Town of Goodman
Lakes Planning Assessment

Marinette County, Wisconsin

July 2000

Principal Author:
Candice M. Kasprzak

Contributing Author:
Mark A. Walter

Technical Report No. 74

Prepared by:

Bay-Lake Regional Planning Commission
Suite 211, Old Fort Square
211 North Broadway
Green Bay, WI 54303
(920) 448-2820
www.baylakerpc.org

Contract #56054

ACKNOWLEDGMENT:

Funded in part by the Wisconsin Department of Natural Resources Lake Management Planning Program

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CHAPTER 1 - INTRODUCTION

CONTRACT WITH BLRPC

The town of Goodman Board entered into a contract with the Bay-Lake Regional Planning Commission to prepare an assessment of the town and in particular the lakes within the town, including Oneonta, LaFave, Hilbert, Lost, Moon, Coleman, and North Pond.

The Town Board worked jointly with the UW-Extension Agent, Marinette County Solid Waste and Zoning Administrator, and the Bay-Lake Regional Planning Commission to prepare the document. The Town Board provided important comment on the needs of the town and lakes as well as reviewing the information which was developed as a result of the Lake Planning Grant. Utilizing the information obtained from a nominal group survey process, the UW-Extension Agent identified important issues and concerns regarding the future development of the town of Goodman. The issues and concerns were used to develop the goals, objectives, and policies of the plan.

This project is a first step in the development of a comprehensive land use plan for the town of Goodman. It will be used as a pilot project that will be applied to similar lakes in Marinette County that have a low rate of second home development and that are located in areas that are very rural in nature. This project will collect and assess the types of social, physical and regulatory data that are available for the lakes and their watersheds. The project will identify deficiencies in data and make recommendations for additional data collection that will be the subject of future grant applications.

Plan Contents

This planning assessment contains five chapters: **Chapter 1**: Introduction, contains the goals and objectives of the report; **Chapter 2**: General Physical Setting, provides a description of the natural features, soils, climate and geology of the planning area; **Chapter 3**: Population, presents information on the population and housing characteristics of the town; **Chapter 4**: Land Use, contains a land use inventory for the town, inventory of existing land use controls in the town and county and develops a density of development for the five lakes pertinent to the assessment; **Chapter 5**: presents the findings of the planning assessment as well as recommendations based off of the findings in order to alleviate some of the citizen concerns derived through the nominal group process and town-wide survey.

State Planning Enabling Legislation

Under §66.945 of Wisconsin State Statutes, regional planning commissions perform land use and thoroughfare studies as part of a regional master plan. The Bay-Lake Regional Planning Commission undertakes the development of comprehensive land use and master plans, zoning ordinances and impact studies as part of its regional master plan in an effort to provide planning and land use assistance to communities within the region. Recent examples of plans and studies completed by the Commission include: the *Green Bay East Shore Cumulative and Secondary Impacts Study (Part 1), Town of Peshtigo Comprehensive Land Use Plan; City of Sheboygan Falls Comprehensive Plan; Wetland Protection Study, Town of Peshtigo and the Cities of Peshtigo and Marinette; Oconto West Shore Cumulative and Secondary Impacts Study; Town of Red River Zoning Ordinance;* and *Town of Abrams Comprehensive Land Use Plan.*

PAST PLANNING EFFORTS

The town of Goodman and Marinette County have been involved in a number of planning efforts and studies over the years. Listed below are past and current plans and studies that contain information and recommendations for the town of Goodman. It is important to note that these plans, if available, should be revisited from time to time in order to check on their implementation progress, or to review their goals to see if they have been achieved.

Table 1. 1: Past Planning Efforts, Town of Goodman

YEAR	TITLE	AUTHOR
1992	Wastewater Management Facilities Plan - Goodman Sanitary Dist. #1	McDonald-Maas Assoc.
1990	Marinette County Community Development Plan	Bay-Lake RPC
1979	Marinette County Snowmobile Facility Plan 1979-1984	UW-Extension
1979	Marinette County Farmland Preservation Plan	Community Research & Management, Inc.
1978	Outdoor Recreation Plan - Town of Goodman	Bay-Lake RPC
1977	Marinette County Resources Conservation Program	Marinette Co Soil & Water Conservation District
1971	Marinette County Outdoor Recreation Plan	Northeastern Wisconsin RPC
1970	Marinette County Sewer and Water Plan	Max Anderson Associates

Source: Bay-Lake Regional Planning Commission, 1999.

COMPREHENSIVE PLANNING PROCESS

A comprehensive plan is an official public document adopted by a local government as a policy guide setting forth its major policies concerning desirable future physical development of the community. It includes all the functional elements of the community; summarizes policies and proposals and plans for potential problems and possibilities for the future. It includes an inventory of the existing natural, socioeconomic and developmental features of the community, a set of goals and objectives, and a list of recommendations to accomplish the community's goals and direct the future growth in an orderly, well thought out manner. The plan is based on the specific recommendations of municipal officials and citizens who have expressed their desires concerning how and where future development should take place in their community. The primary function is to look into the future and develop a long term growth plan for the community. The plan provides guidelines for zoning, developmental and public improvement decisions.

Preparation of a comprehensive plan is a four stage process. Initially, municipal officials and citizens develop a set of goals and priorities to define the future direction for the community. These goals and priorities provide the basic framework upon which the plan is developed.

The second stage, inventory and interpretation, begins with the collection of data on existing land use, socioeconomic conditions, municipal services and environmental features. The data is then analyzed and systematized to identify existing and potential problem areas.

Development of a sketch plan is the third stage. The results of the inventory and interpretation stage are combined with the community goals to create a long-range plan to guide the future growth. This plan is presented to the public officials and citizens of the community for their review and comment. The comments are considered for inclusion in the final plan recommendations.

The fourth stage establishes the tools necessary for implementation of the plan. Regulatory techniques are utilized to insure that the intent of the plan will be achieved. Although this is listed as the final stage in the planning process, it is by no means the end.

Planning is a continual on-going process that is subject to change and modification in order to reflect existing trends and new concepts. Thus, there is no beginning or end to the planning process, but rather a continuum of events and responses to events.

This study will accomplish the first stage (goals) and the second stage (inventory and interpretation) providing the town of Goodman with two of the important parts of developing a comprehensive land use plan.

COMMUNITY GOALS AND OBJECTIVES

A major element of the planning process is the identification of community development goals and objectives. This identification is often difficult, as values held by citizens are highly elusive and complex. People vary widely in their choice of values and the degree to which they will accept or tolerate differing attitudes.

Goals and objectives each have a distinct and different purpose within the planning process:

- Goals describe desired situations toward which planning efforts should be directed. They are broad and long range. They represent an end to be sought, although they may never actually be fully attained.
- Objectives describe more specific purposes that should be sought in order to advance toward the achievement of the overall goals.
- Policies describe a specific approach to meeting an objective.

One of the best ways to identify a community's priorities for community development and natural resource identification that are key issues to be addressed by a planning assessment is to perform a nominal group survey. The UW-Extension Conservation Resource Department conducted a nominal group survey at the very outset of the planning process on September 28, 1999 to identify key issues.

The nominal group survey was conducted during a workshop and was organized to identify the issues of the community and to generate policies to address them. The nominal group process identified twelve issues and needs of the citizens of the town of Goodman. Listed below are the top five issues which most concerned the citizens at the time of the workshop.

- Better development of industrial opportunities, therefore more opportunities for jobs.
- Protection of natural resources - concerns with pollution and environmental degradation of lakes and soil erosion.
- More permanent residents (versus seasonal).
- Lack of law enforcement.
- Communication between full time and seasonal residents.

Appendix A has the complete nominal group results.

There were three main goals that can be identified from the issues describe by the citizens in the nominal group:

1. Provide better job opportunities to increase the permanent resident population.
2. Preserve and protect the natural resources.
3. Level out the tax base, due to the massive amounts of land owned by large landholders.

