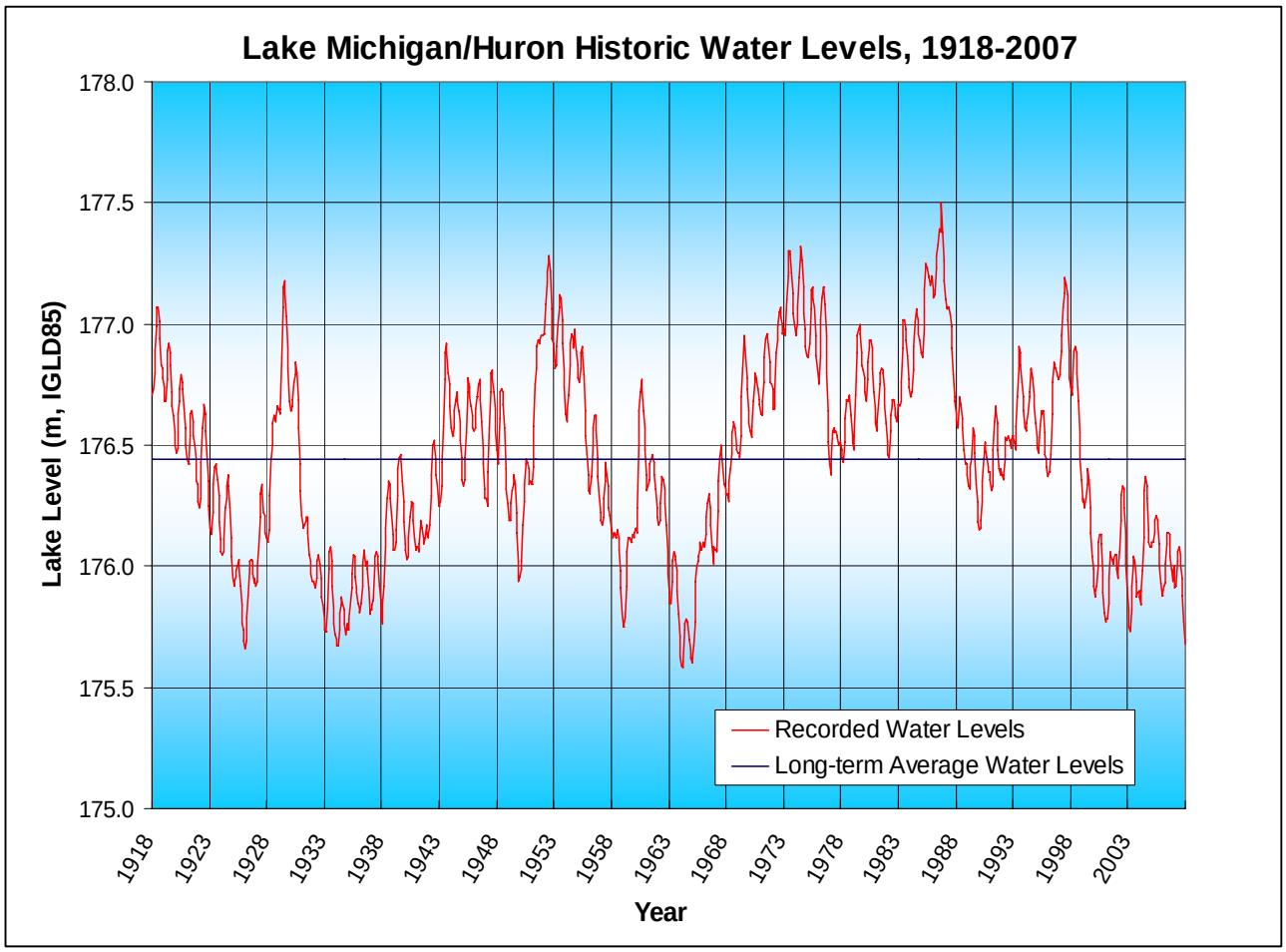
Lake Michigan

The Great Lakes were formed during the Wisconsin Glaciation that occurred approximately 75,000- 10,000 years before present (B.P.). The Laurentide Ice Sheet entered the Lake Michigan area approximately 26,000 years B.P. This ice sheet reached its maximum extent approximately 16,000 years B.P. During this time, the ice sheet carved its way across the northern portion of North America. When the ice receded, runoff from the melting glacier was captured in the basins that were formed by the gouging ice of the glacier thereby forming the Great Lakes.

Lake Michigan is Sheboygan County's largest water resource and the second largest Great Lake when measured by volume. Lake Michigan is 307 miles long, 118 miles wide, 925 feet at its maximum depth, with an average depth of 279 feet and consisting of approximately 1,660 miles of mostly sand and pebble beaches.

[Map 2-6: Quarries & Potential Gravel Sources]

Figure 2-4: Lake Michigan/Huron Historic Water Levels



Source: U.S. Army Corp of Engineers

There are concerns from various agencies about threats to the quality of Lake Michigan. Pollutants, habitat loss, and shifts in species composition in the Lake and in the coastal areas are important factors that continue to contribute to the degradation of the quality of the Lake Michigan Ecosystem.

The past several years we have seen a continued decline in the water levels of Lake Michigan. The drop has had a significant effect on the use of the bay and rivers feeding to it. With lower water levels, more of the shoreline is exposed and wet areas become dry.

In December 1999, the water level of lakes Michigan and Huron continued to drop, passing the Low Water Datum elevation of 577.5 feet (176 meters) above the International Great Lakes Datum of 1985. The occurrence of the water level dropping below the Low Water Datum has become more frequent since 1999, occurring multiple times in a year. In 2003 the water level was lower than the Low Water Datum for nine months and in 2006 and 2007 the water level was lower than the datum for six months. The long-term average lake level is 579 feet (176.44 meters). The water levels have not reached the long-term average water level since November 1998. There has also been a two-foot drop in water level since 2004.

The Lake Michigan basin is the area of land where rivers and streams all drain into Lake Michigan. The Lake Michigan drainage basins covers more than 45,000 square miles and drains parts of four states including Wisconsin, Illinois, Indiana, and Michigan. In Sheboygan County, the Milwaukee River and Sheboygan River Basins make up the majority of the land area within the County and both drain into Lake Michigan.

Lake Michigan has unique conditions that can support a wide variety of species, including plants and animals that are not found anywhere else in the world. The sand dunes, coastal marshes, tallgrass prairies, savannas, forests, and fens provide essential habitat for numerous wildlife. Agricultural and industrial products such as iron ore, coal, limestone, metals, petroleum, coke, and chemicals are derived from the resources within the Lake Michigan Basin. The lake area serves the commercial and sport fishing industries. Lake Michigan provides a source of fresh drinking water, cooling water for industries, and water for agricultural practices in the region. Finally, the lake provides a scenic setting for recreation activities such as camping, swimming, fishing, and bird watching.

The U.S. Army Corps of Engineers released a report stating that lake level decline is due to several natural and man-made factors. Some of these factors include precipitation, snowmelt runoff, groundwater supply, and evaporation. In 1997 the water levels were near record levels, following years of above normal rain and snowfall. In 2009, the International Join Commission was working on a draft report from the *International Upper Great Lakes Water Level Study*. One of the parts of the study discusses the Lake Michigan diversion of water withdrawn from Lake Michigan-Huron at Chicago, and runoff from the Chicago area that in its natural course formerly drained into Lake Michigan-Huron. The water is used for domestic, sanitary, and navigation purposes in the Chicago area and is discharged into the Mississippi River. Although water has been diverted from Lake Michigan-Huron at Chicago since 1848, it was not until 1900 that completion of the Chicago Ship and Sanitary Canal and related control structures allowed for the reversal of the Chicago and Calumet Rivers. This diversion reached a peak of more than 300 m^3/s (10,600 ft^3/s) in the 1920s; however, a 1967 U.S. Supreme Court decree (amended in 1980) limits the long-term average diversion to no more than 91 m^3/s (3,200 ft^3/s) and allows some variations in any year within certain specified limits. This diversion lowers the long-term mean levels by 6 cm (2.4 in) on Lake Michigan-Huron.

In 2000 the Army Corp of Engineers stated “probably the most significant factor during the past three years of declining water levels has been the decrease in snow cover.” In winter 2007-2008 and spring to summer 2009 Sheboygan County received above average rainfall.

Threats to Lake Michigan and its Coastal Resources

The quality of Lake Michigan is a concern to many agencies and organizations that study its health. Pollutants, habitat loss, and shifts in species composition in the lake in the coastal areas are important factors that continue to contribute to the degradation of the quality of the Lake Michigan Ecosystem. Even though reductions have been made in pollutant levels over the past 25 years, data continue to show toxic pollutants continue to create negative impacts on the physical and biological elements of the ecosystem.

In 1972, the United States and Canada signed the Great Lakes Water Quality Agreement (GLWQA) that was subsequently renewed in 1978. This agreement expressed the commitment

of both countries to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin Ecosystem. The Agreement was amended in 1987 and aimed at strengthening the programs, practices, and technology that were described in the 1978 renewal; the amended agreement increased accountability for implementing these programs and practices and set specific timetables for these activities.

The GLWAQ creates the International Joint Commission. The Commission monitors and assesses progress under the Agreement and advises Governments on matters related to the quality of the boundary waters of the Great Lakes system. The Agreement also calls upon the Commission to assist the Governments with joint programs under the Agreement, and provides for two binational boards (the Great Lakes Water Quality Board and the Great Lakes Science Advisory Board) to advise the Commission.

One outcome of the GLWQA was the development of the Lake Michigan Lakewide Management Plan (LaMP) 2000 that addresses 14 warning signs of an impaired ecosystem. The Lake Michigan LaMP is updated every two years to provide a status report on the health of the Lake Michigan ecosystem and a summary of the activities related to the Lake Michigan LaMP that has occurred during the past two years. The vision of the LaMP is to create "a sustainable Lake Michigan ecosystem that ensures environmental integrity and that supports and is supported by economically viable, healthy human communities." The status of the Lake is measured against the long-term goals and targets for 2020. Since the LaMP 2000, several key indicators point to the continuing concern for the health of the ecosystem, such as beach closings, the discovery of new aquatic nuisance species, PCBs and mercury in fish, climatic pattern changes, and other concerns, but the news is not all bad. The most recent LaMP was completed in 2008 and can be obtained on the U.S. Environmental Protection Agency website.

Progress is being made in protecting the ecosystem. Lake Michigan was selected as one of three pilots to test a new national monitoring design. With this system, key pollutants to Lake Michigan are being identified, reviewed, and monitored, remedial action plans are developed for the Lake Michigan Area of Concerns (AOCs), and these plans are being linked to the goals set forth in the LaMP. The main action agenda items for the LaMP are protecting human health, restoration and protection of the Lake, sustainable use, remediation and pollution prevention, information sharing, and research and monitoring. Over the course of the eight years since the original LaMP, many actions have occurred that strive to meet the subgoals that have been created. More specific information on the LaMP can be found through the U.S. Environmental Protection Agency (EPA).

Many agencies are taking part in protecting the Great Lakes. In 2004, the Great Lakes Regional Collaboration of Natural Significance (GLRC) was created, using a unique partnership of key members from federal, state, and local governments, tribes and other stakeholders for the purpose of developing a strategic plan. This group developed a strategy and recommendations for action focused on the steps that should be taken over the next five years to proceed with restoration of the Great Lakes. The key recommendations are:

- Stop the introduction of more aquatic invasive species that can prevent significant future ecological and economic damage to the Great Lakes.
- There is a need for significantly more habitat conservation and species management.

- Minimize the risk to human health resulting from contact with near shore waters whether through drinking water or a variety of recreational activities.
- None of the 31 Areas of Concern along the Great Lakes have been restored to date, so a dramatic acceleration of the cleanup process is need at these AOCs.
- Actions need to be taken to address nonpoint sources of population
- Toxic pollutants such as mercury and PCBs remain present in fish at levels that warrant advisories and restrict consumption through the basin, these pollutants need to be addressed.
- It is essential to have a sound information base and representative indicators to understand what is happening in the Great Lakes ecosystem.
- Ensure the long-term sustainability of the Great Lakes by changing the way we approach things such as land use, agriculture and forestry, transportation, industrial activities, and many others.

Most recently there has been great strides taken to ensure that water from the Great Lakes remains in the Great Lakes Basin. This is to ensure that water is not taken out of the system faster than it can be replenished. In 2005, following nearly five-year negotiations, the governors of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin reached an agreement on the Great Lakes-St. Lawrence River Basin Water Resources Compact. During 2007 and 2008, all the states ratified this Compact. This Compact then gained U.S. Senate approval on August 1, 2008 and U.S. House of Representatives approval on September 23, 2008. The Provinces in Canada are working to pass a similar agreement, in order to have regional consistency. Some highlights on this compact include:

- Economic development will be fostered through sustainable use and responsible management of Basin waters.
- For the most part, there will be a ban on new diversions of water from the Basin but limited exceptions could be allowed in communities near the Basin when rigorous standards are met.
- Communities that apply for an exception will have a clear, predicable decision making process; standards to be met; and , opportunities to appeal decisions.
- The State will use a consistent standard to review proposed uses of Basin water.
- Regional goals and objectives for water conservations and efficiency will be developed, and they will be reviewed every five years.

The passing of this compact will protect the Great Lakes, including Lake Michigan for years to come.

Pollutants

To accomplish the goals of the LaMP, a Critical Pollutants Work Group was formed which consisted of technical staff from the US Environmental Protection Agency, the US Fish and Wildlife Service, the US Geological Survey, and experts from the four states adjacent to Lake Michigan. Together, this group developed a process for listing and delisting substances as pollutants of concern and identified pollutants that were currently impacting Lake Michigan. The group categorized pollutants of concern into three levels based on the degree of association with known impairments in the Lake, their distribution and frequency of occurrence. They are critical

pollutants, pollutants of concern, and emerging pollutants. Table 2-1 shows some of the pollutants in each category.

Critical pollutants are the most harmful to the ecosystem and programs to mitigate their persistence in the environment are a top priority. Pollutants in the category impair beneficial uses due to their presence in open lake waters, their ability to cause or contribute to failures to meet objectives set by the GLWQA, or their ability to bioaccumulate. Critical pollutants for Lake Michigan identified by the Work Group are located in Table 2-1. Mercury is a critical pollutant to area bodies of water, not just Lake Michigan. People in the U.S. are mainly exposed to mercury, an organic compound, when they eat fish and shellfish that contain mercury. Humans who are exposed to mercury may have different health effects depending on the type and length of exposure, but some common effects for fetuses, infants, and children is impaired neurological development.

Table 2-1: Critical Pollutants for Lake Michigan

Critical Pollutants	Pollutants of Concern	Emerging Pollutants
Total PCBs	Hexachlorobenzene	Atrazine
Chlordane	Toxaphene	PCB substitute compounds
Dioxin	Cadmium	Selenium
Mercury	Copper	
Dieldrin	Arsenic	
DDT/DDD/DDE	PAHs	
Furans	Chromium	
	Zinc	
	Cyanide	

Source: Critical Pollutants Work Group

Based on the recommendations of the Work Group, the LaMP will be focusing on addressing these pollutants, according to priority level.

Area of Concern

Another component of the GLWQA is an agreement to develop remedial action plans (RAPs) for the 43 Areas of Concern identified by the International Joint Commission. The Sheboygan River encompasses the lower Sheboygan River downstream from the Sheboygan Falls Dam, including the entire harbor and nearshore waters of Lake Michigan. The Sheboygan River Area of Concern (AOC) serves as a settling area for pollutants transported from three watersheds: the Sheboygan River, Mullet River, and Onion River. Pollutants of concern in the Sheboygan AOC are:

- Suspended Solids
- Fecal Coliform Bacteria
- Phosphorus
- Nitrogen
- PCBs
- PAHs
- Heavy Metals

Other criteria contributing to designation as an Area of Concern are Beneficial Use Impairments. Of the 14 beneficial uses these are impaired for Sheboygan River:

- Restrictions on fish and wildlife consumption
- Eutrophication or undesirable algae
- Degradation of fish and wildlife populations
- Fish tumors or other deformities
- Bird or animal deformities or reproduction problems
- Degradation of benthos
- Degradation of phytoplankton and zooplankton populations
- Restriction on dredging activities
- Loss of fish and wildlife habitat

Greater information on the AOC and the use impairments can be found in Appendix 3.

A two-year cooperative effort of Wisconsin Department of Natural Resources (WDNR), other agencies, researchers and the citizens of the Sheboygan area resulted in the completion of a Sheboygan River and Harbor Stage One RAP in 1989. Progress has been made in implementing the Stage One RAP and developing additional recommendations for restoring beneficial uses. Following a Remedial Investigation and Enhanced Screening, an emergency removal of PCB contaminated sediments in the upper portion of the Sheboygan River was completed in 1991. A total of 4,100m^3 of PCB-contaminated sediments were removed. In 1992, monitoring of soil and groundwater for total PAHs, cyanide, arsenic and nickel at the Coal Gasification Plant site began in spring of 1992. Results of these investigations showed that the County had levels for these substances higher than state enforcement standards.

In 1994, the Wisconsin Department of Natural Resources with the assistance of other local stakeholders outlined activities targeted for implementation and progress toward development of a comprehensive strategy for restoring water quality, fisheries, recreational uses and other benefits of the Sheboygan River Basin. The 1994 RAP was published in October 1995. In 1998, the Sheboygan River Basin Partnership (SRBP) was formed. The SRBP is an alliance of volunteers from conservation and environmental groups; local businesses; local, state and federal agency staff; and individuals working together on natural resource issues in the Sheboygan River Basin. In 2004, SRBP members formed an AOC Committee to coordinate with local, State, and Federal agencies and other interested parties to implement the RAP. The WDNR and SRBP are working together to develop a process to establish delisting targets. In 2006, a RAP update for the AOC was in progress.

The varies activities occurring in the Sheboygan AOC are contributing to successful achievement of alleviating the beneficial use impairments. However, to improve the quality of the Sheboygan River Basin ecosystem and achieve the "desired future state" will require a long-term commitment from all levels of government, as well as local interest groups and citizens. Successful implementation of the RAP will require the cooperation of all stakeholders and a willingness of the Basin's citizens to voluntarily change the way they conduct their everyday lives.

Erosion

Coastal erosion occurs throughout all of the Great Lakes and is a concern because of the potential for property loss and damage, loss of infrastructure, public health and safety issues, water quality degradation, and loss of habitat. Coastal erosion is characterized by the landward retreat of the shoreline or the bluff edge and includes the narrowing loss of beaches, dunes, coastal barriers, and associated wetlands and lakebed down cutting in the nearshore area. Coastal erosion rates in Sheboygan County range from 0.20 to .49 meters per year (8-20 inches per year).

There are three types of erosion processes that typically effect coastal areas. These include wave attack, mass wasting, or surface water. Wave attack (or toe erosion) degrades bluff and beach areas through the constant motion of the water. Waves are generated by wind and storms. The impact of wave action is a function of the climate and is dictated by wave direction, magnitude, and frequency. Waves remove material from the base of the bluff areas, making them unstable. As the bluffs are eroded by wave action, sediment is transported along the shore creating, or destroying, beaches and dunes.