It should be noted that the nominal group session was attended by only a few people. Before proceeding with future planning, another session should be scheduled, or a town wide survey should be administered to get a better understanding of the town's issues and needs.

CHAPTER 2 - GENERAL PHYSICAL SETTING

INTRODUCTION

Statement of Purpose

This section is intended to provide an inventory of the existing physical and environmental features within the planning area. Builders, elected officials and property owners need to consider how these resources are affected by development in order to eliminate costly mistakes and a variety of construction or environmental problems. Some of the factors which need to be considered include: wetlands, floodways and floodplains, bedrock geology, scientific and natural areas, woodlands, unique wildlife habitats, areas of steep slope, and historic and archeological sites. Many of these features are found in corridors that are located along rivers, streams, shorelines and natural drainageways and are essential to the maintenance of an ecological balance and diversity, as well as for the preservation of the natural beauty of the area.

Description of the Town of Goodman Planning Area

The town of Goodman is located in the north western portion of Marinette County and lies partially within the boundaries of the Marinette County Forest (Map 2.1). The town, comprised of 108 square miles, has a 1999 estimated population of 779 persons. It is bounded by the towns of Fence and Homestead in Florence County to the north, town of Dunbar to the east, towns of Silver Cliff and Athelstane to the south, and the towns of Armstrong Creek and Blackwell in Forest County to the west. The town of Goodman encompasses approximately 69,120 acres (108 square miles) of which the vast majority is within woodlands. The town is located 100 miles northwest of Green Bay, Wisconsin.

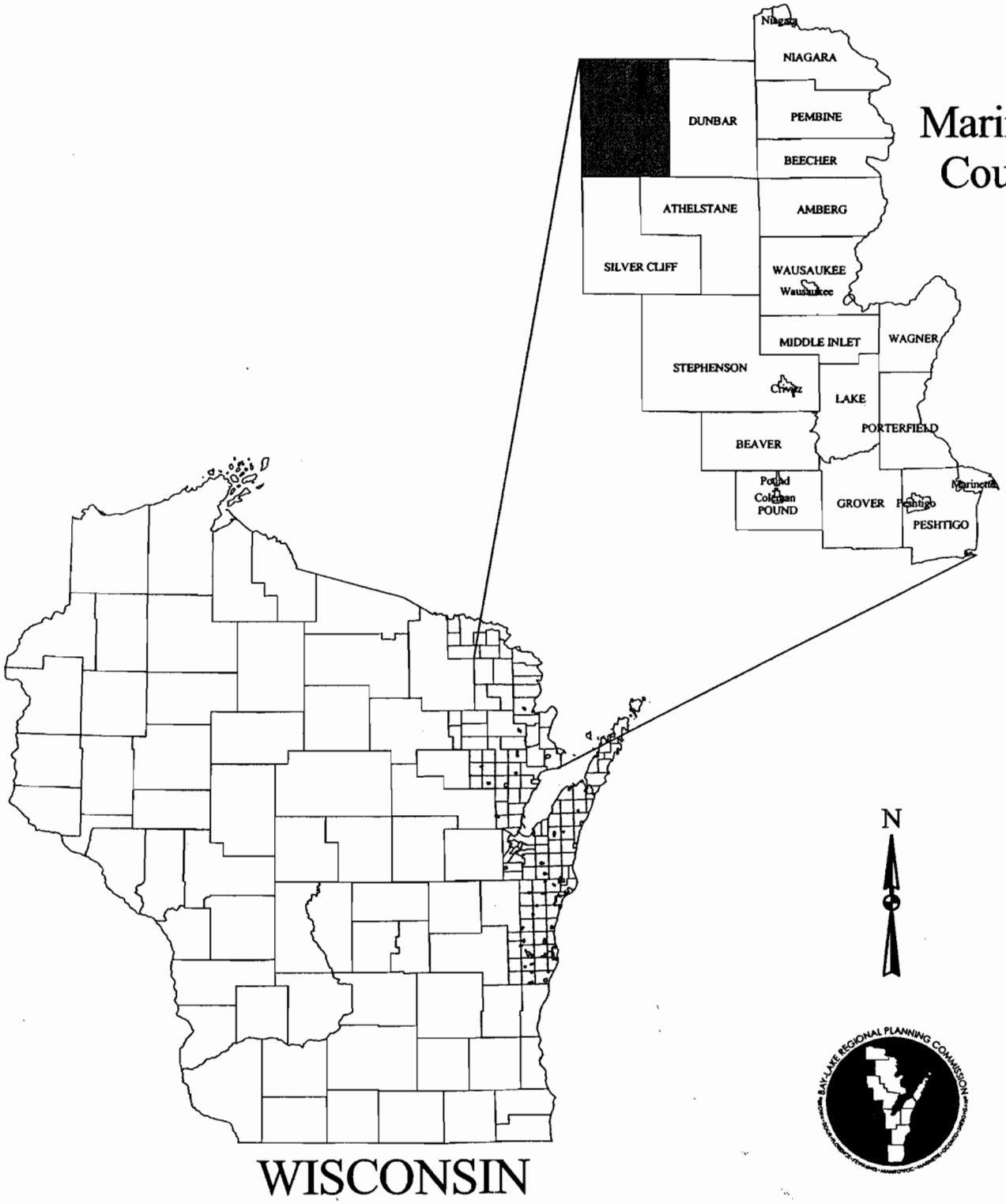
Figure 2.1 Town of Goodman Welcome Sign - STH 8

Map 2.1

Location Map

Town of Goodman

Marinette County, Wisconsin



Source: Bay-Lake Regional Planning Commission, 1999.

PRINCIPAL PHYSICAL ELEMENTS

Geology

Bedrock Geology

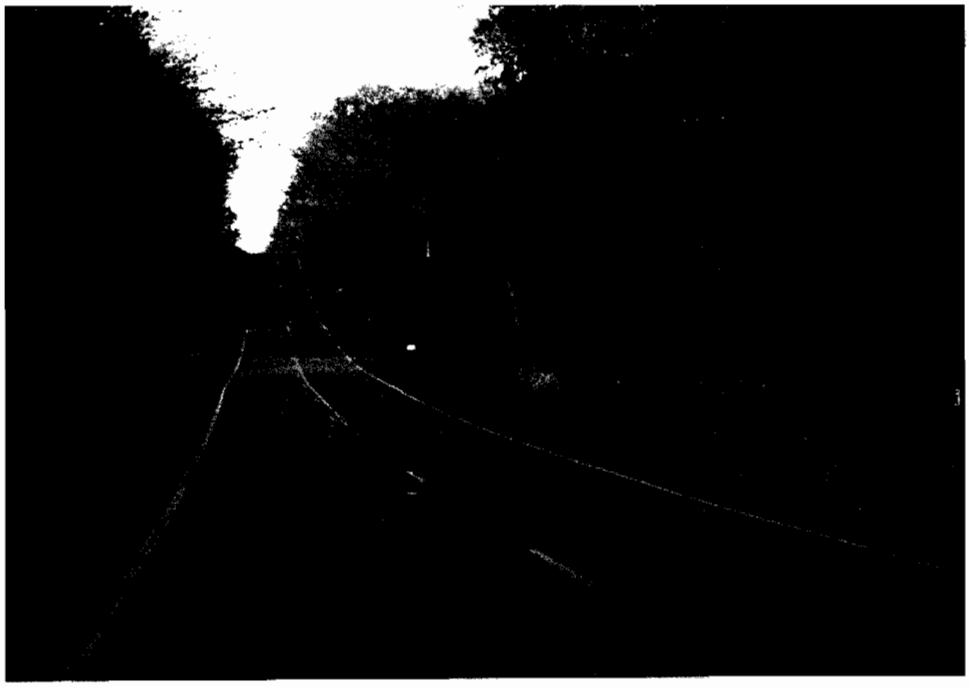
The bedrock in Goodman is a continuation of the Canadian Shield and consists of Lower Precambrian and Cambrian rock types. Crystalline and undifferentiated Precambrian rock of metamorphic and igneous types are found in the planning area throughout the whole town. Undifferentiated sandstone and dolomite Cambrian rocks are found in two small protrusions in the eastern part of Goodman (Map 2.2).

Pleistocene Geology

The town of Goodman falls within the Northern Highlands geomorphic region. This region is comprised of a complex of igneous and metamorphic rocks dating more than 600 million years old. Continental glaciers moved across the planning area in a southwesterly direction forming drumlins, eskers, and other glacial features. Goodman has a variety of deposits including stratified drift of outwash and ice-contact deposits and unstratified drift of clay, silt, pebbles and boulders (Map 2.3). Stratified drift is sandy outwash ice-contact deposits that were laid down by melt water during glaciation and are good sources of ground water because of high permeability. Unstratified drift contains unsorted sandy, clay till laid down directly by thin ice sheets and are poor sources of ground water because of their low permeability (Oakes and L.J. Hamilton).

Across the hills and valleys created by the glacial action, mostly in the northern and eastern portions of the town, winds deposited silty material which covered the glacial deposits and formed a basis for the original hardwood-conifer forests.

Figure 2.2 CTH H Running Through Ground Moraine

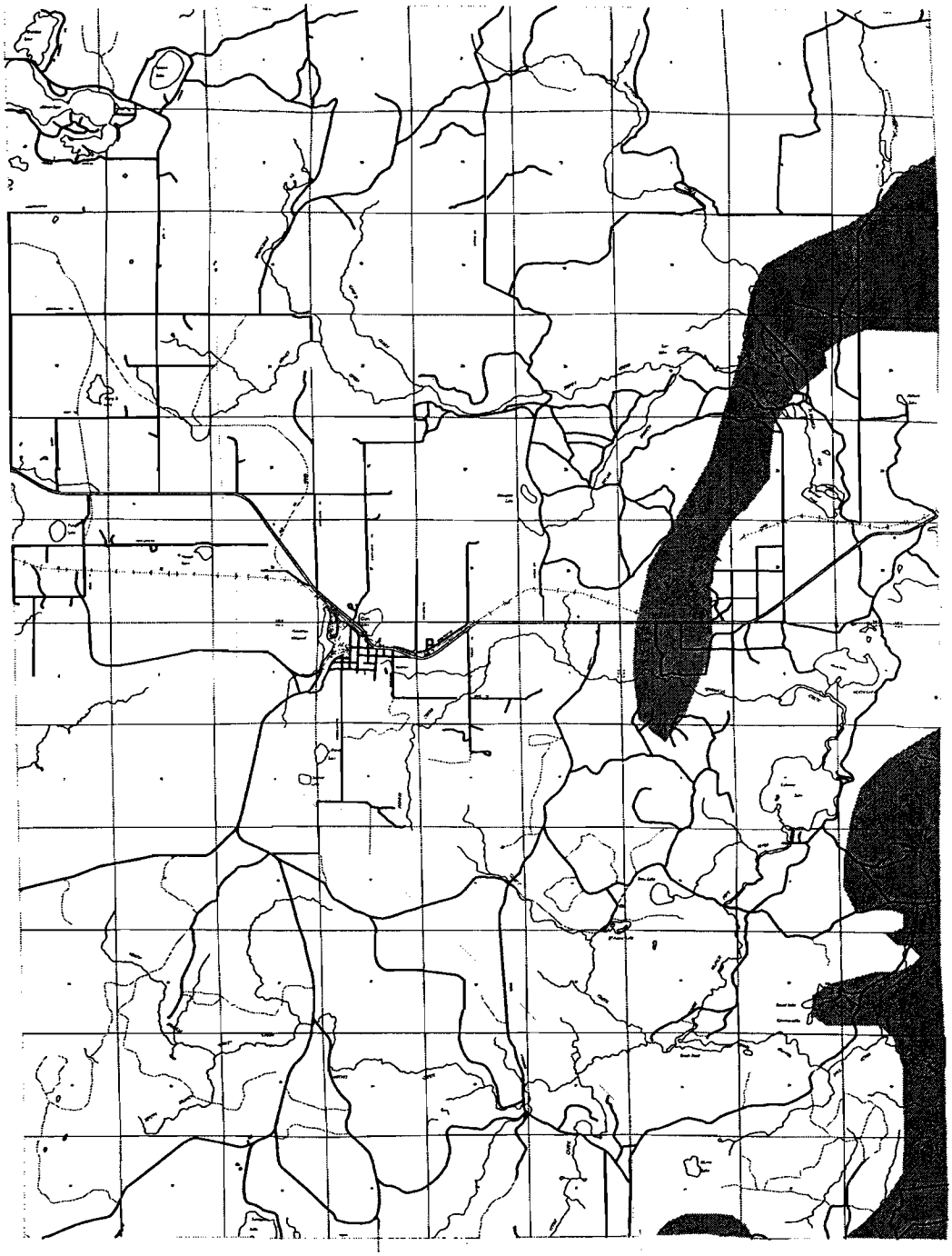


Map 2.2

Bedrock Geology

Town of Goodman

Marinette County, Wisconsin



Sandstone & Dolomite
Crystalline Rock

N

3000 0 3000 6000 Feet

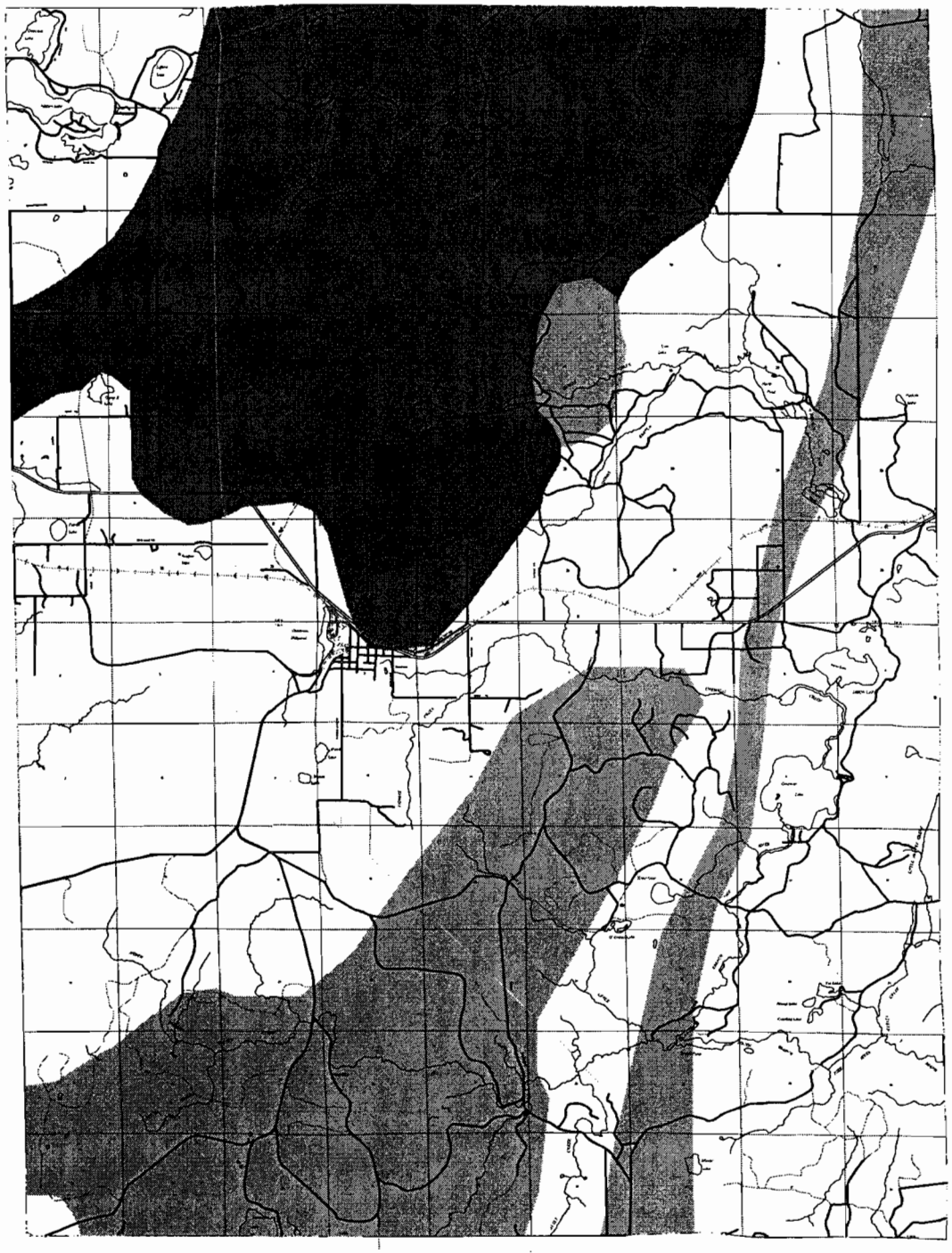
Source: U.S. Geological Survey, 1973; Bay-Lake Regional Planning Commission, 1999.