Mass wasting occurs as soil creep, debris flows, or slides and slumps or some other process that will transport materials down a slope; these processes are driven by gravity and frequently occur on steep, unstable slopes. Depending upon whether or not the materials are consolidated or unconsolidated, the rates and types of bluff failure will be different. Groundwater is often a major contributing factor to the mass wasting process. Frequently, wave attacks on a shoreline will lead to a mass-wasting event. As time proceeds, the process begins again and eventually a major mass-wasting event occurs again. Surface water including that from precipitation and groundwater (climate driven), as well as septic tanks and lawn sprinklers (human driven) washes material away. Sheet and rill erosion often occur on un-vegetated slopes. Ravine and gully erosion can also undermine a bluff or dune area. The freeze/thaw cycle also contributes to failures of bluff areas.

The erosion rate in a coastal area is dependent upon the width and elevation of a beach area, the available sediment supply, the slope of the coastline, shoreland protection (natural and artificial), climate, such as storms, precipitation, surface water, groundwater, and lake levels, and vegetation. Other impacts to shoreland areas of the Great Lakes include lakebed down cutting and beach alterations such as barriers including piers and improperly installed erosion protection structures.

Two “regions”, the bluff areas north of the City of Sheboygan and the dune areas south of the City of Sheboygan characterize the coastal landscape of Sheboygan County. The bluffs north of the City of Sheboygan average approximately 50-feet in height. This area is composed of cohesive glacial till, lacustrine clays, unconsolidated clays, silts, sands, and outwash deposits. The soils in this area tend to become easily saturated by high groundwater levels. This soil saturation is a major contributor to bluff erosion along the coast in this area. Upon saturation the soils become heavy, weakening the structure of the bluff; this coupled with the dynamic wave action of Lake Michigan at the base of the bluff area, make bluff erosion and slumping an ongoing hazard that must be continually mitigated through shoreline regulation and erosion control projects. Map 2-7 shows the summary of Lake Michigan Erosion and Bluff Stability Analysis that was completed by Bay Lake Regional Planning Commission and others in 1996.

The areas south of the City of Sheboygan are made up of a ridge and swale complex with numerous pockets of coastal wetlands gaining protection from Lake Michigan by a series of dune areas. Quartz sand beaches and dunes are underlain by cohesive clays (glacial till) or bedrock. This area is subject to impacts from development due to the high value of real estate along the shores of Lake Michigan. Perhaps one of the greatest potential impacts to the quality of Lake Michigan and the dune areas is the placement of septic systems in coastal dunes. Frequently, the dune area is sited as the only suitable area for a septic system. Currently, state law does not prohibit placement of septic systems in these areas, nor are counties allowed to restrict placement in these areas.

The US Army Corps of Engineers and the Wisconsin Coastal Management Program have recently completed a comprehensive analysis of erosion along the coastal areas of the Great Lakes. Through a modeling process, the Corps of Engineers calculated potential coastal erosion rates and future hazard areas that may impact the resource and the human population. As information from this study becomes available, it will be used as the basis for future programs and policies related to land use regulation in the bluff area.

Drainage Basins

Sheboygan County encompasses some of the most scenic and critical watersheds within Wisconsin. All the watersheds in Sheboygan County drain into the Lake Michigan Watershed either through major rivers or direct drainage to the lake. There are three major drainage basins in Wisconsin. They are the Lake Superior, the Lake Michigan and the Mississippi River Basins. Sheboygan County lies entirely within the Lake Michigan Drainage Basin. These drainage basins are then made up of water management units and geographic management units, as well as watersheds that drain into one larger river. Sheboygan County lies within the Lakeshore, Sheboygan, and Milwaukee River Basins, otherwise referred to as the Geographic Management Units by the WDNR.

Watersheds

There are parts of nine watersheds in Sheboygan County. A watershed can be defined as an interconnected area of land draining from surrounding ridge tops to a common point such as a lake or stream confluence with a neighboring watershed; it is the area of land where all water on it and under it drains to the same place. All lands and waterways contribute drainage to one watershed or another. Map 2-8 identifies the watersheds in Sheboygan County.

Wisconsin initiated a process to rank watersheds for nonpoint source problems back in the mid-to-late 1980s to identify high priority areas under the state's Nonpoint Source Pollution Abatement Program. As management of nonpoint source problems have changed, so have the nonpoint source ranking process. In October 2002, administrative rules for the prevention and management of polluted runoff from rural and urban land use activities went into effect; these new and revised rules replace the Wisconsin Nonpoint Source Water Pollution Abatement Program (NPS Program) which was created in 1978 by the state legislature. These eight new rules written by the WDNR, with one rule promulgated by the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP), are in response to 1997 Wisconsin Act 7 and 1999 Wisconsin Act 9 which required changes to the WDNR’s nonpoint source water pollution abatement program and the DATCP’s soil and water resources management program.

[Map 2-7: Summary of Lake Michigan Erosion and Bluff Stability Analysis: 1996]

[Map 2-8: Watersheds]

Now the WDNR not only ranks watersheds for stream, lakes and groundwater - (high, medium, or low), but individual streams and lakes in the State can be ranked according to expressed impacts from nonpoint source pollution and the waterbody's potential response to best management practices.

The WDNR uses these watershed and waterbody rankings for several purposes: 1) to identify priority areas for best management practice implementation, 2) to help guide funding decisions under nonpoint source related programs, and 3) to convey nonpoint source priority areas to counties for county land and water planning, specifically work tasks and other activities related to BMPs and performance standards implementation.

A brief description of the nine watersheds within Sheboygan County is provided below. This descriptions include the predominate land use as well as the possible sources of nonpoint source pollution. Under the new ranking system, all nine watersheds that are wholly or partially in the County are currently ranked high for their overall nonpoint source pollution. The watershed's rank helps determine what type of funding the watershed may received from the WDNR. These rankings are based on factors such as impairments to streams and lakes within the watershed, along with other factors.

North Branch Milwaukee River Watershed is located in portions of Fond du Lac, Sheboygan, Ozaukee, and Washington counties and has a drainage area of 150 square miles. Land cover is primarily rural with agriculture dominant. Sources of nonpoint pollutants included runoff from animal waste, sedimentation from crop fields, urban construction sites, stream bank erosion, and manure. According to the Wisconsin Natural Heritage Inventory (NHI), there are many known occurrences of rare species and natural communities in the Milwaukee River Watershed.

East and West Branches Milwaukee River Watershed covers 266 square miles and is located in portions of Dodge, Fond du Lac, Ozaukee, Sheboygan, and Washington counties. Land cover is primarily rural with agriculture dominating. Sources of nonpoint pollutants included wetland drainage, urban runoff and agricultural runoff contributing nutrients and sediment.

Onion River Watershed was one of the first watersheds targeted under the old Nonpoint Source Water Pollution Abatement Program. The watershed covers 98 square miles and has 124.2 miles of streams. It flows southerly for about half its length before turning northward, entering the Sheboygan River in the city of Sheboygan Falls. Belgium Creek is the only major tributary to the Onion River. Land use in the watershed is primarily agricultural. The entire Village of Waldo, most of the Village of Belgium, and small portions of the Village of Cedar Grove, and the City of Sheboygan Falls comprise the urban areas of the watershed. Water quality in the watershed ranges from excellent to good in the headwater areas to fair to poor in the lower sections. Sources of nonpoint pollutants included sedimentation, agricultural and urban runoff, pasturing practices, and stream bank erosion.

Pigeon River Watershed is a 30-mile long tributary of Lake Michigan that lies within the Sheboygan River Basin. It forms at the confluence of the Pigeon and Meeme River Branches near the Sheyboygan-Mantitowoc County line. Sources of nonpoint pollutants include sedimentation, stream bank erosion, construction and feedlot runoff. This project is not yet complete, but will be ending in 2009.

Sevenmile-Silver Creeks River Watershed is 113 square miles. The Sevenmile-Silver Creek Watershed includes several smaller streams: Silver Creek, Memee Creek, Sevenmile Creek, Calvin Creek, Pine Creek, Point Creek, Fischer Creek and Centerville Creek. Silver Creek is 14 miles in length, while Point Creek is 12 miles long. There are many direct and indirect tributaries to Lake Michigan in the Basin, including Sevenmile Creek. Sevenmile Creek is located in northern Sheboygan County in the Town of Mosel. Filling, erosion problems, nutrient loadings, and pesticide and agricultural runoff threaten the basin's 62,191 acres of wetlands, as well as Lake Michigan. Managing runoff and other sources of nonpoint source pollution will improve the quality of this watershed. This project has also been completed.

Sheboygan River Watershed originates in east-central Wisconsin and drains an area of land situated between Lake Winnebago and Lake Michigan. The watershed is a sub-basin of the larger Sheboygan River drainage basin that includes: the Sheboygan River, the Pigeon River, Mullet River, Onion River, Black River, and direct tributaries to Lake Michigan. The Sheboygan River Watershed drains approximately 245 square miles. The watershed lies in portions of four counties: Sheboygan, having the largest contributing drainage area with 52 percent of the watershed (127 square miles); Fond du Lac, containing 30 percent of the watershed (74 square miles); Calumet, 7 percent (17 square miles); and Manitowoc, making up 11 percent of the watershed (27 square miles). The majority of the population living in the watershed resides in incorporated areas, primarily concentrated in the metropolitan area of Sheboygan, Sheboygan Falls, Kiel, and the village of Kohler. Land uses in the watershed are primarily rural. Most of the land is used for agricultural purposes, with milk production and dairy products being the predominant industry in all four counties. Sources of rural nonpoint pollutants most commonly found in this watershed include sediment from crop and stream bank erosion, polluted runoff from barnyards and feedlots, and runoff from winter-spread with livestock manure. Sources of urban nonpoint pollutants include construction sites, freeways, industrial areas, commercial areas, and residential areas.

As stated previously, the Sheboygan River Watershed has been designated as a Great Lakes Area of Concern by the International Joint Commission. The Sheboygan River Watershed is the most studied watershed in the Sheboygan River Basin. Many researchers have conducted studies to determine the effects of polychlorinated biphenyl (PCB) uptake in fish and wildlife in the lower 14 miles of the Sheboygan River. This section of the river is listed as a Federal Superfund site. Cleanup on this site is taking place, as sediment filled with polychlorinated biphenyls (PCBs) has been removed and sediments have been dredged. Ongoing monitoring will now occur. There is a status review of the cleanup to date that is scheduled to start fall 2008. This is the first five-year review for the Sheboygan River and Harbor. A five-year review report will be completed by September 2009.

Black River Watershed is located entirely within Sheboygan County and contains the 11.4-mile Black River. It is characterized primarily as natural lowlands with adjacent agricultural areas. Sources of rural and urban nonpoint source pollutants include channel modification, construction site erosion, and increased imperviousness contributes to flash flows, increased nutrients, bacteria, and sedimentation.

Mullet River Watershed is about 98 square miles and it originates at the outlet of Mullet Lake in Fond du Lac County, running northeast into Sheboygan County. The river then runs east and

drains into the Sheboygan River near Sheboygan Falls. Land use in the Mullet River watershed is primarily agricultural. Sources of rural and urban nonpoint pollutants include runoff from barnyards, eroding agricultural lands, and stream bank erosion.

Sauk and Sucker Creeks Watershed includes a small portion of Sheboygan County, but is predominately in Ozaukee County. Sauk and Sucker Creeks flow southward entering into Lake Michigan in and near Port Washington. Agriculture is the dominant land use in the Sauk and Sucker Creek Watershed; however, it is an urbanizing watershed. Sources of nonpoint pollutants include erosion from construction sites, run off from impervious surfaces, agricultural runoff, stream bank erosion, and sedimentation. These pollution sources and habitat modifications are contributing to the high concentrations of nutrients and suspended solids and sediment observed in the watershed.

Surface Waters

There are numerous lakes and rivers in Sheboygan County. The most significant surface water feature is Lake Michigan. Map 2-9 shows the surface water features in Sheboygan County.

Lakes (Map 2-9)

- Lake Michigan Lake Michigan borders on the eastern edge of Sheboygan County. Bottom type consists mainly of bedrock on exposed shores, and sand within the bays and shallow shores. Coho & Chinook salmon, lake trout, northern pike, and yellow perch are the dominant sport fishes, with the occasional smallmouth bass, walleye and rainbow trout. Most sport fishing occurs in the bays. Lake trout numbers are expected to increase with the better control of lampreys. Access of the larger pleasure crafts is restricted to harbor sites because of the rocky and shallow, sandy shores. This area of Lake Michigan averages between 80 and 120-feet deep waters within two miles of shore.

- Sheboygan Lake is a drainage lake located within the Broughton Sheboygan County Marsh. It covers more than 674 acres within the 14,000-acre marsh, but averages no more than 3 feet deep.

- (Big) Elkhart Lake in Sheboygan County has approximately 300 surface acres and a maximum depth of 119 feet. It is the largest kettle moraine in the county and the fourth deepest lake in the state. Increase in fertility is gradual and due mainly to septic tank seepage and some isolated surface water runoff from cropland and farm operations. The fishery of the lake includes walleye, panfish and smallmouth bass. Public access is provided. Elkhart Lake is also part of the Great Lakes Spotted Muskellunge Stocking Program. Elkhart Lake is used as a brood stock for this type of musky.

- Crystal Lake is located in the town of Rhine near the Village of Elkhart Lake. The lake is 113 acres and is heavily used for fishing and boating. Crystal Lake incorporates an extensively developed shoreline which fosters productive fishing in early morning and late evening when northern, crappie, perch, walleye, bass, and bluegills are caught.

- Little Elkhart Lake is adjacent to Big Elkhart Lake and is known for fishing. The size of motors allowed on the lake is limited. The lake covers 47 acres and has a maximum depth of 21 feet.

[Map 2-9: Surface Water & Navigability]

- Gerber Lake consists of two contiguous basins covering approximately 22 acres in the town of Rhine. The basins are spring-fed and are known for largemouth bass and bluegill fishing. No motorboats are allowed on the lake.

- Jetzers Lake is a small lake located in the Town of Herman covering around 14 acres. The lake is spring-fed and has an outlet to the Pigeon River.

- Random Lake is the second largest lake in Sheboygan County with 213 acres in area. It is the first large lake north of Milwaukee and has a public fishing pier, boat landing and docking piers, public beach, picnic area and swimming at Lakeview Park.

- Lake Ellen is the third largest lake in the County with 121 acres located just South of the Village of Cascade. Lake Ellen has public access that is owned and maintained by the WDNR. The lake is most productive for panfish but walleye and largemouth bass are common.

- Lake Seven Lake Seven is 27 acres and has a public access that is owned and maintained by the WDNR. The lake produces small catches of large bluegills and numerous largemouth bass.

- Beachwood Lake Beachwood Lake is 11 acres and has a public access that is owned and maintained by the Town of Scott. Bullheads, panfish, and northern pike are abundant in Beechwood Lake.

- Crooked Lake Crooked Lake is a 91-acrea lake that has a public access that is owned and maintained by the Wisconsin Department of Natural Resources. Crooked Lake is most productive for panfish.

Other Sheboygan County surface waters include:

Haack Lake	Bear Lake
Spring Lake	Bullet (Bullhead) Lake
Grasse Lake	Glenbeulah Mill Pond
Cedar Lake	Hingham Mill Pond
Kellings Lakes	Plymouth Mill Pond
Mud Lake	Waldo Mill Pond
Butler Lake	

Rivers, Streams and Creeks

Nichols Creek is the only stream or river to have been designated as outstanding resource water, while Ben Nutt Creek is designated an exceptional resource waters by the state of Wisconsin. This designation under Wisconsin Administrative Code NR 102 establishes water quality standards for different classes of surface waters in the state.

Sheboygan County is characterized by a number of major river systems that flow from west to east across the County. Major rivers in the County include:

- The *Mullet River* originates at the outlet of Mullet Lake in Fond du Lac County and runs generally east before joining the Sheboygan River in the City of Sheboygan Falls. The two named tributaries to the Mullet River are La Budde Creek and Jackson Creek. The watershed contains nearly 2 miles of Class I trout water, 10 miles of Class II trout water and nearly 35 miles of streams supporting a warm water sport fish community.

- The *Sheboygan River* originates in east-central Fond du Lac County and flows generally southeastward into the City of Sheboygan where it enters Lake Michigan. The major tributaries to the Sheboygan River are the Onion and Mullet Rivers. Other named warm water tributaries to the Sheboygan River are Otter and Weeden Creeks. Millhome, Schuett and Feldner's Creeks are trout streams located in the Sheboygan River Basin. There are also nine dams in the Watershed: Sheboygan Marsh, Kiel, Rockville, Millhome, Johnsonville, Sheboygan Falls, Waelderhaus, Riverbend and Mischo's. The Franklin dam was removed in 2001, restoring this river reach to a free-flowing condition. The positive change in flow, temperature, and oxygen levels will result in habitat suitable for game fish species such as smallmouth bass, northern pike, and rock bass.

- The *Onion River* flows southerly for about half its length before turning northward, entering the Sheboygan River in Rochester Park in the City of Sheboygan Falls. Belgium Creek is the only major tributary to the Onion River. There are two dams on the Onion River, which form the Waldo and Hingham impoundments.

A creek that is being rehabilitated by the SRBP is Willow Creek, which is 5-mile tributary to the Sheboygan River and considered a remnant coastal resource that supports reproducing anadromous salmonid populations within a rapidly urbanizing region of east-central Wisconsin. Another creek of importance to the area is Fisherman's Creek; the SRBP has received a County Stewardship Grant for the creation of a rehabilitation plan for this area.

Some of the rivers, streams, and creeks in the County have dams. Many of the dams were built in the late 1800's and 1900's in Wisconsin. Regardless of size, dams can have profound effects on stream ecosystems. Dams can change free flowing streams into bodies of water more resembling ponds or lakes (called impoundments). Because streams and rivers carry sediment and nutrients from runoff and natural processes, these impoundments tend to act as sinks that slowly fill in with sediment and become shallow. Dams and their impoundments displace many of the native species that thrive in a flowing environment. Dam structures prevent or slow migration of fish and other aquatic life within the stream ecosystem, thereby, having effects throughout the food chains of streams or rivers.

Another problem dams can cause is that over time water pressure and weathering will slowly break down a dam. Dams need constant maintenance and repairs. If dams are allowed to naturally degrade, they have a greater risk for problems such as sudden breaks in flood conditions. The possibility for loss of life and property damage make dam maintenance an important issue. Dams left to deteriorate in place can also pose a threat to the life and health of the public using waterways for swimming and boating. Chapter 31, created in 1917 under the Water Power Law, was developed to ensure that dams are safely built, operated, and maintained. NR 333 provides design and construction standards for large dams and NR 335 covers the administration of the Municipal Dam Repair and Removal Grant Program. Two of Sheboygan

County's dams have been removed since 2001, the Franklin Dam and the Meyer Dam. Map 2-10 shows all of the dams, both current and historic in Sheboygan County. The WDNR is responsible for administration of these regulations. The most common problems for dams are undesirable woody vegetation on the embankment, deteriorated concrete, inoperable gates, and corroded outlet pipes.

Trout Streams

Trout streams have been categorized for many years, but since 1990, a category system has been used to manage a variety of fishing opportunities that anglers desire. Size and limits on the number of fish vary by category to match the productivity of the stream, the fishing pressure, and the local fishing community. Class I trout streams are high quality trout waters that have sufficient natural reproduction to sustain populations of wild trout, at or near the limits of the waterway. Class I streams tend to be small and may contain small or slow-growing trout, especially in the headwaters areas. Class 2 trout streams may have some natural, in-stream reproduction, but not enough to use all of the available food and habitat in the stream. As a result, stocking is required to maintain a strong sport-fishing population in these streams. Class 2 streams have a good survival rate and often produce some fish larger than average. In Sheboygan County there are 38.4 miles of trout streams, of which 20.3 miles are Class 1 and 18.1 miles are Class 2. Table 2-2 shows the trout streams in Sheboygan County.

Table 2-2: Trout Streams in Sheboygan County

STREAM	CLASS TYPE	FISH TYPE	MILES
Ben Nutt Creek- to Junction with Mill Creek	Class 1	Brown Trout	6.0
Glenbeulah Springs	Class 2	Brook Trout	0.5
Gooseville Creek- North branch and below junction to Milwaukee River	Class 1	Brown Trout	1.0
Gooseville Creek- South branch only	Class 2	Brook Trout, Brown Trout	0.9
Jackson Creek	Class 2	Brook Trout, Brown Trout	1.8
LaBudde Creek- Upstream from Badger Road	Class 1	Brook Trout	1.7
LaBudde Creek- Downstream from Badger Road to Mullet River	Class 2	Brook Trout	2.7
Melius Creek	Class 2	Brown Trout	3.3
Mill Creek	Class 1	Brown Trout	2.2
Mullet River from Glenbeulah Pond Dam to State Highway 67	Class 2	Brown Trout	2.0
Nichols Creek to State Highway 28 in Cascade	Class 1	Brook Trout, Brown Trout	3.8
Onion River to County Road N	Class 1	Brown Trout	5.2
Watercress Creek- All	Class 2	Brown Trout	3.3

STREAM	CLASS TYPE	FISH TYPE	MILES
Chambers Creek to County Road W	Class 1	Brook Trout	2.0
Schuett Creek- All	Class 1	Brown Trout	0.4
Willow Creek-below I-43 to Sheboygan River	Class 2	Brook Trout	1.6

Navigability

Navigability determines whether a waterway is "public" or "private". Navigable lakes and streams are "public" waterways, but "public" in this context means that it may only be used for hunting, fishing, swimming, or other recreational activities and permits are required for work in the waterway itself. Any member of the public can "use" a navigable waterway if they keep their feet wet. On lakes, if there is public access available or if a person receives permission from the landowner, the public can use the water surface. Contrary to common belief, there is usually no strip of public ownership adjacent to "public" waterways, and if the land along a navigable waterway is privately owned a person may be prosecuted for trespassing, if without permission, a person crosses the land to use the waterway. In general, the public must "keep their feet wet" except to portage around an obstruction using the shortest way possible.

Sheboygan County undertook a large-scale navigability study countywide. In 1997, the County Planning Department and the WDNR worked together to make determinations on the "navigability" of waterways in northern Sheboygan County. This was in order to create a comprehensive map establishing the jurisdictions of the County's shoreland-floodplain ordinance. Navigability is defined by the Wisconsin Supreme Court as if a waterway has a bed and banks, and it is possible to float in a canoe or other small craft at some time during the spring freshets. In 1999, the Sheboygan County Planning Department and the WDNR determined the navigable waterways for the southern half of the County. The Sheboygan County Board then passed ordinances designating waterways as navigable, non-navigable, and agricultural. These designations establish the jurisdiction of the County's ordinances. If the waterway is in the jurisdiction of the ordinance, certain setbacks from that waterway, as well as other regulations, are required. Designations are being updated on a continual basis and if property owners ask the County and WDNR to review a designation, a determination on the navigability of that waterway will take place. Map 2-9 shows the navigable waterways in Sheboygan County.

Groundwater

Sheboygan County's groundwater reserves are being held in three principal aquifers: the eastern dolomite aquifer, the sandstone and dolomite aquifer, and the sand and gravel aquifer.

The eastern dolomite aquifer occurs from Door County to the Wisconsin-Illinois border. It consists of Niagara dolomite underlain by Maquoketa shale. In areas where fractured dolomite bedrock occurs at or near the land surface, the groundwater in shallow portions of the western dolomite aquifer can easily become contaminated. Map 2-11 shows estimates of the depth to the water table. The depth to the water table is the distance from the land surface to the water table that the water must flow to reach the groundwater. Areas adjacent to Lake Michigan appear to have a higher water table, which would mean there may be a higher susceptibility of contamination to the groundwater. The majority of the County appears to have between 20 and

[Map 2-10: Current Dams and Historic Dams]

50 feet to reach the water table, while the area near the Sheboygan Marsh has only 0 to 20 feet to reach the water table. The Towns of Greenbush and Mitchell appear to have the largest area where the depth to the water table is greater than 50 feet. It is important to remember that these are all estimates and generalizations, this should not serve as substitute a for an in-depth study of the water table in the area, but as a starting place.

The sandstone and dolomite aquifer consists of layers of sandstone and dolomite bedrock that vary greatly in their water-yielding properties. In eastern Wisconsin, this aquifer lies below the eastern dolomite aquifer and the Maquoketa shale layer. These rock types dip slightly to the east, south, and west, away from north central Wisconsin, becoming much thicker and extending to greater depths below the land surface in the southern part of the state. In eastern Wisconsin, most users of substantial quantities of groundwater tap this deep aquifer to obtain a sufficient amount of water.

The sand and gravel aquifer covers most of Wisconsin. This aquifer layer was deposited by glacial ice and river floodplains between 10,000 and 1 million years ago. Many irrigated farmlands in southern and northwestern Wisconsin tap this aquifer. Because the tope of the sand and gravel aquifer is also the land surface, the groundwater it contains may easily become contaminated.

Groundwater is vulnerable and if it is not carefully monitored, managed, and protected it has the potential to be depleted or degraded. The increase of the use of groundwater and surface-water since 1979 is shown in Table 2-2. While much has been done to protect our groundwater supply, we increasingly face the question of how to improve groundwater quality. Wide-spread land-use activities have resulted in elevated concentrations of contaminants such as nitrates and pesticides throughout the state. Cleaning up groundwater after it is contaminated has proven difficult and expensive; therefore it is beneficial to prevent groundwater from becoming contaminated in the first place.

In Wisconsin, the primary sources of groundwater contamination are agricultural activities, municipal landfills, leaky underground storage tanks, abandoned hazardous waste sites, and hazardous/toxic spills. Septic tanks and land application of wastewater are also sources for possible contamination. The most common groundwater contaminant is nitrate-nitrogen, which comes from fertilizers, animal waste storage sites and feedlots, municipal and industrial wastewater and sludge disposal, refuse disposal areas, and leaking septic systems. According to the WDNR, there are seven solid waste landfills or disposal facilities still operating in the County. Thirty other solid waste landfills or disposal facilities have closed. Of the 30 sites, all but three of these sites were municipal or government landfills or disposal sites. Most municipalities closed their sites when the environmental risks became known and cost of operation became too high.

Groundwater commonly contains one or more naturally occurring chemicals, leached from soil or rocks by percolating water, in concentrations that exceed federal or state drinking water standards or otherwise impair its use. Sheboygan County has never tested all private wells in the County, but the UW-Extension has worked to test individual wells and in some cases entire municipalities since 1993. Since 1993, 1097 water samples have been tested for known contaminants. The results of these testings show that 83 percent of all samples had a trace (0

[Map 2-11: Depth-to-Water-Table]

parts per million (ppm) – 10 ppm) of nitrates-nitrites, which can be naturally occurring at levels less than 10 ppm. Another item that is tested is the coliform bacteria which was found to be present in 206 of the 1097 water samples or about 19 percent of the samples. Coliform bacteria do not usually cause disease, but their presence indicates that wastes may be contaminating the water and that disease causing organisms could be present. The presence of coliform bacteria may also mean there are some defects with the well that are easy to be viewed or other problems may required excavating around a well. Map 2-12 shows the nitrate levels of the wells that have been tested within Sheboygan County. Appendix 4 shows breakdown of the contaminants for the 1097 water samples that have been tested since the UW-Extension started the program.

Groundwater Recharge

Groundwater recharge, along with water conservation, is the best and most economical remedy available to tackle dropping groundwater levels. It is difficult to decrease our dependence on water when it is viewed as an infinite resource. Even a little water conservation consciousness can go a long way. However, since water conservation is a difficult task that may take a generation or more to become an accustom practice; addressing groundwater recharge obstacles is a remedy that should be utilized now.

Groundwater recharge occurs naturally when rainfall and surface waters are transmitted to the aquifer. Most areas, unless composed of solid rock or covered by impervious surfaces, allow a certain percentage of total precipitation to reach the water table. However, some areas have greater infiltration levels than others. Areas that transmit a relatively greater volume of precipitation are often referred to as "critical" groundwater recharge areas. There has not been a formal study of the groundwater recharge in Sheboygan County, but one could be completed in the future if the County or its municipalities desire. There is a formula available that one can compute the average recharge. The formula for aquifer recharge per year is:

(Acres) x (annual precipitation) x (volume) x (Percolation percentage)

For Sheboygan County, the calculation would be:

328,723 x 34.1 x 27,000 x 0.1 = **30,265,526,610** gallons per year

The estimated groundwater use of 3,931,050,000 gallons per year is only **13%** of the total recharge volume (30,265,526,610) that is replenishing the aquifer. This calculation is for the County as a whole, but this does not mean that only 13% of the total recharge volume is being used everywhere countywide. Some areas may be using less water than others.

If you look at Table 2-3, in 2005, 10.77 million gallons of groundwater were used per day, or 3,931,050,000 gallons were used per year. This means that Sheboygan County is only using 13 percent of the total recharge volume that is replenishing the aquifer. Sheboygan County has a much larger rate of recharge than what is being taken from the aquifer in a given time period.

[Map 2-12: Nitrate-Nitrite Contamination in Private Wells]

Table 2-3: Sheboygan County Water Use

Sheboygan County Water Use by Year (millions of gallons per day)							
	1979	**1985**	**1990**	**1995**	**2000**	**2005**	**Percent Change**
Surface-water use	12.27	13.85	13.85	15.13	16.01	14.17	15.5%
Groundwater use	7.67	7.32	9.31	9.46	9.43	10.77	40.4%
Total water use	19.94	21.17	23.16	24.59	25.44	24.94	25.1%

Source: U.S. Geological Survey Water Use in Wisconsin reports for calendar years 1979, 1985, 1990, 2000, 2005.

The amount of water that infiltrates to the groundwater depends on vegetation cover, slope, soil composition, depth to the water table, the presence or absence of confining beds and other factors. Recharge is promoted by natural vegetation cover, flat topography, permeable soils that have not been compacted, a deep water table, and the absence of confining beds. Under the force of gravity, groundwater generally flows from high areas to low areas. Thus, high areas, such as hills or plateaus are likely to be the area where aquifers are recharged and low areas, such as wetlands or streams are where the water discharges. However, in many instances aquifers occur beneath streams or wetlands, so those areas can also be important recharge areas.

Water infiltration is severed in areas of urban development that create impervious surfaces such as parking lots, structures, compact soils, etc. Better land use decisions, particularly in critical groundwater recharge areas, could enable needed recharge to the aquifer as well as limit contamination. Making better land use decisions, even if they limit development, is more economical than tackling the expense of costly groundwater contamination and the search for alternate water supply sources.

There are two prominent types of wells in Sheboygan County: private and public. Private wells are wells that are not part of a public water supply, have fewer than 15 connections, and serve fewer than 25 people. They are usually wells that serve a single home or farmhouse. Wisconsin has had well and pump regulations since 1936. Private wells are regulated by the Private Water Supply Program of the WDNR under NR 812, The Well and Pump Code; and NR 146, The Well Driller and Pump Installer Licensing Code.

A public water system is a system for the provision to the public of piped water for human consumption, if such a system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. A public water system can either be a community system, like a municipality, mobile home park or subdivision; or a non-community system, like a school, factory or wayside. The administrative code regulating public water systems varies, according to the type of public water system. The WDNR oversees construction and operation of public water systems to make sure everyone has safe water to drink and use. However, owners have primary responsibility to monitor drinking water quality. There are 202 public water supply systems in Sheboygan County. These systems include municipalities, churches, restaurants, golf courses, colleges, factories, camps, businesses and many other locations.

Shoreland Corridors

Shorelands are the areas of interface between the land and water. In their natural state, these shorelands are comprised of thick and diverse vegetation that protects lakes, rivers, streams, and the natural scenic beauty, while providing fish and wildlife habitat. Shorelands are also viewed

as valuable recreational and environmental resources both in urbanized and rural areas. As a result, the State of Wisconsin requires that counties adopt shoreland/floodplain zoning ordinances to address the problems associated with development in these areas. Cities and villages are also required to have shoreland-wetland ordinances, but they are not required to have waterway setbacks, minimum lot sizes, etc. in the shoreland zone, except for areas annexed after 1982. Development in shoreland areas is generally permitted, but specific design techniques as well as site details must be considered. Development in these areas is strictly regulated and in some instances, is not permitted.

The authority to enact and enforce the shoreland and shoreland-wetland ordinances and other zoning provisions in counties is set forth in Chapter 59.97 of the Wisconsin Statutes and Wisconsin Administrative Code NR 115. This same authority is also vested to cities and villages in Chapter 62.23 of the Wisconsin Statutes and NR 117. Sheboygan County's Shoreland Ordinance is in Chapter 72 of the County Code of Ordinances. Sheboygan County's Shoreland Ordinance regulates the unincorporated areas of the County that are within one thousand feet (1,000') of the ordinary high water mark (OHWM) of navigable lakes, ponds, and flowages, within three hundred feet (300') of the OHWM of navigable rivers, streams, and intermittent streams, or to the landward edge of the floodplain (whichever is greater). In addition to the aforementioned areas of shoreland and wetland jurisdiction, the Town of Wilson has granted Sheboygan County extra-territorial jurisdiction of all wetlands that are contiguous to shoreland-wetlands (those wetlands within the previously described shoreland boundaries) but extend beyond the one thousand foot (1,000') shoreland boundary from the OHWM of navigable lakes, ponds, or flowages, the three-hundred foot (300') shoreland boundary from navigable rivers, streams, and intermittent streams, or the landward edge of the floodplain.

Lakes, ponds, flowages, or waterways in Sheboygan County are presumed to be navigable if they are designated on the shoreland and wetland maps described in Sections 72.07 and 72.08 of the ordinance. If evidence to the contrary is presented (i.e. that they are navigable or that they are not navigable), the Planning Department shall make the determination whether or not the waters in question are navigable under the laws of Wisconsin. The Planning Department shall also make the determination of the location of the OHWM. The Planning Department may contact the Southeast District Headquarters of the DNR for assistance in the determination of navigability or the location of the OHWM. Map 2-13 illustrates the shoreland jurisdictions of Sheboygan County in the unincorporated areas.

Lake Michigan Coastal Features

The Lake Michigan Coastal Features are important in many respects to Sheboygan County. These areas especially noteworthy for the rare regional endemic plants and animals associated with Lake Michigan shoreline habitats, and the highly specialized animals inhabiting the Niagara Escarpment. The coastal areas annually host significant concentrations of migratory birds, especially during the spring migration period. Wetlands near the coasts of Lake Michigan provide rich habitat for plants and animals and greatly influence the larger ecosystem processes of the Great Lakes Ecosystem. As transition zones (or ecotones) 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. However, various types of development and recreation continue to impact coastal wetlands and limit their capacities to perform important ecosystem functions. Sheboygan County is thought to have one of the last undeveloped dune and wetland

[Map 2-13: Shoreland Jurisdiction & Wetlands]

complex along the western shore of Lake Michigan. This areas is identified as the Amsterdam Dunes. Sheboygan County is looking to acquire the 322.8 acre site from its current owners. More information on the project is located later in the Chapter.

Wetlands

According to the Wisconsin Department of Natural Resources, wetlands are areas where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophitic vegetation and that have soils indicative of wet conditions. Other common names for wetlands are swamps, bogs, or marshes. Wetlands serve as a valuable natural resource. Not only do they provide aesthetic, recreational and educational opportunities in both urban and rural areas, they enhance water quality by absorbing excess nutrients into the roots, stems, and leaves of its plants and slow the flow of water to let suspended pollutants settle out. Map 2-13 also shows wetlands as mapped on the Wisconsin Wetland Inventory.

Wetlands act as natural pollution filters, making many lakes and streams cleaner and drinking water safer. They act as groundwater discharge areas and retain floodwaters. Filling or draining of wetlands is costly, destroys the productive capacity of the ecosystem and can adversely affect surface water quality and drainage. Finally, wetlands provide valuable and irreplaceable habitat for many plants and animals.

Because of their importance, there are strict regulations regarding wetlands. Wisconsin Administrative Codes NR 115 and NR 117 fall under the jurisdiction of the WDNR, and mandate that shoreland-wetlands be protected in both the rural and urban areas of the State. In the unincorporated areas, NR 115 provides the legislation to protect wetlands of five or more acres that are within the jurisdiction of county shoreland zoning ordinances. Wetlands not in the shoreland zone are protected from development by the federal government and the WDNR through Section 404 of the Clean Water Act, and NR 103, respectively. It ought to be noted that all wetlands, no matter how small, are subject to WDNR, and possibly, federal regulations, if they meet the State definition. Sheboygan County only regulates wetlands when they fall in the County's shoreland or floodplain jurisdictions, except for those wetlands in the Town of Wilson that are contiguous to those that are located in the shoreland jurisdiction of the County. The villages and cities within the County have their own wetland ordinances, as applicable.

Floodplains

Floodplains are often viewed as valuable recreational and environmental resources. These areas provide for stormwater retention, groundwater recharge, and habitat for various kinds of wildlife unique to the water.

Development permitted to take place in these areas is susceptible to storm damage and can have an adverse effect on water quality and wildlife habitat. In addition, it can also result in increased development and maintenance costs such as flood proofing, repairing repetitive damage of private structures and public infrastructure associated with flooding and high water, increased flood insurance premiums, and extensive site preparation. State Statutes require all communities to adopt a floodplain zoning ordinance if a flood hazard has been identified; the regulations apply to new construction as well as remodeling and the expansion of existing structures. For planning and regulatory purposes, the floodplain is normally defined as those areas, excluding the stream channel, that are subject to inundation by the Regional Flood event. This event has a

one percent chance of occurring in any given year. Because of this chance of flooding, development in the floodplain should be discouraged, and the development of park and open space in these areas should be encouraged.

There are threats to the floodplains and the resource they represent. Some of these threats are filling, grading, impediments, and impervious surfaces. Filling may diminish the flood storage capacity of the floodplain. Grading can degrade the resource function of the floodplains. Impediments can be things like the encroachment of buildings or the construction of undersized culverts and bridge openings in the floodplain. Finally, impervious surfaces limit the ability of precipitation to penetrate into the ground meaning it can increase the velocity of the flood flows.