Pleistocene Geology

Town of Goodman

Marinette County, Wisconsin

Map 2.3



End Moraine
Ground Moraine
Outwash & Ice Contact Deposits

N

3000 0 3000 6000 Feet

Source: U.S. Geological Survey, 1973; Bay-Lake Regional Planning Commission, 1999.

General Soils

The soils within the planning area are made up of the sandy Menahga, Pence-Padus loam, and Sarona-Keweenaw sandy loam associations (Map 2.4).

Menahga Association:

The soils in this association are found on moraines, outwash plains and stream terraces. These soils are excessively drained, and the slope ranges widely from 0 to 25 percent. Most of the area in the county of this type is in woodlands. Problems for managing for woodlands are equipment limitations because of the sandy soils, the steep slope in certain areas, and water erosion in areas of steep slope. Some areas in less sloping terrain may be used for certain crops, but need to be managed for droughts and soil blowing. These soils are not suited well for septic tanks because the poor filtering capacity creates a danger for ground water pollution. Less sloping areas are suited for dwellings.

Pence-Padus Association:

These loamy soils are found on outwash plain, stream terraces, moraines, kames, and eskers. The landform ranges from broad, convex plains to irregularly shaped ridges, and slopes from 1 to 35 percent. Pence soils are found on flats, broad ridgetops, and side slopes of ridges. They are characterized by being well drained, varied slope (1 to 35 percent), and low water capacity. The upper, loamy layer has moderately rapid permeability, whereas in the substratum it is rapid or very rapid. Padus soils are also found on flats, ridgetops, and side slopes of ridges. They are well drained and a little less steep compared to the Pence soils (1 to 25 percent). These soils have a moderate to moderately rapid permeability in the loamy upper profile, and rapid to very rapid in the sandy and gravelly substratum. Water capacity is moderate. Areas within the Pence-Padus association are mainly used for woodlands. Managing concerns are equipment limitations; Pence soils for steep slope, and Padus for low soil strength during wet periods and slope. Less sloping areas are suited to dwellings, but all areas are poorly suited for septic due to the danger of ground water pollution from their poor filtering capabilities.

Sarona-Keweenaw Association:

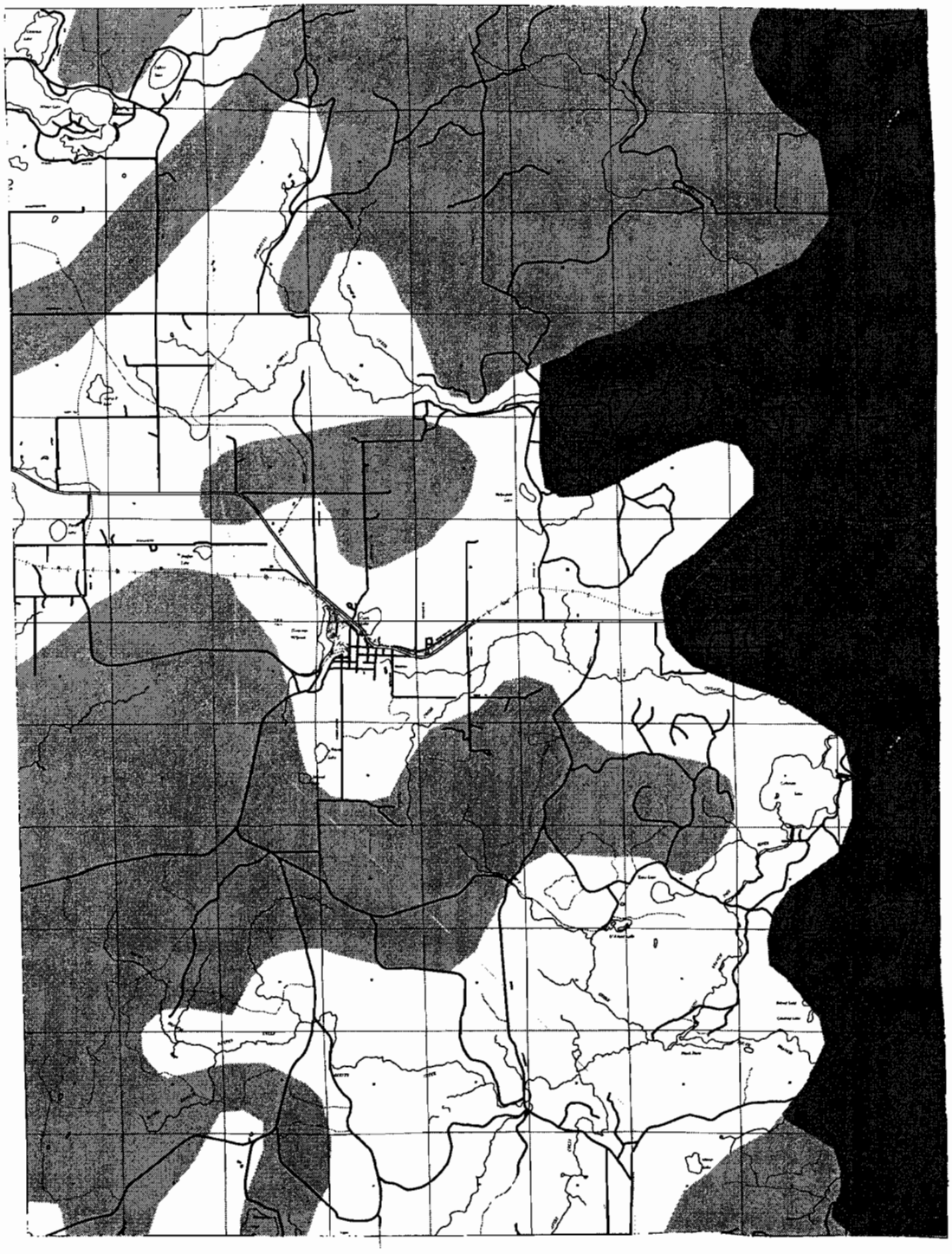
This is the dominant association in Marinette County, making up 68 percent of it. Areas of these sandy and loamy soils are found on ground and end moraines that are generally oriented from northeast to southwest. Sarona soils are on broad ridges and side slopes of ridges. Slope ranges from 2 to 25 percent, are well drained and have moderate permeability and water capacity. Keweenaw soils are also found on broad ridges and their side slopes. These soils are characterized by being well drained, low water capacity, moderate permeability, and a ranging slope of one to 25 percent. The main use for this soil type is woodland management. Managing concerns are equipment limitations, caused by low soil strength during wet periods, slope and the hazard of water erosion on the steeper slopes. Some less sloping areas can be used for crops and pasture. The main concerns would be water erosion, droughtiness, and soil blowing. Less sloping areas are suited for dwellings, but are only moderately suited for septic tanks because of moderate permeability.

Map 2.4

General Soils

Town of Goodman

Marinette County, Wisconsin



Soil Associations

- Menahga
- Pence-Padus
- Sarona-Keweenaw

N

3000 0 3000 6000 Feet

Source: Marinette County Soil Survey, 1991; Bay-Lake Regional Planning Commission, 1999.

Water Resources

Watershed and Sub-watersheds

Lakes, rivers, and streams comprise the surface water resources within the town of Goodman and make up the Menominee drainage basin. There are three main watersheds within this basin. The Pike River watershed makes up over 80 percent of the town. The Upper Peshtigo watershed is found on the southwest and western borders of the town. In the northwest corner, the Popple River watershed is found. Within these watersheds, there are 22 sub-watersheds (Map 2.5). Drainage of the town's surface waters is typically west to east and flows into the Menominee River and eventually to the Bay of Green Bay.

Surface Water Features – Lakes and Ponds

Within the town of Goodman there are 26 named lakes with a total of 1,030 surface acres (Map 2.6). These lakes form a combined total of 31.15 miles of shoreline where only 3.05 miles are public. Following is a brief description of the named lakes within the town.

Brock Pond

This hard water drainage lake (impoundment) has a surface acreage of 22 acres. The maximum depth is five feet, with 75 percent of it being less than three feet. The water is neutral, light brown of moderate transparency (Secchi disk of greater than five feet). The littoral zone is composed of mostly muck, with limited amounts of gravel, sand, and rubble. The shoreline is 85 percent uplands with a mix of hardwoods and conifers. The remaining 15 percent is a wetland shrub meadow. Brook and brown trout are reported to inhabit this pond, but has no public access.

Camp B Lake

Camp B Lake is a 14.6 acre, shallow, hard water spring pond with slightly alkaline, clear water of high transparency. It is located on the headwaters of Camp B Creek. Maximum depth is only two feet, with the littoral zone being composed entirely of silt. Seventy percent of the shoreline is an upland mix of hardwoods and conifers, and the rest being a wetland shrub bog. Waterfowl make limited use of the lake and the fish population consists of mainly forage species. There is no public access.

Clark Lake

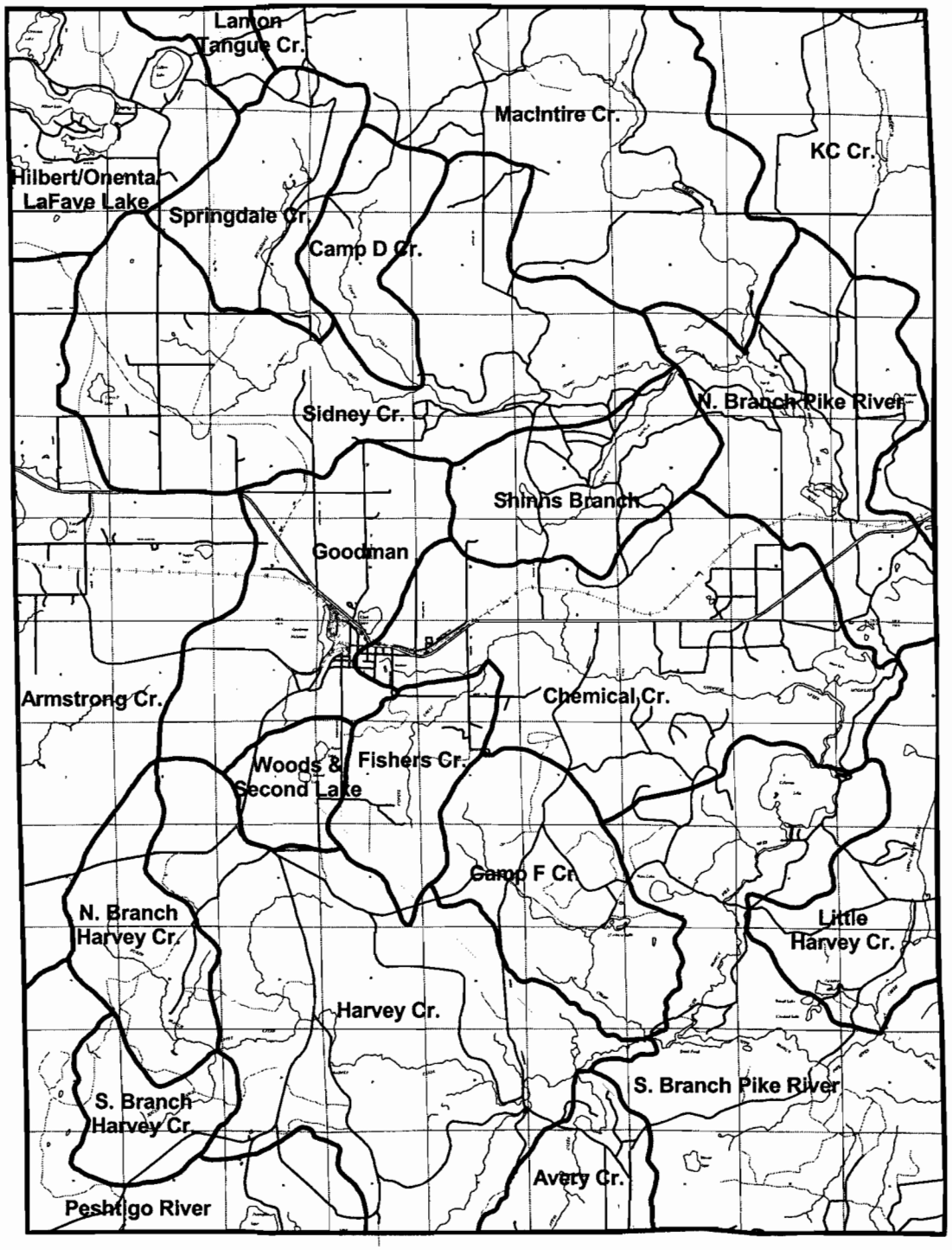
This is a hard water spring lake having neutral, light brown water of moderate transparency. Clark lake is seven acres with a maximum depth of nine feet. The water is neutral, light brown and has a moderate transparency (Secchi disk of nine feet). The shoreline is 95 percent upland hardwoods, and a small coniferous swamp. Fish species include northern pike and perch, and waterfowl do make use of the lake. Submergent vegetation occupies 40 percent of the lake surface and floating vegetation 20 percent of the lake area. Public access is unimproved and difficult from STH 8.

Map 2.5

Watersheds

Town of Goodman

Marinette County, Wisconsin



Source: Bay-Lake Regional Planning Commission, 1999.