As a result of the problems that can be associated with development in a floodplain, the State of Wisconsin requires that counties, cities, and villages adopt floodplain zoning ordinances to address the problems associated with development in floodplain areas. The authority for floodplain management is given in Wisconsin Statutes 87.30 and NR 116. Chapter 73 of the Sheboygan County Code of Ordinances is the County's Floodplain Ordinance. The boundary of the floodplain districts, including floodway, floodfringe, and other floodplain districts are designated as floodplains on the Flood Insurance Rate Maps (FIRMs) for Sheboygan County. These maps are prepared for Sheboygan County by the Federal Emergency Management Agency (FEMA) and are kept on file in the Sheboygan County Planning and Resources Department Office. The type of development that can occur depends if the property is in the floodway, floodfringe, or general floodplain district. The County regulates the unincorporated areas of the County, but individual incorporated municipalities regulate the floodplain within their own boundaries. Not all communities are mapped by FEMA because some communities do not have identified flood risks. For parcel specific information in the unincorporated areas of the County, the Planning and Resources Department shall be contacted. Map 2-14 shows a general overview of the Floodplain for Sheboygan County.

Woodlands

Woodlands throughout Sheboygan County are comprised primarily of sugar maple, yellow birch, American beech, basswood, red oak, white oak, red pine, white pine, hemlock, paper birch, aspen, white cedar, shagbark hickory, ashes, elms, and small stands of the northern hardwood species. Also seen in Sheboygan County are balsam firs, white spruce, black spruce, and tamarack. The woodlands provide an aesthetic and natural purpose, providing habitat to many animals. The WDNR divides the State of Wisconsin into Ecological Landscapes. Sheboygan County is in two of these landscapes, the Southeast Glacial Plains Ecological Landscape and the Central Lake Michigan Ecological Landscape. Robert Finley mapped the original vegetation of the state. The original vegetation cover of Sheboygan County, based on that data, is shown on Map 2-15. According to that data, most of Sheboygan County was originally covered with deciduous forest, mainly beech, sugar maple, basswood, red oak, white oak, and black oak. There was a smattering of coniferous forests in the County as well. Landscaping with native species of woodlands has many appealing factors, such as savings on energy, as they do not need as much fertilizer or water and also provide habitat for wildlife.

According the U.S. Forest Service in 2006, Sheboygan County had 67,949 acres of forest, which made up 21 percent of the total land in the County. Of the 67,949 acres, 12,813 acres are publicly owned and 55,136 are privately owned forest lands. Sheboygan County does not have a County forest program. As of 2008, Sheboygan County had 9,620 acres of forest enrolled in the managed

[Map 2-14: Floodplains]

[Map 2-15: Original Vegetation Cover]

forest law (MFL) program. The MFL program was enacted in 1985 and replaced the Forest Crop Law. These are both forest tax laws. The purpose of Wisconsin's forest tax laws is to encourage sustainable forestry on private lands by providing property tax incentives to landowners. This is accomplished with a binding agreement between the state Department of Natural Resources and private landowners. Sheboygan County had 1,485 acres of MFL open to the public in 2008, and a total of 9,620 acres of land enrolled in the MFL program. In order to be eligible for the program someone must have at least 10 acres of contiguous forest land, a minimum forest cover of 80 percent, an average width of 120 feet, and the landowner must submit a forest management plan and follow that plan. Lands remain in the MFL program for 25 or 50 years. These lands can be open to the public or closed, depending upon what the landowner chooses. MFL open lands are available for hunting, fishing, cross county skiing, hiking, and sightseeing. Lands that allow public access have to pay less in taxes.

According to the WDNR's Summary of County Economic Sectors in 2003, the forest products and processing industry employed 3,284 people and had an industry output of $567 million dollars. Sheboygan County's forest products and processing industrial output is 6 percent of the total county industrial output. In the State, for every ten jobs in forest related industries, an additional 23 jobs are produced in other sectors of the State's economy.

The Kettle Moraine State Forest-Northern Unit is a mesic forest still in existence today. Part of the Kettle Moraine State Forest is located in western Sheboygan County. Map 2-16 shows the woodlands of Sheboygan County.

Kettle Moraine State Forest-Northern Unit

The northern unit of the Kettle Moraine State Forest contains approximately 30,000 acres of state land, of which 67 percent are forested. It is an important area ecological in part because it is the largest block of contiguous forest in Wisconsin, east of the Baraboo range. As such the State Forest is important for "area sensitive" wildlife species including several Neotropical migrants, including the red-shouldered hawk and others classified as endangered and threatened species.

It is also a internationally significant area from a geological perspective, representing some unique geological features formed during the last ice age. Special interest areas include Dundee Mountain, the Henry S. Ruess Ice Age Visitor Center, the Ice Age Trail, Parnell Tower and Esker just to name a few.

Outdoor recreation and education are also important uses of this Forest. It is a regional significant area for hunting, including deer, waterfowl and small game hunting. Spruce Lake Bog and Jersey Flats prairie are also areas that are excellent for viewing wildlife. Wildlife species found throughout the forest include whitetail deer, turkeys, warblers, Cooper's hawks, red squirrels, meadowlarks, bluebirds and red-winged blackbirds. Camping, hiking, cross-country skiing, mountain biking and sight-seeing attract thousands of visitors every year.

Wildlife Habitat

Fish and wildlife habitat areas have been delineated according to their level of quality and importance in many of the coastal areas of Sheboygan County as part of a 1976 Fish and Wildlife Habitat Study prepared by the WDNR. In this study, habitat areas were identified as being top, medium, or low quality areas, which measures the capability of supporting various types of wildlife habitat.

[Map 2-16: Woodlands]

The WDNR has developed an update to the 1976 study titled, "Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need", also known as the Wildlife Action Plan. "Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need" identifies which native wildlife species, with low or declining populations, are most at risk of no longer being a viable part of Wisconsin's fauna, what habitats they are associated with, where they occur across the state, and a menu of conservation actions to be developed into specific on-the-ground projects. The Wildlife Action Plan identifies the species of greatest need, the habitats they require, where they are located in Wisconsin, issues, threats, and conservation actions for the species, and identifies the opportunities

The Wildlife Action Plan classifies species within each ecological landscape as is and/or was significantly (highly) associated with the ecological landscape, restoration of this ecological landscape would significantly improve conditions for the species; moderately associated with the ecological landscape, restoration of this ecological landscape would moderately improve conditions for the species; minimally (low) associated with the ecological landscape, restoration of this ecological landscape would only improve conditions for the species. A listing of the species can be found in the Wildlife Action Plan for each ecological landscape. Some species that are highly associated with the Central Lake Michigan Coastal Ecological Landscape are the American Woodcock, Dunlin, Field Sparrow, Osprey, Upland Sandpiper, Lake Sturgeon, Four-toed Salamander, Northern Ribbon Snake, Mudpuppy, and many others. Some species that are highly associated with the Southeast Glacial Plains Ecological Landscape are the Acadian Flycatcher, Black Tern, Brown Thrasher, Buff-Breasted Sandpiper, Field Sparrow, Hooded Warbler, Red-headed Woodpecker, Western Meadowlark, Whooping Crane, Gravel Chub, Lake Sturgeon, Longear Sunfish, Blanding's Turtle, Butler's Garter Snake, Pickerel Frog, Franklin's Ground Squirrel, and many others. These are just a few of the species, more detail can be found in the Plan.

A majority of the large remaining wooded and wetlands areas within the County were designated as Class 1 (most desirable) wildlife habitats by the Wisconsin Department of Natural Resources. Major wildlife species using these habitats include songbirds, deer, ruffed grouse, chipmunks, and squirrels. Other common species include coyote, gray fox, raccoon, skunk, and porcupine. Muskrat, mink, beaver, and otter have been identified in wetland areas. Several species of gulls, terns, geese, and ducks inhabit the area, and some of the old fields provide habitat for pheasants. Woodchuck, meadow vole, American toad, snapping turtle, Canada goose, and wild turkey can be found in places in the County. Sheboygan County lies within an important migratory corridor for songbirds, shorebirds, waterfowl, and raptors. These birds, possibly including some threatened or endangered species, use the wooded and wetland areas for food and rest.

The Wisconsin Department of Natural Resources has also designated the waters of Lake Michigan as Class 2 (desirable habitat) fish habitat. Fish species that may be found include small mouth bass, yellow perch, northern pike, rock bass, rainbow trout, lake trout, and brown trout. Sheboygan County is home to a diverse number of species and protecting these species and their habitat is important to the County.

Threatened and Endangered Species

Under the Endangered Species Act of 1973, an "endangered species" is any species that is in danger of extinction throughout all or a significant portion of its range (excluding species of the Class Insecta determined to be a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to humans). A "threatened species" is any species that is likely to become an endangered species within the near future throughout all or a significant portion of its range. The U.S. Fish & Wildlife Service in the Department of the Interior, and the NOAA Fisheries Service in the Department of Commerce, share responsibility for administration of the Endangered Species Act.

The Wisconsin Department of Natural Resources designates species as threatened or endangered for species that live within the borders of Wisconsin, regardless of how common they are in other states. In Wisconsin, threatened and endangered species are protected by the Wisconsin Department of Natural Resources under NR 27 of the Wisconsin Administrative Code. This law regulates the sale, transport, taking and possession of state endangered and threatened plant and animal species.

Both federal and state identification efforts for threatened and endangered resources were conducted as part of a WDNR review of the Ice Age Trail project area in Sheboygan County which showed many occurrences of rare species and natural communities recorded in the WI Natural Heritage Inventory (NHI). Sheboygan County has both aquatic occurrences and terrestrial occurrences. All Towns in the County are listed as having at least one occurrence, but the Towns of Russell, Rhine, Holland, Wilson, and Sheboygan have occurrences throughout the towns. A listing of these rare species and natural communities can be found in the *Natural Areas and Critical Resources Plan,* as well as in Appendix 5: Wisconsin Natural Heritage Inventory (NHI). The piping plover is listed as a federal endangered species, the dune thistle is listed as a federally threatened species, as well as the prairie white-fringed orchid.

Invasive Species

Many invasive exotic plants and animals have devastating impacts on our native plant communities, fish and wildlife habitat, agricultural yields, recreational opportunities, and ultimately, local economies. Because these non-native species disperse widely across the landscape, it is advantageous to work cooperatively across jurisdictional boundaries towards prevention, management and control objectives. In addition, the number of new invasive species introduced into our region each year has been out-pacing control activities, making prevention and management tasks impractical for any one agency to manage alone. The cost to the U.S. economy to monitor, contain, and control theses species is estimated at $100 to 200 billion per year. Landscaping with native species provides habitat and has reduced maintenance costs, while slowing the spread of invasive species.

The Southeastern Wisconsin Invasive Species Cooperative (SEWISC) is a broad-based coalition that promotes efficient and effective management of invasive species throughout an eight-county region, including Sheboygan County. The mission of SEWISC is to educate the public and protect biodiversity and ecological function throughout this region, contributing to a high quality of life for present and future generations. SEWISC provides a forum to share information and resources, and to cooperatively execute invasive species management activities in southeastern Wisconsin. Over 75 percent of respondents to the County Comprehensive Planning Survey stated

that invasive and exotic species represent are a threat to the quality of Lake Michigan and the coastal features adjacent to the Lake. Invasive species also pose a threat to other wildlife habitats. Some invasive species include the zebra mussel, purple loosestrife, Eurasian water milfoil, phragmites, and the Japanese knotweed. Sheboygan County also is in the quarantine area for the Emerald Ash Borer. The Emerald ash borer an invasive, wood-boring beetle that attacks ash trees, was positively identified for the first time in Wisconsin in August 2008. The beetle and beetle larvae were found at a private home in Ozaukee County, Wisconsin. Sheboygan County has developed a team to help develop a plan that will address how Sheboygan County will prepare for the Emerald Ash Borer. This committee is in the beginning stages of identifying how many ash trees are located within Sheboygan County. Phragmites are a wetland plant species found in every U.S. state. It can grow up to 6 meters high in dense stands and is long-lived and is a problem in Sheboygan County. Japanese knotweed spreads quickly to form dense thickets that exclude native species and are of little value to wildlife, leading to it being described as an environmental weed. This plant grows to shade out vegetation as well as when it dies, it leaves stream and river banks more vulnerable to erosion.

Significant Natural Features

Sheboygan & Kiel Marshes located in northwestern Sheboygan County are important wetland areas for wildlife, flood control, and other wetland functions. The properties are used for outdoor recreation activities, including fishing, hunting & trapping. The Sheboygan Marsh Park provides an outdoor classroom for the Sheboygan Outdoor Skills Center. The following website provides more information on the Broughton Sheboygan Marsh Park and Wildlife Area http://www.co.sheboygan.wi.us/html/d_planning_broughtonmarsh.htm, as well as a copy of the strategic plan for the Sheboygan Marsh.

John Michael Kohler State Park and Terry Andrae State Park are heavily used parks that preserve almost two miles of Lake Michigan shoreline, including uplands and wetlands associated with the lake and Black River. These parks are managed as one unit by the Wisconsin DNR. The area is known for its wonderful sand beaches and stabilized sand dunes, interdunal wetlands, river marsh, dune thistle, sand reed grass, migrating birds, phyllira tiger moth, seaside grasshopper, and several types of forest. The park and surrounding areas are ecologically vital and have high recreational value. Kohler-Andrae has been identified as a WDNR Land Legacy site and a Priority Conservation Site by Glacial Lakes Conservancy. For more information on these parks please see Chapter 6, Utilities and Community Facilities. The *Kohler Park Dunes* located within the state parks has three uncommon Great Lakes shore habitats present in this area: Lake Michigan dunes consisting of large, active potions surrounded by stabilizing dunes; one quarter mile of beach community; and two small remnants of white pine forest. The area is rich in coastal plant species and there are numerous critical plant species present.

Nichols Creek is located in the Towns of Sherman and Lyndon, and has been designated as a State Exceptional Water Resource. Wisconsin's Outstanding and Exceptional Resource Waters Program is designed to maintain the water quality in Wisconsin's cleanest waters. An exceptional resource water is defined as a stream that exhibits the same high quality resource values as outstanding waters, but which may be impacted by point source pollution or has the potential for future discharge from a small sewer community. The Nichols Creek State Wildlife Area, which makes up the headwaters of Nichols Creek which drains into the North Branch of the Milwaukee River, is located in the Towns of Lyndon and Mitchell.

North Branch Milwaukee River Wildlife and Farming Heritage Area includes portions of Sheboygan, Ozaukee, and Washington Counties and encompasses a total of 19,487 acres of land. The core area is made up of 16,549 acres of land with an additional 2,938 acres made of corridors along the five tributary streams in the area. The project includes river and stream corridors, large wetland complexes, three lakes, and rural/agricultural lands and is one of the largest blocks of open space remaining in southeastern Wisconsin where agriculture is the dominant land use. The purpose of the project is to:

- Maintain the rural character of the area
- Maintain and enhance existing natural resources
- Restore plant communities and wetlands to improve wildlife habitat and water quality
- Provide nature-based outdoor recreation and education opportunities

Nearly 9,100 acres of cropland and pasture areas, 5,900 acres of wetlands, and 700 acres of forest occur within the boundary area. In an effort to achieve the goals outlined for the North Branch Milwaukee River watershed and project area, the Wisconsin DNR, Ozaukee Washington Land Trust, and Glacial Lakes Conservancy are using a variety of real estate tools, including fee title, donated conservation easements, and purchase of development rights (PDR) in this three county area with willing landowners to protect agricultural lands, wetlands, forests, natural resources, and the surface water quality of streams, the Milwaukee River, and ultimately Lake Michigan.

Sheboygan County Memorial Arboretum in Sheboygan County is a wet lacustrine swamp that is made up primarily of black ash and American elm with alder in the under story. The tree canopy is somewhat open and there are many plant species throughout the swamp and there is little local relief. Trails run along the east and west fringes of the swamp.

Amsterdam Dunes Project may be the last large tract of undeveloped sand dune and wetland complex along the western shore of Lake Michigan, in the Town of Holland. Sheboygan County is looking to acquire the 322.8 acre site from its current owners. This project will look to restore wetlands and forests, create additional critical habitats, restore and improve waterways, prevent erosion and sedimentation, prevent movement of nutrients and pesticides into wildlife habitat, develop the site for limited public access and outdoor recreation, create innovative educational media that highlights the unique ecological and built environments of the site, create jobs, and create partnerships with other agencies and citizens for long-term preservation. In 2009, the County applied for a grant from the National Oceanic and Atmospheric Administration (NOAA). This would include funding for acquisition, restoration, and development. The restoration will benefit rare species and habitats, as well as providing educational opportunities. Humans will benefit through environmental education and recreational opportunities.

The Wisconsin State Natural Area program was established to formally designate sites 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 rather to serve the mission of the Natural Areas Program, to locate and preserve a system of State Natural Aras harboring all types of biotic communities, rare species, and other significant natural features native to Wisconsin.

There are some other significant natural areas that are labeled State Natural Areas (SNA). These are listed in Table 2-4. These areas include a wetland, bog, kame, a hawk research station and

many others. More information on these State Natural Areas can be found in *Sheboygan County's Outdoor Recreation and Open Space Plan-2007* and the *Natural Areas and Critical Resources Plan.*

Table 2-4: State Natural Areas within Sheboygan County

Name (Identification)	Location with Sheboygan County
Cedar Grove Hawk Research Station (State Natural Area #8)	Section 30-Town of Holland East
Kohler Park Dunes (State Natural Area #71)	Sections 22 & 23-Town of Wilson
Kettle Hole Woods (State Natural Area #254)	Section 18-Town of Scott
Crooked Lake Wetlands (State Natural Area #255)	Sections 6 & 31-Town of Scott
Butler Lake Flynn's Spring (State Natural Area #257)	Section 20-Town of Mitchell
Johnson Hill Kame (State Natural Area #258)	Section 8-Town of Mitchell
Kettle Moraine Red Oaks (State Natural Area #259)	Section 14-Town of Scott
Rhine Center Bog (State Natural Area #414)	Section 11-Town of Rhine

Source: Wisconsin Department of Natural Resources

Land Legacy Places

Starting in 1999, the Wisconsin DNR initiated a three-year study to identify, with considerable input from the public and non-profit groups, places in the state that will be critical in meeting Wisconsin's long-term conservation and recreation needs. The resulting 229 "Legacy Places" collectively are the special places that "make Wisconsin, Wisconsin." The WDNR only represents the Legacy Places as points because specifically identifying which lands and waters associated with each place are most appropriate to maintain and protect is most appropriately left to a locally-focused planning process. The Land Legacy information helps to bring cultural and environmental meaning to the demographic data that we present. There are seven land legacy places within Sheboygan County. These seven lands are identified in Table 2-5.

Table 2-5: State Land Legacy Places in Sheboygan County

Land Legacy Place	Location
Kettle Moraine State Forest	Towns of Greenbush, Mitchell, and Scott
Kohler-Andrae Dunes	Town of Wilson
Millhome Woods	Town of Rhine
Milwaukee River	Towns of Scott and Sherman
Onion River Grasslands	Town of Lima
Sheboygan County Trout Streams	Various locations see Page 23 for more information
Sheboygan River Marshes	Towns of Greenbush and Russell

Source: Wisconsin Department of Natural Resources

Environmental Corridors

Environmental corridors serve many purposes. They protect local water quality and wildlife habitat through identification and preservation of environmentally sensitive areas. They can be used as a means of controlling, moderating, and storing floodwaters while providing nutrient and sediment filtration. Environmental corridors can provide fish and wildlife habitat, recreational opportunities, and serve as buffers between land uses, while improving the aesthetics of the community. The environmental corridor process is also used as part of the planning process for making planning and zoning decisions at the local level.

The concept of a corridor is based on the delineation of environmental features adjacent to waterways and water-related resources. Bay-Lake Regional Planning Commission, which Sheboygan County is a part of, has defined environmental corridors to include the following set of uniformly available information: Wisconsin Department of Natural Resources wetlands; Federal Emergency Management Agency's 100-year floodplains; areas with slopes greater than or equal to 12 percent; lakes, rivers, streams and ponds; a 75-foot lake and river setback; and, a 50-foot buffer of wetlands. Many of the commission's planning activities require delineation of environmental corridors (comprehensive plans, watershed plans, sewer service area plans, etc.).

Other features that are considered as part of the environmental corridor definition on an area-by-area basis include: designated scientific and natural areas; unique and isolated woodland areas; scenic viewsheds; historic and archaeological sites; unique geology; wetland mitigation sites; isolated wooded areas; unique wildlife habitats; parks and recreation areas; and other locally identified features. The Bay-Lake Regional Planning Commission (BLRPC) has defined environmental corridors for Sheboygan County to help in identifying areas that have the greatest need for protection. Some of these areas are discussed in the *Sheboygan County Outdoor Recreation and Open Space Plan-2007*. These corridors were delineated using BLRPC's Geographic Information System (GIS) to overlay a variety of features. These corridors are shown in Map 2-17. It is important to maintain important connections for environmental corridors, so these corridors are not fragmented.

Parks and Open Space

Sheboygan County has an abundance of diverse outdoor recreational facilities and opportunities, for all ages and seasons. The County owns a few parks and open space areas. These areas will be discussed below, but a greater discussion and maps of all the parks and open spaces throughout the County can be found in *Sheboygan County's Outdoor Recreation and Open Space Plan-2007*, as well as the *City of Sheboygan's Outdoor Park, Recreation, and Open Space Plan*. Individual municipalities will also have better descriptions of their own parks and open space areas. Below will be an overview of the County-owned parks and recreation areas.

Broughton Sheboygan Marsh Park

In 1937, 6,349 acres of land consisting of wild, undeveloped open space and surface water was purchased by Sheboygan County at a public foreclosure auction. Today, this property is the principle area of the Broughton Sheboygan Marsh Park and Wildlife Area. The Park was named after civic leader and conservationist, Charles E. Broughton, who had worked to restore the Marsh after attempts were made to drain the area for farmland.

In 1938, a permanent dam was constructed; the area was reflooded and once again restored to an excellent habitat for waterfowl and a diversity of other game and non-game species. Numerous other individual parcels of land have been acquired by and donated to the County and the State of Wisconsin throughout the years since the initial acquisition.

Thirty acres of land were set aside for construction of a developed park and campground area currently includes the following recreational facilities and opportunities:

- Family restaurant and bar (managed by a private vendor)
- Meeting and special events building

[Map 2-17: Environmental Corridors]

- Sixty-four (64) fully developed campsites at three camping areas
- Large picnic area
- Large playground
- Canoe and boat rentals (with 674 acres of available surface water)
- Boat launch ramp
- Fishing piers
- Snowmobile trails
- Access to 14,000 acres of land and water for hunting, fishing, canoeing/boating, cross-country skiing, hiking, and nature study
- Part of the Ice Age National Scientific Reserve
- Delineated archaeological sites

The Marsh itself (not including the developed park area) is managed through a cooperative agreement with the Wisconsin Department of Natural Resources following the Sheboygan Marsh Strategic Management Plan that was updated in 2002. There are scheduled to be some improvements to the Marsh Park in the years ahead. This includes the construction of an 80-foot observation tower on the property.

Gerber Lakes Public Fish & Wildlife Area

Sheboygan County's newest public lands, this Fish & Wildlife Area is open to the public for multiple outdoor recreation uses. The Wildlife Area is located in Section 35, Town of Rhine, 3 miles east of Elkhart Lake and is open to public hunting and fishing during these seasons.

The property includes 3 lakes, 2 of which are among the most popular fishing and canoeing lakes in the area. Big Gerber Lake is 15 acres and has a maximum depth of 37 feet, Little Gerber Lake is 8 acres with a maximum depth of 21 feet, and Bullet Lake, which is approximately one acre in size. Big Gerber and Little Gerber Lake are connected by a short, navigable channel; both lakes have restrictions on motorized watercraft.

The land cover on the property is diverse, consisting of tillable uplands, deciduous trees (principally maple, beech, oak, ash, birch, and aspen), coniferous forest (principally pine, spruce, and tamarack), meadow, and wetland. The topography of the property ranges from rugged steep slopes greater than 25% on the western and southern portions of the property, and gently rolling along the areas adjacent to the lakes. The southern portion of the property is in the process of being restored to a native prairie. This restoration project was complete following the planting of prairie vegetation in spring 2005. A barn on the site was removed in summer 2005. Removal of the barn structure enhances the overall wildlife experience on the property.

The lakes on this property are within the headwaters of the Otter Creek tributary. The lakes include one of the region's most productive warm water fisheries, with the principal species being largemouth bass, bluegill, and black crappie. Game and non-game animal species commonly found on the property include whitetail deer, red and grey fox, raccoon, skunk, cottontail rabbit, squirrels, various mice, voles, and moles, wild turkeys, herons, red tailed hawks, barred and great horned owls, migratory waterfowl (such as mallard, wood duck, greenwing and bluewing teal, Canada geese), songbirds, pheasant, and Hungarian partridge.

Natural Resource Organizations in Sheboygan County

Sheboygan County has a wide variety of organizations that strive to protect and enhance the County's natural resource base. These include local chapters of national organizations, local conservation organizations, and many friends organizations.

Sheboygan County Conservation Association

Many of the County's conservation organizations have joined together to form the Sheboygan County Conservation Association (SCCA), which is a nonprofit organization. In 1957, a few conservation minded groups incorporated and formed the SCCA. Now, 50 years later, the group consists of 33 conservation clubs, about 3,000 members strong. This group meets monthly, and has become a strong force in conservation efforts in the County. The SCCA is recognized state-wide for its multitude of programs and improvement of Wisconsin's great outdoors. To date, over $850,000 has been raised for conservation efforts and projects. This organization supports a Pheasant Program, supports Trees for Tomorrow, and provides an annual scholarship. Since 1996, The SCCA's Pheasant Program raises a more wild strain of bird in hopes of establishing a sustaining pheasant population. The SCCA also acquires land, sometimes keeping ownership of the land, but most of the time the land is donated to the Wisconsin DNR, conservation organizations with in the SCCA, or other government agencies. In 2005, they purchased a 154 acre parcel of land for public use. The SCCA also acquired land in 2006. Table 2-6 is a listing of the 33 conservation organization that makeup the SCCA. Most of these member organizations have yearly or monthly dues, and have their own monthly meetings. These organizations also are involved in their own conservation activities along with those of the SCCA. Some of these organizations acquire their own lands.

Table 2-6: Sheboygan County Conservation Association Member Clubs

Adell Sportsmen Club	Rhine Field & Stream
Binversie's Sportsmen Club	Ridge Runners Sportsmen Club
Cascade Sportsmen Club, Inc.	Riverside Hunting & Fishing Club
Crystal Lake Sportsmen Club	Sauk Trail Conservation Club
Farmers and Sportsmen Conservation Club	Sheboygan Falls Conservation Club
Great Lakes Sport Fisherman (Sheboygan Chapter)	Sheboygan Rifle & Pistol Club
Hermitage Conservation Club	Sheboygan Riverside Boat Club
Howards Grove Rod & Gun	Sheboygan Walleye Club
Hunters Education Conservation Club	Smerke's Sportsmen Club
Izaak Walton League (Sheboygan Chapter)	Suscha Fale Sportsmen Club
Johnsonville Rod & Gun	Tri-County Sportswomen Club, LLC.
Kettle Moraine Bass Anglers	Trout Unlimited
Koenig's Conservation Club	UAW 833 Conservation Committee
Marshview Conservation Club	Whitetail Bowhunters
Muskie's Inc.	Winooski Bowman
Northern Kettles Chapter of NWTF	Wisconsin Trappers Association – District 8
Peterman's Hunting & Fishing Club	

Source: Sheboygan County Conservation Association.

Glacial Lakes Conservancy

Glacial Lakes Conservancy is a private, non-profit, land trust conservation organization dedicated to preserving and protecting working, urban, and natural lands that contribute significantly to the ecological integrity, agricultural sustainability, scenic beauty and recreational enjoyment in Sheboygan, Manitowoc, Kewaunee, Calumet and Fond du Lac counties. Glacial Lakes envisions a legacy of permanently protected lands and land-use policies that sustain and enhance a regional quality of life defined by the beauty and productivity of its working lands and natural resources and is supported by memberships and contributions from those who share in this vision. The Conservancy achieves its goals at this time primarily through the use of donated conservation easements, advocating for resource protection, and entering into project partnerships. GLC is part of the Lake Michigan Shorelands Alliance, a collaboration of 9 land trusts within the Lake Michigan watershed basin.

Sheboygan River Basin Partnership

The Sheboygan River Basin Partnership (SRBP) is a non-profit organization working to improve water quality and preserve our natural resources within the Sheboygan River Basin. Improving the health of our rivers and lakes is our goal. The SRBP is an alliance of conservation and environmental groups; local businesses; local, state and federal agency staff, and concerned individuals. Together, we are working to cultivate partnerships to raise public awareness, engage participation in stewardship, and promote informed decision-making regarding issues that affect the health of water resources in our area.

Friends of the Sheboygan Marsh

The Friends of the Sheboygan Marsh is a non-profit organization that has a mission allowing this and future generations to learn about nature and the environment, and to enjoy the rich beauty the Broughton Marsh Park has to offer. The Friends of the Marsh have worked to raise funds to build a tower. This tower will be the largest structure of its kind in Wisconsin and will be a great asset to the Marsh. The tower itself will be a tourist destination, drawing families wishing to enjoy the park without getting their feet wet or venturing into the wilderness areas that can instead be seen from the tower.

Friends of Kettle Moraine State Forest

The Friends of the Kettle Moraine is a non-profit organization dedicated to promoting a greater appreciation of the Kettle Moraine. The Friends of the Kettle Moraine involve the public in their activities and the Northern Unit of the Kettle Moraine State Forest. Anyone can become a member. The Friends of the Kettle Moraine helps in planning and staffing special activities in the forest such as cross-country ski outings, hikes, seminars and many other activities. The Friends of the Kettle Moraine hold regular meetings at the Ice Age Visitor Center (located on State Highway 67, 1/2 mile west of Dundee).

Friends of Kohler-Andrae State Park

The Friends of Kohler-Andrae State Park is a non-profit support organization dedicated to assisting the Department of Natural Resources at the park. Members are committed to furthering the historical, educational, recreational, interpretive and visitor services programs of the park. The Friends of Kohler-Andrae State Park organization was established in 1987. It continues the park's historical and vital link in joining private and state efforts toward our common goal of improving and sustaining the park.

The Environmental Park Trust of Sheboygan County

The Environmental Park Trust of Sheboygan County supports Maywood through private donations, grants, bequests, and annual fund raising events. This trust and its donors made the 5,600 square foot Wm. A. Hayssen Pavilion - Ecology Center Addition, a multi-purpose facility addition, a reality.

Sheboygan County Audubon Society

Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity.
It is made up of a national network of community-based nature centers and chapters, scientific and educational programs, and advocacy on behalf of areas sustaining important bird populations, engage millions of people of all ages and backgrounds in positive conservation experiences. Sheboygan County has a local chapter of the Audubon Society.

Pheasants Forever

Another conservation organization in Sheboygan County is the Pheasants Forever organization. It is a national organization with a Sheboygan/Manitowoc Chapter. The organization meets in Plymouth one month and then Valders the following month. Pheasants Forever is dedicated to the conservation of pheasants, quail and other wildlife through habitat improvements, public awareness, education and land management policies and programs. This chapter is responsible to determine how 100% of their locally raised funds will be spent.

Master Gardeners

Master Gardeners are individuals who have an interest in horticulture, have taken Master Gardener training offered by UW-Extension and share their time and expertise with others. It is the acquisition of knowledge, the skill in gardening, and giving back to the community that distinguishes UW-Extension Master Gardeners from other gardeners. The purpose of the Wisconsin Master Gardener Program is to provide unbiased, research-based horticultural information to the citizens of Wisconsin through Master Gardener volunteers. Master Gardeners receive training in horticulture through the University of Wisconsin Extension. In return for their training, Master Gardeners volunteer in UW-Extension horticulture programs and projects which enhance the community.

Wild Ones

Wild Ones: Native Plants, Natural Landscapes promotes environmentally sound landscaping practices to preserve biodiversity through the preservation, restoration and establishment of native plant communities. Wild Ones is a not-for-profit environmental education and advocacy organization. The Sheboygan Area Tension Zone Chapter of Wild Ones suspended it operations for 2009, but may become active again in the coming years.

Nature Conservancy

The Nature Conservancy is a leading conservation organization working around the world to protect ecologically important lands and waters for nature and people. The Nature Conservancy recently created a new GIS Mapping Tool developed for the Sheboygan River Basin. This took includes which basin-wide priority maps for terrestrial, wetland and aquatic resources.

AGRICULTURAL RESOURCES

Agriculture in the State of Wisconsin has long been a significant, but an increasingly smaller segment of the statewide economy. Agriculture for purposes of this plan include the land used for farming, dairying, pasturage, apiculture, aquaculture, working forest lands, orchards, horticulture, floriculture, viticulture, or animal and poultry husbandry; this includes the necessary accessory uses for packing, treating, or storing the produce from these activities. In 2002, there were 77,131 farms in the State and that number increased to 78,463, at the same time the statewide average size of farms has decreased and the number of acres of land in farms has also decreased. As growth continues to occur, it is important to protect the productive farmland. Over a half million acres of farmland has been lost from 2002 to 2007. Sheboygan County has recognized the need to protect farmland and prepare for the future, by developing a Farmland Preservation Plan in 2004, Sheboygan County and its municipalities took a step in protecting the resource for generations to come. All of the County's towns are included in the farmland preservation plan and the Village of Glenbeulah, all other municipalities did not enter into the farmland preservation plan. Since 2000, the WDNR has acquired 1,438 acres of total land within Sheboygan County. They have also acquired easements and development rights on an additional 643 acres of land. As of summer 2009, the Glacial Lakes Conservancy had about 490 acres in conservation easements in Sheboygan County. It is difficult to know the exact number of acres that have been taken out of farmland production, due to WDNR purchases, but it is estimated that less than 1,000 acres have been taken out of farm production. By comparison, between 2002 and 2007 over 3,500 acres of farmland have been lost in Sheboygan County, according to the U.S. Agricultural Census; this means that the WDNR purchases are only a small part of the total farmland loss the County is experiencing. The U.S. Fish and Wildlife Service has also acquired about 203 acres from 2003 to 2009, most of this land is no longer farmed.

Prime Agricultural Lands

The USDA, Natural Resources Conservation Service defines prime farmland as land that has 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. Prime farmland includes land that is being used currently to produce livestock and timber. It does not include land already committed to urban development or water storage. It is important to note that these soils characteristics are only one of many variables that contribute to a viable farming operation; agricultural land is not only tillable land but can also include but are not limited to beekeeping, fish or fur farming, orchards, plant greenhouses and nurseries, poultry raising, raising of grain, grass mint and seed crops, raising of fruits, nuts and berries, and sod farming.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. The land must also be available for these uses (cropland, pastureland, forestland, or other land, but not water or urban built up land).

Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods.

In general, prime farmland in Wisconsin:

- Has an adequate and dependable water supply from precipitation or irrigation
- Has a favorable temperature and growing season
- Has acceptable acidity or alkalinity
- Has few or no rocks
- Is permeable to air and water
- Is not excessively erodible
- Is not saturated with water for long periods of time
- Does not flood frequently, or is protected from flooding

Conservation Reserve Program (CRP)

The USDA administers the Conservation Reserve Program (CRP) to help provide water quality protection, erosion control, and wildlife habitat in agricultural areas. Under the CRP, the landowner enters into an agreement to restore or protect lands for a 10-year or longer period in return for cash payments or assistance in making conservation improvements.

Working Lands Initiative

Purchase of Development Rights (PDR) and Purchase of Agricultural Conservation Easements (PACE)

PDR or PACE programs are growing as an important tool in protecting important farmland and the right to farm for generations to come, which uses a legal agreement called a conservation easement. A conservation easement is a voluntary legal agreement between a landowner and a private land trust/qualified conservation organization or government entity, which limits current and future uses of the land in order to protect specific ecological, scenic, recreational, historic, agricultural, or forestry values that provide long-term public benefits. Commonly, agricultural easements remove most, if not all, development rights from the land and prohibit future uses that would interfere with a viable agricultural enterprise. They are written to include a land management plan and the protection of natural resources on the property. PDR programs are a growing trend in Wisconsin, and a primary goal of the Wisconsin Working Lands Initiative, that directly compensates landowners for their participation. Another variation, Agricultural Conservation Easements, may be donated rather than sold (or both partially donated and compensated) with certain tax implications that may benefit the landowner, such as federal income tax incentives, estate taxes, and possibly property taxes. Easements are individually crafted to reflect the landowner and easement holder's goals. Since an easement is legally recorded and attached to the deed, future owners are bound by its terms in perpetuity. The conservation organization or government body that holds the easement monitors and enforces its terms to ensure compliance. Private lands protected by conservation easements stay on the tax rolls and remain privately owned and managed.

Agriculture Enterprise Areas (AEA)

Agricultural Enterprise Areas are a way to voluntarily identify and protect critical areas of working lands. These programs:

- Encourage farmers and local governments to invest in agriculture,
- Establish large areas of contiguous land primarily in agricultural use; reduce land use conflicts,
- Increase income tax credits for program participants, and
- Ensure compliance with state soil and water conservation standards,

The program is aimed at protecting viable and productive working lands including agricultural and forested land, by creating these AEA.

Land Evaluation-Site Assessment Tool (LESA)
In 2004, the County Planning & Resources Department worked with a private consultant, EarthTech, to develop an individualized Land Evaluation-Site Assessment Tool for farmland in Sheboygan County. The LESA was developed by the Natural Resources Conservation Service (previously known as the Soil Conservation Service) in the 1980s as a tool for local governments to rate the agricultural lands in their community for use when making land use decisions. Sheboygan County used the model developed by the NRCS and the results from a similar exercise conducted by Saint Croix County to develop its own LESA.

The LESA has two components, a Land Evaluation component and a Site Assessment component. Only the Land Evaluation component is in a form that can easily be used; the Site Assessment tool needs additional modification before its usefulness can truly be utilized. The Land Evaluation component was developed for *Sheboygan County's Farmland Preservation Plan-2005*.