N

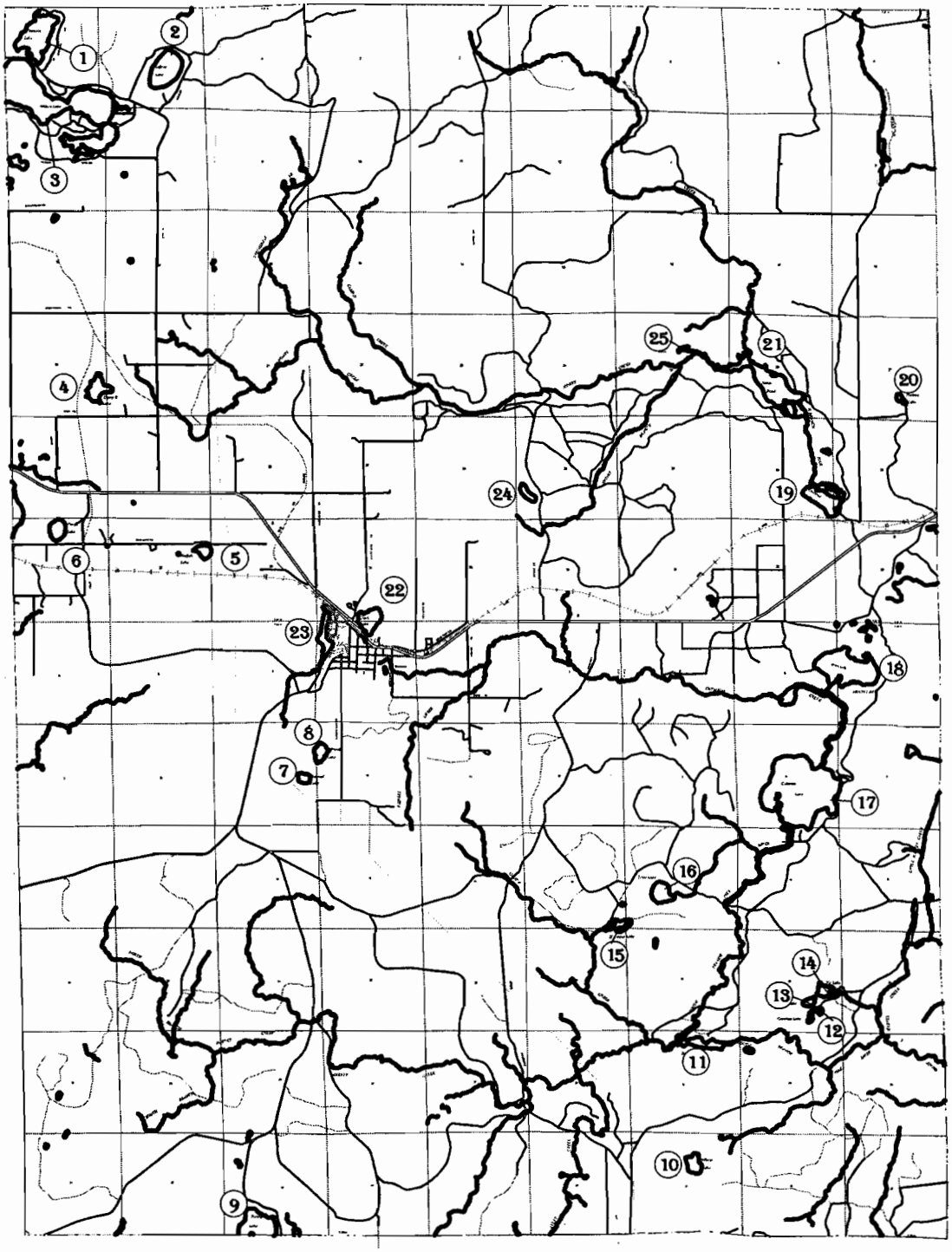
3000 0 3000 6000 Feet

Map 2.6

Surface Water Features - Lakes & Ponds

Town of Goodman

Marinette County, Wisconsin



1 - Oneonta Lake	9 - Porcupine Lake	18 - Moon Lake
2 - Lafaye Lake	10 - Mirror Lake	19 - Railroad Pond
3 - Hilbert Lake	11 - Brock Pond	20 - Pothole Lake
4 - Camp B Lake	12 - Crooked Lake	21 - North Pond
5 - Nadjak Lake	13 - Round Lake	22 - Clark Lake
6 - Petryk Lake	14 - Vic Lake	23 - Goodman Millpond
7 - Second Lake	15 - D' Amour Lake	24 - Hobachee Lake
8 - Woods Lake	16 - Trout Lake	25 - Lost Lake
	17 - Coleman Lake	26 - Harvey Lake

N

3000 0 3000 6000 Feet

Source: Bay-Lake Regional Planning Commission, 1999.

Coleman Lake

This lake has a surface area of 246 acres and a maximum water depth of 67 feet. It is a hard water drainage lake with slightly acidic, moderately transparent water. Secchi disk depth is eleven feet. The littoral zone is composed of 70 percent sand, 15 percent gravel and 15 percent boulders. Shoreline is owned by the Coleman Lake Club and consists of

90 percent upland mixed hardwoods and conifers and 10 percent wetland shrub bogs. The inlet and outlet are part of the South Branch Pike River. Fish species include northern pike, large mouth bass, small mouth bass, black crappie, brown trout, rainbow trout and white sucker. Both diving and puddle ducks make moderate use of the lake during migration periods. There is no public access.

Crooked Lake

Crooked Lake is a very soft water seepage lake having slightly acid, light brown water of moderate transparency. The maximum depth of this 4.7 acre lake is 33 feet and has a Secchi disk depth of seven feet. The littoral zone is composed entirely of muck. The entire shoreland is a wetland coniferous bog. The fish population information is lacking but largemouth bass, panfish and different forage species are probable. This is no public access.

D'Amour Lake

This lake has slightly alkaline, clear water of high transparency. The littoral zone is composed of 97 percent muck, two percent rubble and one percent boulders. D'Amour Lake is ten feet deep, has a Secchi depth of greater than ten feet, and a surface area of 9.2 acres with the outlet flowing to Camp F Creek. The shoreline is made up of 90 percent upland hardwood/conifer mix and the remainder being an open meadow wetland. Fish species may include panic and forage species, and waterfowl make limited use of the lake. Unimproved and difficult access is available from a trail road on the north side of the lake.

Goodman Millpond

This 20 acre impoundment has a maximum depth of ten feet and medium hard, slightly acid, dark brown water of low transparency (Secchi disk depth of three feet). The littoral zone is composed of 40 percent muck, 40 percent sand, ten percent gravel, and ten percent rubble. The shoreline is 95 percent uplands and five percent wetland. The outlet is Chemical Creek, which flows into Coleman Lake. Waterfowl make little use of the lake and largemouth bass and bluegill are reported to be present. The dam at the outlet maintains a heard of seven feet and is owned by the Goodman Lumber Company. There is no public access.

Harvey Lake

Harvey Lake is a hard water drainage lake having slightly acid, clear water of moderate transparency. The lake has a Secchi disk depth of eight feet, a surface area of 3.2 acres and a maximum depth of eight feet. The littoral zone is composed entirely of muck. The shoreline consists of 70 percent wetland shrub meadow and 30 percent of upland hardwoods. Harvey Lake is the headwaters of Little Harvey Creek, which drains into the South Branch Pike River. Trout are reported to be present and waterfowl make some use of the lake. A dense mat of submergent vegetation covers most of the lake basin. There is no public access.

Hilbert Lake

This very soft water seepage lake has lightly acidic, clear water of high transparency (Secchi disk depth of 16 feet). The maximum depth of this 247 acre lake is 38 feet. The littoral zone is comprised of 80 percent muck, ten percent sand, five percent gravel, and five percent rubble. The shoreline is 90 percent upland hardwood and ten percent wetland shrub meadow, although much of the shoreline is developed. Many fish species are found in the lake including northern pike, largemouth bass, perch, black crappie, pumpkinseed, and white sucker. Waterfowl make limited use of the lake. The town of Goodman maintains a park with good boat landing facilities on the northeast shore.

Hobachee Lake

This is a hard water, four foot deep seepage lake having slightly acidic, dark brown water of low transparency (Secchi disk depth of one foot). The littoral zone of the seven acre lake consists entirely of muck. The whole shoreline is a coniferous bog. Fish information is lacking; however, the shallow depth of the lake indicates winterkill. Wilderness type public access is available by crossing county land.

LaFave Lake

LaFave Lake is a 50 acre, 38 foot deep soft water seepage lake with slightly acidic, clear water of high transparency (Secchi depth of 17 feet). Sand (60 percent) and muck (40 percent) make up the littoral zone. Fifty percent of the shoreline is upland hardwoods and 50 percent coniferous swamp. Perch and largemouth bass inhabit this lake, and waterfowl make limited use. There is no public access.