The Land Evaluation (LE) component uses three criteria for developing a score for the land in relation to its agricultural use. The score is parcel-based and uses the NRCS soil data that Sheboygan County has in digital format. Because of the digital nature of the datasets that were used in this process, it was easy to filter the information through a Geographic Information System (GIS) to conduct the analysis. The three criteria that were used for the LE scores were Prime Farmland Class Index, Land Capability Class Index-Improved Condition Index, and the Productivity Index. Included in the LE score is a weighting factor that was applied to each of the three criteria to reflect their importance in the overall score as follows:

- Prime Farmland- 15%
- Capability Class- 30%
- Productivity Index- 55%

To calculate the LE score, the three criteria are weighted for the soils on a parcel and the LE score for each parcel ranges from 0 to 100.

Map 2-18 shows the Land Evaluation Score for the entire County. The second component of the LESA is the Site Assessment (SA) tool. The SA factors take into account socio-economic factors such as contiguous ownership, adjacent land use, land use policy, distance to public sewer, and the proximity to roads and the classification of the nearest road. This component is much more subjective and requires significant input from the local communities and stakeholder groups to assign values and weighting factors to each of the criteria. The SA for Sheboygan County is still preliminary and a technical committee will need to be formed to finalize the scores. For more information on the development of the LE scores see Appendix 6.

Farm Size and Numbers
According to the 2002 Census of Agriculture, there were 1,116 operating farms in Sheboygan County, of which 230 were dairy farms. The Census of Agriculture defines a farm as anything that sells over $1,000 of commodities in a year. Over 80 percent of farms in Sheboygan County

[Map 2-18: Farmland Agricultural Suitability Land Evaluation Score]

are between 10 and 500 acres. Table 2-6 shows the breakdown of farm size. Only a little over 2 percent of all farms in the County were over 1,000 acres in 2002. There were only 15 farms over 1,000 acres in the 1997 Census of Agriculture. Besides dairy farms there are also beef, poultry, hogs and pigs, sheep and lamb, mink, vegetable, fruit, crops, and many other types of farms in Sheboygan County.

The Agriculture Census found that there was 195,248 acres in farms in 2002, with the average size of the farm being 175 acres. The average farm size in the State was 203 acres in 2006. This means that Sheboygan County's farms on average are slightly smaller than the average for the State. According to the 2008 assessments for the municipalities in Sheboygan County, there was 165,149 acres of land assessed as agricultural lands (See Table 2-7). This land had a value of over $27,000,000. The 165,149 acres of land assessed as agricultural seems to support the trend of a decline in agricultural lands. The Town of Holland has the largest number of assessed acres in agriculture. It is important to remember that assessed agriculture is different than the number of acres in the farm. Some land could be included in farm size, but be assessed as a different type of land.

Table 2-5: Farm Size, 2002

Farm Size*	Number of Farms	Percent of Total
1 to 9 acres	117	10.5%
10 to 49 acres	340	30.5%
50 to 179 acres	320	28.7%
180 to 499 acres	246	22.0%
500 to 999 acres	67	6.0%
1,000 acres or more	26	2.3%
Total	1,116	100%

Source: U.S. Agricultural Census, 2002 * Farms by size is defined as all farms classified into size groups according to the total land area in the farm. The land area of a farm is an operating unit concept and includes land owned and operated as well as land rented from others. Land rented to or assigned to a tenant was considered part of the tenant's farm and not part of the owner's.

Wisconsin also ranks number one in production of mink pelts. In 2007, the State of Wisconsin mink farms produced over 914,000 pelts. In 2007, there were eight mink farms in the County, including the largest in North America. These mink farms sold about 230,000 pelts in 2007.

Table 2-6: Assessed Agricultural Lands, Sheboygan County's 2008

Municipality	Total Parcels	Total Acreage	Land value*	Total Value
T GREENBUSH	520	11477.64	$1,440,800	$1,440,800
T HERMAN	734	16087.16	$2,409,400	$2,409,400
T HOLLAND	918	18282.57	$2,976,200	$2,976,200
T LIMA	788	16770.69	$2,907,300	$2,907,300
T LYNDON	537	11638.71	$2,230,800	$2,230,800
T MITCHELL	384	7963.74	$1,315,300	$1,315,300
T MOSEL	442	8933.22	$1,365,000	$1,365,000
T PLYMOUTH	428	8573.94	$1,510,800	$1,510,800
T RHINE	436	8766.50	$1,268,100	$1,268,100

Municipality	Total Parcels	Total Acreage	Land value*	Total Value
T RUSSELL	265	6206.63	$880,100	$880,100
T SCOTT	611	12620.00	$2,402,400	$2,402,400
T SHEBOYGAN	86	1327.81	$178,100	$178,100
T SHEBOYGAN FALLS	631	12795.75	$2,262,600	$2,262,600
T SHERMAN	577	12777.71	$2,013,200	$2,013,200
T WILSON	363	7335.19	$1,254,800	$1,254,800
V ADELL	3	38.00	$4,600	$4,600
V CASCADE	12	78.60	$15,700	$15,700
V CEDAR GROVE	24	459.48	$62,300	$62,300
V ELKHART LAKE	1	48.03	$9,200	$9,200
V GLENBEULAH	8	158.10	$22,800	$22,800
V HOWARDS GROVE	25	161.76	$31,800	$31,800
V KOHLER	46	1245.30	$224,100	$224,100
V OOSTBURG	13	231.55	$41,400	$41,400
V RANDOM LAKE	15	216.61	$25,800	$25,800
V WALDO	16	269.10	$35,900	$35,900
C PLYMOUTH	4	92.47	$17,400	$17,400
C SHEBOYGAN	11	0.00	$42,100	$42,100
C SHEBOYGAN FALLS	27	592.51	$94,400	$94,400
SHEB. COUNTY TOTALS	**7,925**	**165,149**	**$27,042,400**	**$27,042,400**

Source: Sheboygan County Real Property Listing Office *This is only the assessed value of the land and not the true value of the land because agricultural lands are assessed at between $150-$175 dollars an acres, but sell for between $3,000 and $4,000. If you take the number of acres of farmland multiplied by $3,500 per acre the land would have a value of over $578,000,000.

Concentrated Animal Feeding Operations

Every farm, regardless of size, is responsible for proper manure management to protect water quality from discharges. Over the past ten years, Wisconsin has become home to an increasing number of Concentrated Animal Feeding Operations (CAFOs), those operations with 1,000 or more animal units. Due to the increased number and concentration of animals, it is particularly important for these facilities to properly manage manure in order to protect water quality in Wisconsin.

A specific regulatory program for the handling, storage, and utilization of manure was developed by the DNR in 1984 in NR 243of the Wisconsin Administrative Code. The rule creates criteria and standards to be used in issuing permits to CAFOs as well as establishing procedures for investigating water quality problems caused by smaller animal feeding operations. Because of the potential water quality impacts from CAFOs, animal feeding operations with 1,000 animal units or more are required to have a Wisconsin Pollutant Discharge Elimination System (WPDES) Concentrated Animal Feeding Operation permit. These permits are designed to ensure that operations choosing to expand to 1,000 animal units or more use proper planning, construction, and manure management to protect water quality from adverse impacts. Animal units are calculated for each different type and size class of livestock and poultry. For instance, 710 milking and dry cows count as 1,000 animal units, but 2,500 pigs over 55 pounds is equal to 1,000 animal units. A more detailed breakdown of the number of animals equal to 1,000 animal units can be obtained from the WDNR.

For new or expanding operations, a permit application must be submitted at least 12 months before an operator expects to reach 1,000 animal units or more. It is essential that operators contact the WDNR early on in the expansion planning process. This ensures that WDNR review of regulated structures is completed prior to construction, that permitting concerns can be addressed as part of the planning process, and that the WPDES permit is issued before the operation expands beyond 1,000 animal units. It is the responsibility of the owner to request an application from the WDNR.

Sheboygan County has three CAFOs. They are located in the Towns of Lima, Russell, and Sherman. Two of the CAFOs have less than 1200 animal units; whereas, one of the CAFOs is scheduled to have over 2700 animal units by 2013, over doubling in size from 2008. All of Sheboygan County's CAFOs that have WPDES permits are all dairy cattle operations.

Hobby Farms

A hobby farm is a small farm that is maintained without expectation of being a primary source of income. Some are merely to provide some recreational land, and perhaps a few horses for the family's children, others are managed as working farms for side income, or are run at an ongoing loss as a lifestyle choice by people with the means to do so. While there is no firm data on the number of hobby farms, it is known that the number of hobby farms has been increasing. According to the UW-Extension Sheboygan County Agriculture staff, it can be estimated that most farms less than 100 acres would be classified as hobby farms, this would mean that Sheboygan County has about 600 farms that would be classified as hobby farms.

Community Supported Agriculture

Community Supported Agriculture (CSA) is like having your own personal farmer. In a CSA, you become a member of a local farm by purchasing a "share" in that farm. In return, you receive weekly deliveries of fresh produce throughout the growing season, typically late May to November. CSA's grow their food in ways that enhance the life above and beyond the soil by eliminating pesticides that can kill micro- and megafauna and –flora, and reducing the use of fossil fuel as an energy source because all CSA farms are local so food only travels a short distance from the field to the kitchen.

In 2008, a CSA's share typically averaged $15 to $20 a week. A shareholder pays up front for the entire season, which averages between 19 and 27 weeks a year, depending on the farm. Some farms offer "worker shares" exchanging work for a share of the produce. Each CSA provides a variety of fruit and vegetables, while some may even offer eggs, meats, and other products at an extra cost.

In 2008, there were at least five CSA's within Sheboygan County, and two of these opened within the last year. As people lean towards buying local, organic, fresh foods, they have been turning to CSA's.

Farm Household Demographics

In 2002, there were a total of 1,729 total farm operators. Of these, 1,116 are principal operators of the farms. In 2002, the principal operator had an average of 20.2 years on the present farm, while the average age of the principal operator is 51.4 years of age. Family or individual farm ownership make up the greatest number of farms with 984 farms falling into this category.

Environmental Impacts of Agriculture

Sheboygan County farmers own and manage the resources on about 195,000 acres of land-35.2 percent of all land in the County. This includes pastures, cropland, woods and forests. Farmers implement various conservation practices to protect environmental resources and provide habitat for wildlife. A CAFO or large-scale farming operation is defined by federal and state statute as a facility that contains 1,000 animal units. As stated before, CAFOs are required to have a Wisconsin Pollution Discharge Elimination System (WPDES) permit. These farms are regulated under the Federal Clean Water Act and state water law because of their potential to negatively impact water resources. The WPDES permit regulates where and how much waste can be spread on fields, how the waste is temporarily stored in lagoons, and the design of a permanent runoff control system.

Due to the passage of 1997 Wisconsin Act 7 and 1999 Wisconsin Act 9, there were new regulations and rules that need to be implemented by the. Sheboygan County Land and Water Conservation Department (LWCD). The LWCD was given the authority of implementing NR 151, a runoff management administrative rule. This law sets new performance standards for farms to prevent runoff and protect water quality. This regulation states: all cropped fields must meet the tolerable soil erosion rate established for that soil type, all manure storage facilities must be constructed, maintained, or abandoned with accepted standards, there must be clean water diversions, agricultural operations applying nutrients to agricultural fields must do so according to a nutrient management plan, and manure management prohibitions must be followed.

The companion rule to go with the WDNR's runoff rules is ATCP (Agriculture, Trade, and Consumer Protection) 50, which is promulgated by the Department of Agriculture, Trade, and Consumer Protection (DATCP). ATCP 50 identifies the conservation practices that farmers must follow to meet the WDNR standards. ATCP 50 establishes: the standards for the nutrient management plans, guidelines for DATCP approval of county land and water resource management (LWRM) plans, the allocation of DATCP funds for county implementation of LWRM plans, the use of the DATCP funds to pay for county staff and landowner cost-sharing, local regulation including cost-sharing requirements to enforce performance standards, and practices cost-shared by DATCP and WDNR.

Sheboygan County's LWCD is responsible for implementing the nonpoint source pollution regulations at the local level. The LWCD developed the Land and Water Resource Management Plan. This Plan sets forth the way the County will implement the rules set forth by the DATCP, in particular this plan developed goals and the first being to reduce the sediment and phosphorus loadings that degrade the water quality of Sheboygan County. Many of the goals require involvement from farmers, as well as other agencies, and community groups. Some programs that LWCD implements provide cost-sharing, so that people are able to come into compliance with the regulations and rules. These programs help to improve the environment and water quality of Sheboygan County. This Plan was developed by the LWCD and then approved by the DATCP in 2004, in response to ATCP 50.

The LWCD has created a Vegetated Buffer Strip Program. This program is administered by the LWCD. The goal of the Buffer Strip Program is to install vegetated buffers along all the streams

classified as navigable under the County's Shoreland and Floodplain Ordinance. This program will help to reduce the soil erosion that occurs during rain events. Participation in the program is voluntary, but County cost-sharing funds are being provided as a conservation incentive to landowners for planting these buffer strips. The amount of payment per acre and the length of the required maintenance period varies between three different buffer options the landowner can choose to build. Since the program began, 288 tons of sediment was saved from being washed away and over 30 miles of linear feet of buffer strips have been installed. There are 63 landowners participating in this program and about 178 acres are located in these buffer strips.

Sheboygan County is also part of the North Branch Milwaukee River Wildlife and Farming Heritage Area. This area is encompasses river and stream corridors, large wetland complexes, agricultural lands, and three small lakes. The core area of wetlands and agricultural lands make up 16,549 acres and corridors along five tributary streams make up an additional 2,938 acres. The entire study area lies within the Milwaukee River basin in northeastern Washington, northwestern Ozaukee, and southwestern Sheboygan counties. The DNR, Ozaukee Washington Land Trust, and Glacial Lakes Conservancy are using a variety of real estate tools, including fee title, donated conservation easements, and purchase of development rights (PDR) in this region with willing landowners to protect agricultural lands, wetlands, forests, and other natural resources in order to maintain farming as a viable land use in one of the largest blocks of open space remaining in southeastern Wisconsin, and to protect the water quality of the Milwaukee River.

Sheboygan County's LWCD is in charge of regulating the Sheboygan County Animal Waste Storage Ordinance (AWSO) (Chapter 77) enacted in August of 1996. The purpose of the AWSO is to assure the safe handling and spreading of animal waste, as well as to regulate the location, design, construction, alteration, operations, and maintenance of all animal feeding operations and livestock waste storage facilities; to regulate the abandonment of livestock waste storage facilities in order to prevent water pollution; protect the health and safety of residents and transients; and to prevent the spread of disease. This ordinance helps the LWCD to achieve their goal of controlling animal waste runoff.

Forest lands are also very important as they capture carbon and are a renewable resource. They provide clean water, clean air, erosion control, wildlife habitat, and sanctuaries for hundreds of species of rare plants and animals and natural communities.

Economic Impacts of Agriculture

According to the "Sheboygan County Agriculture: Value and economic impact," Sheboygan County agriculture generates more than $1.74 billion in economic activity. This accounts for 21 percent of Sheboygan County's total economic activity. Every dollar of sales of agricultural products generates an additional $0.31 of economic activity in other parts of Sheboygan County's economy.

Sheboygan County agriculture provides 9,399 jobs, which include owners, on-farm employees, veterinarians, crop and livestock consultants, feed and fuel suppliers, food processors, farm machinery manufacturing and sales, barn builders, and many others. Every new job in agriculture in the County generates one additional job in the County. Agriculture is economically vital to the County.

Agriculture also generates $485.2 million of Sheboygan County's total income. This includes wages, salaries, benefits, and profits of farmers and workers in agriculture-related businesses. Every dollar of agricultural income generates an additional $.73 of county income.

Dairy is Sheboygan County's largest sector of agriculture. Sheboygan County milk and dairy producers and the dairy industry contribute $1.14 billion to the County's economy. One dairy cow generates $2,148 in direct income to producers. In 2002 it was thought there were over 25,600 dairy cows in the County. Each of these cows generates $15,000 to $17,000 of economic activity. Twelve plants in Sheboygan County process dairy products. This means this industry affects a lot more than just the farmers. Milk is the tope commodity in Sheboygan County. Table 2-7 provides the top commodities (sales by dollar value, 2002) for Sheboygan County.

Table 2-7: Sheboygan County's Top Commodities

Commodity	Sales by Dollar Value, 2002 (in millions)
Milk	$58.7
Cattle & Calves	$15
Grain	$13.9
Other animals & products	$7.3
Vegetables	$3.0

Source: "Sheboygan County Agriculture: Value and Economic Impact", 2004

Not only do the farms generate income and jobs for the County they also generate nearly $44.2 million in local and state taxes. Farms and agriculture-related businesses generate $11 million in income tax, $10.6 million in sales tax, and $12.9 million in property taxes.

According to the 2007 Census on Agriculture, mink farms recorded a record amount of sales, generating $74 million in pelt and animal sales, which is the second highest amount in the State and fourth highest in the nation.

Agriculture Related Infrastructure and Operations

Sheboygan County's agriculture industry makes a larger impact to the County than just producing milk or livestock. The agriculture industry needs infrastructure to operate, which in turn, provides economic opportunities for other businesses. Farmers need: machinery to work their fields, seeds to plant, fertilizer to buy, places to store grain, places to send their milk and meat for processing, veterinarians to check on animals, etc.; this is where many other industries and jobs are related to agriculture.

Feed Mills, Agricultural Cooperatives, Grain Storage, and Implement Dealers

Sheboygan County is home to a few feed mills, agricultural cooperatives, and grain storage availability. An agricultural cooperative aggregate purchases, storage, and distribution of farm inputs for their members. By taking advantage of volume discounts and utilizing other economies of scale, supply cooperatives bring down the cost of the inputs that the members purchase from the cooperative compared with direct purchases from commercial suppliers. Supply cooperatives provide inputs required for agricultural production including seeds,

fertilizers, chemicals, fuel, and farm machinery. Some supply cooperatives operate machinery pools that provide mechanical field services (e.g., plowing, harvesting) to their members. There are also two places that allow for grain storage in the County. This is a necessity for farmers and will continue to be in the future. For those farmers do not use cooperatives for their equipment, many purchase equipment through a variety of local implement dealers. These dealers sell a variety of products to help in the farming operations.

Processing Dairy, Meat Products, and Canning Companies

Two of the top ten large employers in Sheboygan County rely on agriculture for their operations. Sargento and Johnsonville Sausages are two of the largest employers in the County, and both rely on agriculture for their business. Sheboygan County has several other cheese making and cheese packaging companies, as well as, meat and meat processing companies. These are located throughout Sheboygan County. Random Lake is also home to a cannery. This is becoming less common throughout the state and is another business that is supported through agriculture.

Other Agriculture-Supported Businesses

Some other businesses that are supported through agriculture are veterinarians, agronomists, grocery stores, irrigators, forest product and business industries, including log homes. All of these business and jobs are partially or wholly supported through agriculture and its related products.

It will be important for Sheboygan County's future to make sure that both the farmers and their related services and operations are available in the County. These industries rely on one another and without one, the other may fail.