Lost Lake

This hard water spring pond has neutral, clear water of high transparency. The maximum depth is five feet, with a Secchi disk depth of greater than five feet. The littoral zone is composed primarily of silt (80 percent), with sand making up the rest. This 1.8 acre lake's shoreline is a coniferous wetland. Submergent vegetation is dense in parts of the lake basin. Brook trout and forage species make up the fish population. Waterfowl make limited use of this lake. There is no public access.

Mirror Lake

This is a very soft water seepage lake having slightly acid, light brown water of moderate transparency. Mirror Lake is 18 feet deep, has a surface area of 13.7 acres and a Secchi disk depth of nine feet. Seventy-five percent of the littoral zone is muck with lesser amounts of sand, gravel, rubble, and boulders. Mixed hardwood and conifers make up 90 percent of the shoreline with the remaining being a coniferous bog. The lake conditions suggest that there may be largemouth bass and panfish, but complete data is lacking. Waterfowl make limited use of this lake. Wilderness type public access is available on the north end of the lake.

Moon Lake

Moon Lake is a medium hard water lake having slightly acid, light brown water of high transparency. This lake has a surface area of 97.3 acres, a maximum water depth of 25 feet and a Secchi disk depth of 25 feet. The littoral zone is composed of sand (60 percent), gravel (35 percent), and silt (five percent). Eighty percent of the shoreline is mixed hardwoods and conifers, whereas the remaining 20 percent is a shrub bog. The population consists of northern pike,

largemouth bass, smallmouth bass, black crappie, brown trout, rainbow trout, white sucker and some panfish species. Diving and puddle ducks make moderate use of the lake. The outlet flows into Chemical Creek. There is no public access.

Nadjak Lake

This is a very soft water seepage lake having slightly acid, light brown water of moderate transparency (Secchi disk depth of greater than seven feet). Nadjak Lake is 10 acres, and has a maximum depth of seven feet. The entire littoral zone is muck. A coniferous bog makes up 90 percent of the shoreline, with the rest being an upland hardwood forest and cleared land. The only known fish is black bullhead, and winterkill is likely. Submergent vegetation is in moderate density throughout the lake. There is no public access.

North Pond

This impoundment is a hard water drainage lake with neutral, light brown water of moderate transparency. North Pond has a maximum depth of seven feet, a surface area of 69.5 acres and a Secchi disk depth of greater than seven feet. The littoral zone is primarily (90 percent) muck, with the remainder being sand and gravel. The two inlets are Sidney and McIntire Creeks and the outlet becomes the North Branch Peshtigo River. This flowage is inhabited by rainbow, brown and brook trout inhabit the lake. During migration periods, diving and puddle ducks make moderate use of the area. Submergent vegetation is dense throughout a major part of the lake basin. The Coleman Lake Club maintains the dam which has a head of 8 feet. There is no public access.

Oneonta Lake

This very soft water seepage lake has slightly acidic, light brown water of high transparency. Oneonta Lake has a 66.4 acre surface area, a maximum water depth of 24 feet, and a Secchi disk depth of 16 feet. The littoral zone is a mix of muck (67 percent), sand (25 percent), and gravel (8 percent). The shoreline is composed of 90 percent upland hardwood and ten percent coniferous bog. Largemouth bass, bluegill, pumpkinseed, and perch are known to inhabit the lake. Waterfowl make limited use of this lake. The south end has unimproved public access.

Petryk Lake

Petryk Lake is a very soft water seepage lake with slightly acid, clear water of moderate transparency (Secchi disk depth of six feet). This 16 acre, nine foot deep lake has a littoral zone of mostly muck (99 percent) with a little gravel. The shoreline is 70 percent coniferous bog wetland and 30 percent upland, consisting of hardwoods and cleared land. Black bullheads are known to inhabit the lake, and waterfowl make limited use of the lake. There is no public access.

Porcupine Lake

This seepage lake has medium hard, neutral, medium brown water of low transparency. The littoral zone is 60 percent silt, 30 percent rubble and 10 percent gravel. Porcupine Lake is 47.8 acres, has a maximum depth of eight feet, and a Secchi disk depth of two feet. The shoreline is 50 percent mixed hardwoods and conifers, and 50 percent coniferous swamp. Information on fish species is lacking but largemouth bass and panfish are probable. Submergent vegetation is in moderate density throughout half of the lake. Wilderness type public access is available on the south side by crossing public lands.

Pothole Lake

Pothole Lake is a very soft water seepage lake having neutral, clear water of high concentration. The entire littoral zone is muck. The shoreline is entirely bog wetland. Brook trout have been stocked in this lake for several years. Waterfowl make limited use of this lake. The surface area is three acres, has a maximum depth of 25 feet and a Secchi disk depth of 12 feet. Unimproved or difficult public access is available at the east end of the lake and involves crossing an unstable bog.

Railroad Pond

This drainage lake (impoundment) has hard, slightly alkaline, light brown water of high transparency (Secchi disk depth of greater than eight feet). Railroad Pond is on the North Branch of the Pike River and is 34.2 acres and eight feet deep. The littoral zone is a mix of muck (69 percent), sand (20 percent), gravel (ten percent) and boulders. Sixty percent of the shoreline is upland and the rest is wetland shrub meadow. Brook, brown and rainbow trout are found here. During migration periods diving and puddle ducks make use of this lake. Submergent plants are moderate in density throughout most of the lake. There is no public access.

Round Lake

This very soft water seepage lake has slightly acid, clear water of high transparency. The littoral zone is composed entirely of muck. Round lake is a small, very deep lake being only 3.9 acres, but having a maximum depth of 60 feet. The Secchi disk depth is 16 feet. The shoreline is mostly (90 percent) upland hardwoods, with the rest being a coniferous bog. The known fish population consists of trout planted by the Coleman Lake Club. An intermittent outlet flows to Vic Lake. There is no public access.

Second Lake

Second Lake is a very soft water seepage lake with acidic, light brown water of low transparency. It has a depth of 19 feet and a Secchi disk depth of three feet. The littoral zone of this five-acre lake is composed entirely of muck. Fish population information is lacking, but it may support largemouth bass and panfish. Wilderness type access is available by crossing private forest land.

Trout Lake

This is a hard water spring lake with slightly alkaline, clear water of moderate transparency. The littoral zone is composed entirely of silt. The shoreline is 70 percent cedar and spruce wetland and 30 percent hardwood upland. This shallow lake is 21 acres and only three feet deep. Forage species are the only known fish population. The outlet forms the headwaters of Trout Creek which flows to the South Branch Pike River. There is no public access.

Vic Lake

Vic Lake is a medium hard water spring lake having slightly acidic, light brown water of moderate transparency. The littoral zone is mostly (85 percent) muck, with the rest being sand and gravel. The lake has a surface area is 9.5 acres, a maximum water depth of 16 feet and a Secchi disk depth of nine feet. The shoreline is 60 percent upland of mixed hardwoods and conifers and 40 percent wetland primarily coniferous bog. Largemouth bass and panfish are the known fish species. The outlet flow to Little Harvey Creek. There is a dam at the outlet which maintains a head of four feet. There is no public access.

Woods Lake

This very soft water seepage lake has slightly acidic, clear water of high transparency. The littoral zone is composed entirely of muck. The shoreline is 90 percent wetland primarily of open bog and ten percent upland consisting of hardwoods. Waterfowl make limited use of this lake. Conditional public access is available by crossing private forest crop land. Bullheads are the only known fish species, and the lake may be subject to winterkill. Submergent aquatic plants are moderate in density throughout most of the lake basin.

Surface Water Features – Rivers and Streams

There are 17 named rivers and streams within the town of Goodman (Map 2.7). Below is a brief description of these water features.

Avery Creek

This 3.7 mile, hard water stream has slightly alkaline, clear water. This stream is tributary to Harvey Creek. A native brook trout population is present. Public access is available at one road crossing and on 7.1 miles of public frontage. Wildlife values are limited due to the stream's small size. The entire watershed is wooded.