Agricultural Organizations and Programs in Sheboygan County

Wisconsin and Sheboygan County Farm Bureau Federation

The Wisconsin Farm Bureau Federation is the state's largest general farm organization representing the needs and interests of all farmers for all commodities. There are 43,000 member families that belong to the Wisconsin Farm Bureau. Voting Farm Bureau members (farmers) annually set the policy the organization follows, and are involved in local, state and national affairs making it a true grassroots organization. Members belong to one of 61 county Farm Bureaus, all run by farmer board of directors. Sheboygan County's Farm Bureau is involved in a variety of legislative and promotional activities. People join the Farm Bureau to support legislative and public relations efforts, to qualify for member benefits, to support farming families of Wisconsin. Sheboygan County's Farm Bureau mails a newsletter to members every other month to keep members informed. The board of directors also holds monthly meetings.

U.S. Department of Agriculture Farm Service Agency (FSA)

The Farm Service Agency (FSA) administers and manages farm commodity, credit, conservation, disaster and loan programs as laid out by Congress through a network of federal, state and county offices. These programs are designed to improve the economic stability of the agricultural industry and to help farmers adjust production to meet demand. Economically, the desired result of these programs is a steady price range for agricultural commodities for both farmers and consumers. The FSA County Office is located in Sheboygan Falls on Forest Avenue. In 2006, farmers received $5,576,723 in farm subsidies, of which $5,389,468 was related to farm programs and the rest related to conservation programs.

National Farmers Organization (NFO)

The National Farmers Organization has a primary goal of better prices for farm commodities. Across the country, National Farmers combines commodities from farms, and then NFO's marketing professionals go to work for the farmers, negotiating with major agricultural industry buyers to improve farmers bottom line.

Green Tier

Wisconsin's Green Tier program rewards regulated and un-regulated businesses, communities and trade associations aspiring to deliver superior environmental performance. The law provides tools that allow for a transition from just compliance minimums to performance recognition systems. Green Tier uses collaborative, proactive relationships to find creative solutions to further protect, improve, and restore Wisconsin's environment while building business value and recognition.

CULTURAL RESOURCES

Historic and Archeological Sites

Portions of Sheboygan County have been inhabited by Native Americans for several thousand years, and since the 1700s by European Settlers. In recent years, Hispanics, Laotians, and other ethnic groups have moved to Sheboygan County. This continues to add to the area's ethnic diversity. Subsequently, there are many buildings of historical importance within the region. For this plan, historic districts on the state and/or national registry have been identified in *Sheboygan County's Natural Areas and Critical Resources Plan,* Appendix C-State of Wisconsin Historical Society Database Results for Sheboygan County. In 2004's *Natural Areas and Critical Resources Pla*n the Cultural Resources Committee identified important cultural resources in the following categories shown in Table 2-10. *Sheboygan County's Natural Areas and Critical Resources Plan* developed a vision for cultural and historic resources in Sheboygan County through the year 2020. This vision is "In 2020, Sheboygan County embraces a climate for cultural and historic resources that promotes a healthy economy and a high quality of life for all residents and visitors. The County promotes sound land use decisions that minimize negative impacts on these resources, considers long-term consequences, is suitable for a location, accounts for community costs, results from a broad public consensus, and is consistent with the community and regional character."

An inventory of these cultural resources can be found in *Sheboygan County's Natural Areas and Critical Resources Plan,* Appendix B-Cultural Resources Inventory. Some of these cultural resources include: the All Saints Chapel in the Town of Rhine; the Random Lake Ice Company; Henschel's Indian Museum; the old resorts in Elkhart Lake; Plymouth, Sheboygan, and Elkhart Lake Railroad Depots; old school houses all around the County; and many other cultural resources.

Table 2-10: Categories of Cultural Resources Inventory

Archaeological Sites	Libraries
Arts (galleries/museums, murals)	Lighthouses
Barns	Meat Markets ("old fashioned")
Bridges	Native Sites
Cemeteries	Old Hotels
Century Farms	Railroad
Cheese Factories	Railroad Depots
Churches (old)	Restaurants
Ethnic Events (Holland Fest, Greek Fest)	Road America
Feed Mills	Roads
Forests (kettle forest in Elkhart Lake)	Settlement Patterns
Government Buildings	Schools, education, parks (e.g. Marsh)
Historical Event/People	Streets (brick)
Ice Industry	Stores (e.g. corner stores)
Inter-Urban Rail Line (resort-town culture, influence on the communities)	Wade House Historic Site

Sheboygan County is home to 41 places on the National Historical Registry. Care should be taken when excavation is done within Sheboygan County, since there is the possibility of disturbing a site of cultural or archeological significance. Table 2-11 provides a listing of all of the places in Sheboygan County on the National Historic Register.

Table 2-11: Sheboygan County Places on the National Historic Register

Landmark name	Date listed	Location	City or Town
American Club	May 22, 1978	High St.	Kohler
John Balzer Wagon Works Complex	December 23, 1993	818-820, 820A Pennsylvania Ave.	Sheboygan
Thomas M. and Bridget Blackstock House	March 17, 1995	507 Washington Ct.	Sheboygan
Cole Historic District	December 01, 1988	501 and 517 Monroe St. and 504, 508, and 516-518 Water St.	Sheboygan Falls
Downtown Historic District	December 27, 1984	Roughly bounded by Broadway, Monroe, Pine, and Buffalo Sts., and the Sheboygan River	Sheboygan Falls
Elkhart Lake Road Race Circuits	February 17, 2006	Cty Hwys, J, P, JP, A, and Lake St.	Elkhart Lake
Foeste, Henry Store Building	September 01, 1995	522 S. Eighth St.	Sheboygan
Franklin Feed Mill	April 11, 1985	Franklin Rd.	Franklin
Friendship House	July 10, 1974	721 Ontario Ave.	Sheboygan
Garton Toy Company	May 11, 2000	746, 810, 830 N. Water St., 1104 Wisconsin Ave.	Sheboygan
Glenbeulah Mill/Grist Mill	December 27, 1984	Gardner St.	Glenbeulah
Gooseville Mill/Grist Mill	December 27, 1984	Silver Creek-Cascade Rd.	Adell

Landmark name	Date listed	Location	City or Town
HETTY TAYLOR (shipwreck)	June 01, 2005	Lake Michigan, 7 mi. SE of Sheboygan R.	Sheboygan
Hotel Laack	December 02, 1985	52 Stafford St.	Plymouth
Henry H. Huson House and Water Tower	November 28, 1980	405 Collins St.	Plymouth
Henry and Charles Imig Block	July 09, 1998	625-629 N. Eighth St.	Sheboygan
Jung Carriage Factory	July 10, 1974	829-835 Pennsylvania Ave.	Sheboygan
Jung Shoe Manufacturing Company Factory	January 22, 1992	620 S. Eighth St.	Sheboygan
Kletzien Mound Group (47-SB-61)	July 23, 1981	Address Restricted	Sheboygan
Kohler Company Factory Complex	April 06, 2001	444 Highland Dr.	Kohler
John Michael Kohler House	November 30, 1982	608 New York Ave.	Sheboygan
Mission House Historic District	December 20, 1984	County Trunk M	Herman
Onion River Flouring Mill/Grist Mill	December 27, 1984	Hwy 57	Waldo
Plymouth Post Office	October 24, 2000	302 E. Main St.	Plymouth
Riverbend	December 04, 1980	Lower Falls Rd.	Kohler
Charles Robinson House	December 20, 1984	Center St., Old Wade House State Park	Greenbush
Robinson-Herrling Sawmill	December 27, 1984	Old Wade House State Park	Greenbush
Henry and Henriette Roth House	April 29, 1993	822 Niagara Ave.	Sheboygan
Sheboygan County Courthouse	March 12, 1982	615 N. 6th St.	Sheboygan
Sheboygan Post Office	October 24, 2000	522 N. Ninth St.	Sheboygan
Sheboygan Theater	December 22, 1999	826 N. Eighth St.	Sheboygan
St. Patrick's Roman Catholic Church	September 08, 1983	WI 1	Adell
David Taylor House	January 02, 1976	3110 Erie Ave.	Sheboygan
Third Ward School	September 03, 1981	1208 S. 8th St.	Sheboygan
I. C. Thomas Drug Store	July 10, 1974	632 N. 8th St.	Sheboygan
USS Edson (DD-946)	1990		Sheboygan
Villa Laun	January 28, 1982	402 Lake Side Park Dr.	Elkhart Lake
Villa Von Baumbach	November 30, 1982	754 Elkhart Lake Dr.	Elkhart Lake
Sylvanus Wade House	October 26, 1971	At jct. of WI 23 and Kettle Moraine Dr. in Old Wade House State Park	Greenbush
Windway	July 28, 1988	CTH Y, N of CTH O	Sheboygan
Wolff-Jung Company Shoe Factory	January 30, 1992	531 S. Eighth St.	Sheboygan

Source: National Parks Service, National Register of Historic Places

Sheboygan County has several museums of particular interest. The first is the *Sheboygan County Museum* which features a complex of historical buildings built in the 19th Century as well

as temporary exhibits that exemplify the historical significance of the area. The museum's mission is the discovery, collection and preservation of information, records and objects relating to the history of the county of Sheboygan and the dissemination of knowledge concerning the same.

Another museum is the *John Michael Kohler Arts Center* was established in 1967 with the intent to encourage and support study in the arts and to promote exchange between a national community of artists and a broad public to realize the significance of art. The center supports a wide variety of educational programs, artistic displays, and performing arts productions.

Wade House Stagecoach Inn & Wesley Jung Carriage Museum includes eight historical buildings, nature trails, picnic areas, famous carriage collection & museum, all in a designated National and State Historic Site. The Wades were the first permanent settlers in Greenbush. They chose a place halfway between Sheboygan and Fond du Lac along a well-used stagecoach trail. The Mullet River crossed the trail, offering a promising source of water power. The Wade's purchased several sections of land around a potential mill site as well. The Wade House was used as an inn until 1910, but with the railroad bypassing Greenbush, the inn no longer became necessary. The Kohler Family restored the Wade House in the 1950s and in 1963 the Wisconsin Legislature voted to create a permanent home for the carriage collection of Wesley W. Jung, grandson of a Sheboygan carriage maker, at the Wade House site.

The *Sheboygan County Historical Research Center* specializes in the preservation and storage of written records of all of Sheboygan County and the surrounding area. It is a private, non-profit archive that funds itself primarily by memberships and donations. Information that can be found here include birth, death, and marriage information, township records, immigrant information, church records, land records, and many other pieces of history of Sheboygan County.

Historic Districts

There are four main historic districts within the County.

Cole Historic District, City of Sheboygan Falls was listed in the State and National register on December 1, 1988. It is situated on about an acre and consists of 5 commercial and domestic dwellings in Greek Revival and other styles from the period between 1837-1867. This district is home to the Sheboygan County Historical Research Center which is housed in the Mill House, the oldest building in Sheboygan County. The Mill House is a two-story, wood frame Greek Revival building with a side-gabled roof and returned eaves, that rests on a limestone foundation. It was built in 1837 by the Rochester Lumber Company for boarding their workers, it also served as the first home for early settlers in the county, accommodating their families until they could build their own homes. Charles Cole purchased the structure in 1860 for two of his sons. A wall was built through the middle of the house, dividing it exactly in half. Called the double or "mirror" house by local residents, the house remained a two-family home until the late 1960, when it was remodeled into a four family apartment house.

Downtown Historic District, City of Sheboygan Falls was listed in the State and National Register on December 27, 1984. It is situated on 65 acres consisting of over 30 buildings in later Victorian, 19th and 20th Century Revivals and other styles from the period between 1885 and 1928.

Mission House Historic District, Lakeland College, Town of Herman was listed in the State and National Register on December 20, 1984. It is situated on 100 acres and consists of 5 buildings in Colonial Revival, Classical Revival and late Gothic Revival from the period between 1879 and 1934.

Downtown Churches Historic District, City of Sheboygan, was listed as a State Historic Register in 2009, making it the first historic district in the City of Sheboygan. This district is bordered by Erie Avenue, Ontario Avenue and Sixth and Seventh Streets. There are four churches in this square block including: Grace Episcopal Church, St. Mark's Lutheran Church, Hope Reformed Church, and St. Luke's Methodist Church.

The *City of Sheboygan, Wisconsin Architectural and Historical Intensive Survey Repor*t, prepared in 2002 by LJM Architects for the City of Sheboygan is a valuable resource for identifying potential historic resources in the City of Sheboygan.

Community Design

Community design as a cultural resource helps explain the origins and history of how a given community looks, feels, and functions in the present day. Components of the origin of community design to include historic settlement patterns, resource use (like mining, farming, and forestry) in rural areas, the industries and businesses that influence urban areas, transportation features and traffic flow patterns, natural features like rivers, lakes, and wetlands, and the heritage and values of the people that lived in a community in the past and that live there today.

These factors might be expressed through street layout, building architecture, landscaping, preservation of natural features, development density, highway entryways, and other components of development design. The design of a community as seen today might also be influenced by community decisions including the use of zoning and subdivision controls, the establishment of parks and other community facilities, the use of historic preservation, and in some cases, the use of land use planning. Each municipality within Sheboygan County has its own unique community design, so when all municipalities are taken together, they make up the community design of Sheboygan County.

SUMMARY

Sheboygan County has a diverse amount of natural resources. Lake Michigan and other surface water features make this area unique. These areas should be protected and preserved. The air quality standard for 8-hour ozone levels in the County is above EPA standards. The County shall work with other governmental entities in order to work to reduce the ozone levels.

The County also has unique land features because of the glacial landforms that occur in the western portion of the County. There are kames, kettles, bogs, and a kettle lake within the County. Many of these landscapes are located in the Kettle Moraine State Forest-Northern Unit.

Agriculture also plays an important role not only with land use, but in the local economy, where it generates $1.74 billion in economic activity. Some agriculture land is used for development, but land use conflicts can occur if development is not planned properly.

Cultural and historical resources play a role in taking a glimpse into Sheboygan County's past. These sites are important because they help show the cultural and economic effect various immigrants had on the community.

It will be vital for the future of Sheboygan County that natural, agricultural, and cultural resources be protected and preserved as development occurs that may impact these resources. Policies and programs shall be developed in a way that allows these resources and development to coexist.

NATURAL, AGRICULTURAL, AND CULTURAL RESOURCES STRATEGY AND RECOMMENDATIONS

Sheboygan County will seek direction for this element from various forms of public input such as the survey that was sent to County residents and the input from the Smart Growth Implementation Committee.

Vision

"Sheboygan County envisions the Smart Growth Plan to be a living document responsive to the changing needs of its citizens and fostering intergovernmental cooperation through reference to a compilation of local land use plans.

From Lake Michigan to the Kettles, from the cities to the farms, our County has a rich heritage. We enjoy an attractive combination of rural, urban, and semi-urban areas. Our unique location provides many opportunities for employment, housing, education, recreation, transportation, or agri-business.

The Smart Growth Plan will promote balanced development with the preservation and protection of our natural, scenic, agricultural, economic, and cultural resources. Through the Smart Growth Plan, we will retain our character and unique identity, while enhancing the quality of life for all citizens in the County."

Natural Resource Goals, Objectives, Policies, and Programs

Water Resources

Groundwater

Goal 1: Protect, enhance, and restore groundwater quality and quantity in Sheboygan County.

Objective: Protect both public and private drinking water supplies.

Policy/Program: Work with appropriate partners to complete a study to determine the County's groundwater recharge areas.

Policy/Program: Develop a program to protect the groundwater recharge areas.

Policy/Program: Promote groundwater infiltration in areas associated with natural groundwater recharge by minimizing impermeable areas and promoting wetland creations, enhancements, and restorations.

Policy/Program: Continue to monitor private drinking water supplies through voluntary testing by the UW-Extension, and where feasible look to have a water testing lab at UW-Sheboygan.

Policy/Program: Continue to monitor public drinking water supplies, in accordance with state and federal laws.

Policy/Program: Continue to identify unused wells and then promote the proper abandonment of wells through the County Land and Water Conservation Department's abandoned well program.

Policy/Program: Support land use patterns and water quality control facilities, programs, and operational improvements, including non-point pollution controls and sewage and stormwater management systems, to protect groundwater quality.

Policy/Program: Continue to implement the County Sanitary Regulations, Chapter 70 of the Sheboygan County Code of Ordinances, which includes regulation of private onsite waste treatment systems (POWTS).

Policy/Program: Promote groundwater supply planning at a regional level.

Surface Water

Goal 2: Identify, protect, and restore valuable surface water resources in Sheboygan County.

Objective: Take a watershed approach to the management of water resources.

Policy/Program: Provide technical support and assistance to partners on watershed protection.

Policy/Program: Utilize plans from partnering agencies and organizations in the County's watershed planning efforts.

Objective: Encourage the protection of lakes, rivers, streams, and creeks in Sheboygan County.

Policy/Program: Continue to implement the Sheboygan County Shoreland-Wetland Ordinance, Chapter 72 of the Sheboygan County Code of Ordinances.

Policy/Program: Continue to provide the Water Quality Improvement Program (the Buffer Strip Program), that create buffers along Sheboygan County's waterways.

Objective: Promote stormwater management measures that prevent non-point pollution in rural and urban areas.

Policy/Program: Continue to implement the Animal Waste Storage Facility Code, Chapter 77 of the Sheboygan County Code of Ordinances.

Policy/Program: Continue to implement the Erosion Control and Stormwater Management regulations, Chapter 75 of the Sheboygan County Code of Ordinances.

Policy/Program: Develop and maintain stormwater management plans at County facilities.

Policy/Program: Seek to work with and support municipalities on the management of stormwater structures.

Policy/Program: Encourage a watershed approach to stormwater management.

Policy/Program: Work towards compliance with State and Federal stormwater management requirements.

Policy/Program: Encourage partnerships for stormwater management.

Policy/Program: Continue education and outreach to inform the public about stormwater management projects.

Policy/Program: Promote stormwater Best Management Practices, including rain barrels, rain gardens, green roofs, porous pavement, infiltration basins, etc. in new and existing development areas.

Policy/Program: Apply for stormwater management and education grants.

Objective: Reduce sedimentation, pollution, and eutrophication of lakes, rivers, and streams in Sheboygan County.

Policy/Program: Develop and continue programs that address agricultural runoff, farming practices, and shoreland development as it relates to water quality impacts to surface waters in Sheboygan County.

Policy/Program: Limit the amount of salt used on County highways, to reduce salt runoff into surface waters.

Policy/Program: Collaborate with the WDNR and others to develop and distribute educational materials to the public regarding non-point and point source pollution, including the continuation of the Clean Water Partnership.

Policy/Program: Support the continuation of the County's Waste Pharmaceuticals and Hazardous Waste Collection Programs.

Policy/Program: Continue to implement the County Sanitary Regulations, Chapter 70 of the Sheboygan County Code of Ordinances, which includes regulation of private onsite waste treatment systems (POWTS).

Lake Michigan/Coastal Areas

Goal 3: Protect and enhance Lake Michigan and its coastal resources.

Objective: Encourage the protection of Lake Michigan's water quality and shoreline, including Lake Michigan bluffs, estuaries, dunes, habitat areas, floodplains, coastal wetlands, and natural areas.

Objective: Support the goals and objectives of the federal, state, and local Lake Michigan plans, such as the Great Lakes Regional Collaboration, Wisconsin's Great Lakes Restoration and Protection Strategy, and the EPA's Lake Michigan Lake Management Plan.

Policy/Program: Support the acquisition and restoration of the Amsterdam Dunes property.

Policy/Program: Support the protection and restoration of coastal wetland areas.

Policy/Program: Inventory and preserve environmental corridors in the "coastal corridor."

Policy/Program: Inventory and protect coastal areas that conserve the Lake Michigan flyway, the WDNR's Land Legacy Areas, and the natural communities of beaches and dunes.

Policy/Program: Encourage projects that provide public access to Lake Michigan.

Policy/Program: Provide educational opportunities for the public to gain a better understanding of their role in protecting Lake Michigan and measures to mitigate human impacts on the resource.

Policy/Program: Continue to provide technical assistance to landowners who build along the Lake Michigan coast, including educating landowners on the proper siting of septic systems, vegetative management of bluffs, and proper stormwater management to reduce impact on slope stability.

Policy/Program: Support restoration and delisting of the Sheboygan River Area of Concern, as defined by the International Joint Commission (IJC).

Policy/Program: Support programs that address runoff, farming practices, public works projects, construction, and shoreland development as it relates to water quality impacts to Lake Michigan.

Policy/Program: Continue to implement the Sheboygan County Shoreland-Wetland Ordinance, Chapter 72 of the Sheboygan County Code of Ordinances in coastal areas, including appropriate setbacks in bluff and dune areas.

Floodplains

Goal 4: Manage and protect floodplains in Sheboygan County.

Objective: Promote effective floodplain management programs.

Policy/Program: Provide technical resources to towns, homeowners, businesses, and institutions and raise awareness of the risks of floodplain development and the availability of mitigation and disaster assistance programs.

Policy/Program: Continue implement the Sheboygan County Floodplain Ordinance, Chapter 73 of the Sheboygan County Code of Ordinances.

Policy/Program: Develop a public educational program and distribute these materials to the public regarding floodplain management.

Policy/Program: Inform local insurance agents, real estate agents, builders, and lenders on who to contact regarding floodplain issues.

Objective: Strive to limit urban development in floodplains.

Policy/Program: Eliminate repetitive loss properties in Sheboygan County.

Objective: Continue to work with the U.S. Army Corps of Engineers and FEMA in numerous projects/programs.

Policy/Program: Update the floodplain maps periodically.

Wetlands

Goal 5: Identify, protect, and restore wetlands in Sheboygan County.

Objective: Encourage the protection and restoration of wetlands from destruction and degradation.

Policy/Program: Maintain an inventory of the County's wetlands, including those created for mitigation purposes.

Policy/Program: Continue to implement the Sheboygan County Shoreland-Wetland Ordinance, Chapter 72 of the Sheboygan County Code of Ordinances.

Policy/Program: Consider the development of new wetland setback requirements adjacent to all wetlands.

Policy/Program: Encourage development away from wetlands.

Policy/Program: Collaborate and cooperate with the NRCS, the WDNR, and the U.S. Fish and Wildlife Service to ensure classification and restoration of wetlands.

Air Quality

Goal 6: Improve and protect air quality in Sheboygan County.

Objective: Promote measures designed to improve air quality.

Policy/Program: Encourage development designs that promote walking, bicycling, and transit options.

Policy/Program: Continue to seek funding for the maintenance of non-motorized transportation facilities.

Policy/Program: Continue to cooperate with the EPA and WDNR to improve and protect air quality.

Policy/Program: Encourage municipalities to create Climate Action Plans.

Land Resources

Goals 7: Protect, enhance, and restore land resources.

Soils

Objective: Preserve soils in Sheboygan County.

Policy/Program: Encourage soil conservation practices to reduce erosion and protect water quality in the County.

Policy/Program: Implement strategies regarding soil sustainability and sedimentation as recommended in the Sheboygan County Land and Water Resource Management Plan.

Policy/Program: Encourage the use of Best Management Practices (BMPs).

Woodlands

Objective: Preserve, enhance, and promote the sustainable use of forest resources.
Objective: Conserve productive forestland by expanding the use of conservation easements, incentives, and voluntary, long-term stewardship of forestlands.
Objective: Promote healthy vigorous forests to minimize losses from pests and wildfire.
Objective: Discourage forest parcelization and isolation.

Policy/Program: Conserve forestlands that are susceptible to development, have the potential to connect to other parcels of forestland, have public importance, and provide critical ecological functions.
Policy/Program: Work with the appropriate individuals and organizations to prohibit development on critical forestland by acquiring donated conservation easements, purchase of development rights or transfer of development rights on those lands.
Policy/Program: Develop a fund for protection and management of high priority forestland, where reasonable.
Policy/Program: Protect lands identified as Wisconsin Forest Legacy Areas and areas identified in the Land Legacy Report, if they fall within Sheboygan County.

Environmental/Natural Corridors

Objective: Identify, preserve, and protect environmental corridors and valuable natural resources areas in Sheboygan County.
Objective: Encourage conservation easements and other protection tools to preserve environmental corridors.

Policy/Program: Work with Bay Lake Regional Planning Commission to develop an environmental corridors program.
Policy/Program: Classify and prioritize environmental corridors in Sheboygan County.
Policy/Program: Research and become aware of the "Sustain, Reconnect, and Grow the Environmental Corridors Program, (SRGE)."
Policy/Program: Work with local organizations and land trusts to preserve environmental corridors.

Shorelands/Riparian Areas

Objective: Conserve and restore shorelands and riparian areas (corridors adjacent to waterways) in Sheboygan County.

Policy/Program: Combine public and private efforts to restore riparian stream buffers for water quality and wildlife.
Policy/Program: Explore the use of overlay districts in the Shoreland Zone with setbacks for lakes, streams, and wetlands requiring additional care and proof that development will not have a negative effect on these resources.
Policy/Program: Continue to implement the Sheboygan County Shoreland and Shoreland-Wetland Ordinance, Chapter 72 of the Sheboygan County Code of Ordinances.
Policy/Program: Protect the wooded riparian areas, by exploring the modification of existing County ordinances to increase the minimum distance for brush and tree removal from riparian areas.

Scenic Resources

Objective: Encourage the preservation of scenic viewscapes.

Policy/Program: Identify and compile a listing of the geological features in the County.

Policy/Program: Provide educational information to local municipalities about view and vista ordinances and about preservation of these natural features.

Nonmetallic Mining Operations

Goal 8: Encourage the wise management of aggregate (sand, clay, gravel, and crushed stone) resource areas in Sheboygan County.

Objective: Ensure that future mining sites will not negatively impact the County or its residents.

Objective: Promote planning for an adequate supply of aggregate for new construction and maintenance of existing infrastructure.

Objective: Strive to protect views, the natural environment and aesthetics throughout the mining process.

Policy/Program: Continue to implement the Sheboygan County Nonmetallic Mining Ordinance, Chapter 78 of the Sheboygan County Code of Ordinances.

Policy/Program: Ensure mining sites follow their reclamation plans.

Biological and Habitat Resources

Goal 9: Identify and protect Sheboygan County's native biological resources.

Objective: Inventory, protect, and restore Sheboygan County's biodiversity and habitats.

Policy/Program: Refer and support resource priorities and plans of Wisconsin and conservation associations, such as Land Legacy Reports, Lake Michigan Shorelands Alliance, Sheboygan River Basin Partnership, Glacial Lakes Conservancy, and the Nature Conservancy.

Policy/Program: Promote and encourage landscaping of native species on public and private lands in Sheboygan County.

Policy/Program: Continue to provide the County tree/plant sale to encourage the planting of native species.

Objective: Inventory, control, and reduce the spread of invasive species in Sheboygan County, including both land and aquatic species.

Policy/Program: Develop programs to educate, control, and reduce the spread of invasive species on public and private lands in Sheboygan County.

Policy/Program: Continue to inventory areas with invasive species.

Policy/Program: Develop a repository for invasive species data.

Policy/Program: Support the creation of plans to address any major invasive species infestations, including the Emerald Ash Borer, zebra mussels, Japanese Knotweed, etc.

Policy/Program: Work to eliminate invasive species from within the County, where feasible. Partner with local organizations and governmental agencies, where available.

Policy/Program: Develop a public-informational program on invasive species, including the prevention of and removal of the species.

Objective: Inventory critical habitat areas in Sheboygan County.
Objective: Preserve habitat sites for native plants and wildlife.

Policy/Program: Protect and enhance environmentally sensitive habitats.
Policy/Program: Gather and share information on critical habitats and species with the Bureau of Endangered Resources and other interested parties.
Policy/Program: Work with organizations to apply for funding to enhance and preserve the sensitive habitat areas and species.

Parks and Open Space

Goal 10: Preserve and enhance the system of parks, trails, and open space within Sheboygan County.

Objective: Provide an integrated system of public parks, trails, and related open space areas that will provide County residents with adequate opportunity to participate in a wide range of outdoor recreation activities.
Objective: Encourage the protection of high-quality open space lands through public, private, and nonprofit partnerships.

Policy/Program: Conduct an inventory of areas that would support a natural corridor between major public land holdings.
Policy/Program: Continue cooperation in the management of the Sheboygan Marsh Park with the WDNR.
Policy/Program: Identify, protect, and preserve the County's significant natural scenic and open space areas for the enjoyment of residents and visitors and for the present and future generations.
Policy/Program: Ensure future County outdoor recreation and open space plans are adopted by the County Board of Supervisors and certified by the WDNR, so the County is eligible to receive available State and Federal outdoor recreation grants.
Policy/Program: Work with local municipalities to ensure the outdoor recreation and open space plan are updated.
Policy/Program: Continue to fund the County Stewardship Program for preservation and acquisition of parks and open space.
Policy/Program: Support private conservation organizations, including shooting clubs, fishing clubs, conservation clubs, etc.

Agricultural Resource Goals, Objectives, Policies, and Programs

Goal 11: Identify Sheboygan County's productive and viable agricultural land.

Objective: Develop a Land Evaluation and Site Assessment (LESA) study for Sheboygan County.

Program/Policy: Develop and adopt Site Assessment criteria for the Sheboygan County's Land Evaluation and Site Assessment (LESA) score.
Program/Policy: Hold public informational meetings to share the LESA scores with local municipalities.

Goal 12: Encourage agri-businesses and agricultural activities as viable economic industries in the County.

Objective: Retain and expand ag-related businesses in the County.

Policy/Program: Explore the development of a program to promote an agricultural economic cluster of farming operations and appropriate agri-businesses on lands designated for agricultural use on the County Future Land Use Map.

Policy/Program: Support a program to market and link Sheboygan County farms and agricultural products, including organic products, to restaurants and grocery stores in Sheboygan County and surrounding areas.

Policy/Program: Develop a local or regional 'brand' for agricultural products.

Policy/Program: Work with the UW-Extension to create a resource log of existing programs available to support beginning farmers and ensure that this resource is effectively communicated to existing and potential farmers so that people are aware of available programs.

Program/Policy: Continue to support the UW-Extension, local high schools, and LTC to promote agribusiness education programs, and encourage young and beginning farmers to attend classes.

Program/Policy: Work with the UW-Extension to promote the economic impact of agriculture in Sheboygan County.

Policy/Program: Continue to support and provide a periodic economic analysis for agriculture in Sheboygan County, following the agriculture census.

Objective: Work with ag-related businesses looking to locate or expand in the County.

Policy/Program: Use State and Federal grants to promote agriculture and associated agricultural industries in the County.

Policy/Program: Support economic initiatives to ensure farming remains viable in Sheboygan County, including funding programs, agri-tourism, and direct marketing of farm products.

Policy/Program: Support Green Tier and agricultural businesses who participate in Green Tier.

Objective: Encourage local municipalities to acknowledge the value of agri-business in their communities.

Policy/Program: Educate local municipalities on the importance of agri-businesses and farmers reliance on these businesses.

Goal 13: Sheboygan County offers assistance and resources for the preservation and protection of agricultural lands to ensure farming remains viable in Sheboygan County.

Objective: Protect the most productive and viable agricultural lands in the County for long-term agricultural use.

Program/Policy: Protection of farmlands that have the highest LESA scores shall be given highest priority for preservation.

Program/Policy: Encourage more compact, dense development within sewer service areas to minimize the development of farmland for urban uses.

Program/Policy: Utilize grants and funding sources, where applicable, to preserve and protect agricultural lands.

Program/Policy: Continue to support the County's Stewardship Fund.

Objective: Support implementation of the Working Lands Initiative recommendations..

Program/Policy: Update the Sheboygan County Farmland Preservation Plan based on the LESA analysis and any revisions made to the Wisconsin Farmland Preservation Program (FPP) by the Wisconsin Working Lands Initiative legislation.

Goal 14: Protect farms and farming in Sheboygan County.

Objective: Support the "Wisconsin's Right to Farm" Law.

Policy/Program: Minimize the potential for conflicts between rural landowners.

Policy/Program: Educate citizens, landowners, and elected officials by providing materials and links on "Wisconsin's Right to Farm" Law.

Objective: Support other farming activities of niche farms, such as community supported agriculture, organic farms, orchards, working forest lands, tree farms, viticulture, aquaculture, community gardens, and hobby farms within the County.

Program/Policy: Educate and inform municipalities of the various types of farming operations, and how these farms can be better supported.

Objective: Encourage future generations of people to operate farms.

Program/Policy: Protect agricultural infrastructure in Sheboygan County to support farm operations.

Program/Policy: Support programs that help to keep productive farmland and ranchland in agricultural uses, such as the Farm and Ranch Land Protection Program.

Program/Policy: Study and consider developing a County purchase of development rights (PDR) program, a transfer of development rights (TDR) program or a County agricultural easement program to protect parcels identified as high priority by the LESA analysis.

Program/Policy: Continue to work with the UW-Extension and local schools to support youth farming related programs, as well as to develop an educational program that outlines grants and loans available through Federal and State agencies for youth programs, including 4-H Clubs and FFA.

Program/Policy: Work with the UW-Extension to provide information to farmers on succession planning. Support mentor programs to assist beginning farmers.

Program/Policy: Work with the UW-Extension and local organizations to develop and distribute a voluntary inventory of available farmland and agricultural-related assets.

Objective: Maintain roads and other infrastructure, needed for agricultural activities.

Program/Policy: Encourage revenue-sharing grants for roads and bridges.

Policy/Program: Develop an inventory and rating system for local roads to identify those most likely to be used by farm operators to create a safe environment for travel between fields and everyday activities.

Objective: Sustain the County's agriculture heritage and character.

Policy/Program: Develop methods to preserve the agricultural heritage of the County.

Policy/Program: Encourage identification and preservation of historic structures.

Policy/Program: Compile a list of the century farms in Sheboygan County.

Objective: Develop an educational program for the real estate industry to better inform buyers of the processes involved with building/developing in the country and what to expect from a rural landscape.

Goal 15: Protect soil and water resources through utilizing agricultural best management practices (BMPs) and other strategies.

Objective: Encourage the use of the Best Management Practices by farmers.

Policy/Program: Develop an educational program and distribute educational materials regarding farming techniques that promote soil conservation such as no till and zone tilling farming, rotational grazing, contour stripping, grass waterways, terracing, crop rotation, and nutrient management through soil sampling. This educational program focus should include local governments and individual farmers.

Policy/Program: Work with UW-Discovery farms to provide information on best management practices and its research.

Policy/Program: Work with LTC agricultural department on the Best Management Practices.

Objective: Implement the *Sheboygan County Land and Water Resource Management Plan*.

Policy/Program: Provide support, information, and application assistance for Federal and State programs, including County cost-sharing, to implement farming practices that promote soil conservation and water quality protection.

Policy/Program: Continue to implement the County's Animal Waste Management Ordinance, Chapter 77 of Sheboygan County's Code of Ordinances.

Policy/Program: Continue to support the County's Water Quality Improvement Program (Buffer Strips), including County cost-sharing, especially in agricultural areas along waterways.

Policy/Program: Continue to implement the County's Erosion Control and Stromwater Management Ordinance, Chapter 75 of Sheboygan County's Code of Ordinances.

Policy/Program: Promote the benefits of reducing sediment and phosphorus loadings to surface waters.

Policy/Program: Reduce soil erosion, using the objectives from the *Sheboygan County Land and Water Resource Management Plan* as a starting point to reduce the erosion.

Policy/Program: The Land and Water Conservation Department shall continue to provide technical service and conservation planning assistance to landowners and units of government.

Policy/Program: The Land and Water Conservation Department shall continue to provide technical assistance to the US Department of Agricultural and the Natural Resources Conservation Service for the Conservation Reserve Enhancement Program, Environmental Quality Incentive Program, and others.

Policy/Program: Apply for grants that will help implement the programs in the *Sheboygan County Land and Water Resource Management Plan.*

Policy/Program: Continue to provide staff to facilitate the implementation of the *Sheboygan County Land and Water Resource Management Plan*.

Goal 16: Streamline the regulatory process and provide educational opportunities.

Objective: Develop a broad countywide strategy that promotes interagency and intergovernmental cooperation involving agriculture.

Policy/Program: Work with each Town to develop individual fact sheets to be given to land owners at the time permit issuance that include the process at the local level so landowners know what to expect.

Policy/Program: Develop specific training for elected officials on current issues related to agriculture and land use law.

Policy/Program: Support local "forums" for elected officials to provide education on agriculture and land use issues.

Policy/Program: Work with neighboring municipalities, including neighboring counties, to have consistent standards and ordinances, where applicable.

Cultural Resource Goals, Objectives, Policies, and Programs

Goal 17: Identify and inventory areas of cultural, archaeological, architectural, and historical significance.

Objective: Use local, state, and national criteria for identifying cultural, archaeological, architectural, and historical sites with unique historic characteristics of Sheboygan County.

Policy/Program: Partner with local preservation groups to help to inventory the cultural, archaeological, architectural, and historical sites in Sheboygan County.

Policy/Program: Map the cultural, archaeological, architectural, and historical sites on a Countywide level.

Goal 18: Support public engagement to help the local cultural, historical, archaeological, and architectural resources remain relevant to contemporary society.

Policy/Program: The Sheboygan County Museum and other area organizations should continue to develop and host locally focused programs and events to highlight cultural resources in the County.

Goal 19: Protect and preserve the historical, cultural, archaeological, and architectural resources of the County, both past and present.

Objective: Encourage the continued use of areas of historical and cultural heritage.

Policy/Program: Encourage and explore funding to preserve the historical, cultural, archaeological, and architectural resources of the County.

Policy/Program: Partner with local preservation groups to acquire cultural, archaeological, architectural, and historical sites in Sheboygan County.

Goal 20: Promote and support the local artistic culture.

Objective: Encourage the local artistic culture.

Policy/Program: Encourage the integration of local art in public places.

Policy/Program: Identify and promote the local artistic resources (e.g. performing arts venues, galleries, museums, sculpture gardens, etc.

Objective: Encourage the continued support of arts education programs in Sheboygan County.

Policy/Program: Encourage the continued funding for arts programs in the local schools.

Policy/Program: Encourage continuation of private art education programs, including those offered by the John Michael Kohler Arts Center.

Goal 21: Promote land use decisions that are sensitive to the local culture and history.

Objective: Inform and educate citizens about the procedures for building on land that may be culturally or historically sensitive.

Policy/Program: Facilitate community vision sessions to ensure the important aspects of a community's character are addressed.