Camp D Creek

Camp D Creek is 2.5 miles long, five feet wide and characterized by having hard, neutral, clear water. The stream is tributary to Sidney Creek. A native population of brook trout inhabit the stream. Wildlife values are limited due to the small size of the creek. Public access is available on 1.9 miles of public frontage. The entire watershed is forest land.

Camp F Creek

This hard water stream has neutral. Light brown water; is 3.2 miles long and averages eight feet wide. Camp F Creek is tributary to Harvey Creek. This stream also contains a native brook trout population. It has limited wildlife value due to the creeks small size. Public access is available at one road crossing and on 3.7 miles of public frontage. The watershed is primarily forest land.

Chemical Creek

Chemical Creek is a 7.6 mile, 12 foot wide hard water stream characterized by slightly acidic, light brown water. This stream flows through Trout Lake, and is tributary to the North Branch Pike River. Excellent brook and brown trout fishery is present. Mink and muskrat make moderate use of the stream, but waterfowl do not due to the smaller size. Public access is available at three road crossings. The watershed is primarily wooded with limited areas of agriculture.

Fishers Creek

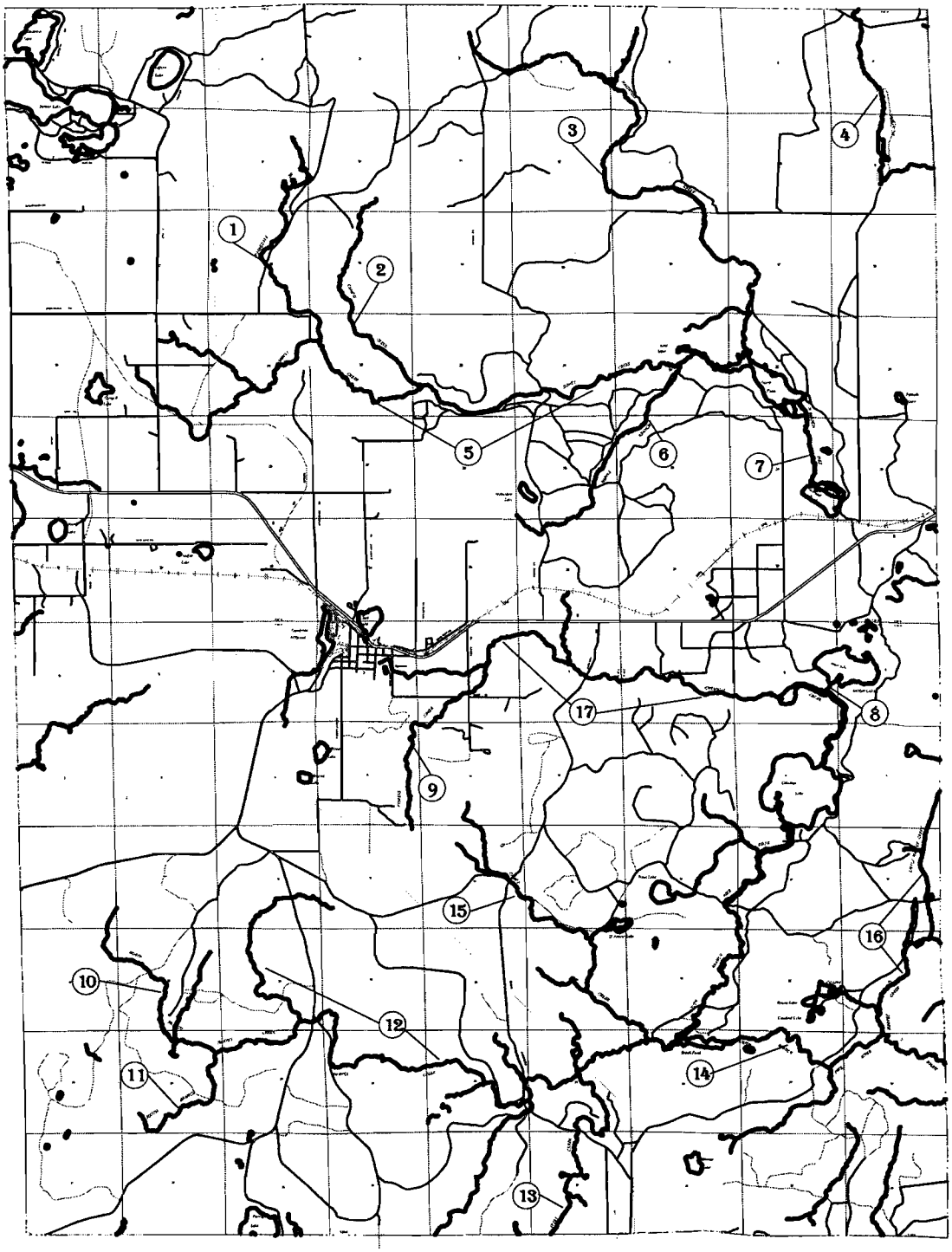
This creek is 2.3 miles long, six feet wide and has hard, slightly acidic, light brown water. Fishers Creek is tributary to Chemical Creek. Native brook and brown trout populations are present. Small size limits the wildlife value. Public access to this forested watershed is available at one road crossing.

Map 2.7

Surface Water Features - Rivers & Streams

Town of Goodman

Marinette County, Wisconsin



1 - Springdale Creek
2 - Camp D Creek
3 - MacIntire Creek
4 - KC Creek
5 - Sidney Creek
6 - Shinns Branch
7 - North Branch Pike River
8 - Moon Creek
9 - Fishers Creek
10 - North Branch Harvey Cr.
11 - South Branch Harvey Cr.
12 - Harvey Creek
13 - Avery Creek
14 - South Branch Pike River
15 - Camp F Creek
16 - Little Harvey Creek
17 - Chemical Creek

N

3000 0 3000 6000 Feet

Source: Bay-Lake Regional Planning Commission, 1999.

Harvey Creek

This is a medium hard water stream having slightly alkaline, light brown water. The 6.2 mile long, 19 foot wide creek flows to Brock Pond. A native brook and brown trout is supported. Furbearers make moderate use of the stream, but waterfowl use is limited due to the small size. The entire watershed is devoted to timber management, but one public road crossing gives access to 2.8 miles of public access.

KC Creek

KC Creek is a hard water stream characterized by having neutral, clear water. It is 6.7 miles in length, and has a average width of 12 feet. The lower six miles provide an excellent brook trout fishery with a few brown trout. Few furbearers make use of this forested stream, due to the small size. Public access is available at two road crossings providing 11.6 miles of public frontage.

Little Harvey Creek

This medium hard stream has slightly acid, clear water, flows through Harvey Lake and is tributary to the South Branch Pike River. It is 3.5 miles long, has an average width of eight feet, and provides a good brook trout fishery. The small size limits wildlife value. Public access is available from 0.7 miles of public frontage. The watershed is mainly wooded.

MacIntire Creek

MacIntire Creek flows into North Pond and has an excellent brook and brown trout population. It has hard, slightly acidic, clear water. Beaver dams are present in the upper portion of this 6.5 mile, 14 foot wide stream. Muskrat also make some use of the entire stream. The entire watershed is wooded, and public access is available at one road crossing and provides 7.2 miles of public frontage.

Moon Creek

Moon Creek flows from Moon Lake to Chemical Creek. It is only 0.1 mile long but averages 15 feet wide. Trout are reported to be present. There is no public access to this forested watershed.

North Branch Harvey Creek

This stream joins the South Branch Harvey Creek to for Harvey Creek. Slightly alkaline, medium hard, light brown water characterizes this 3.4 mile, seven foot wide stream. A native brook trout population is present. Small size limits wildlife use. Public access to this forested watershed is available, but only provides 0.6 miles of frontage.

North Branch Pike River

This is a hard water stream having neutral, light brown water. The north branch joins the south branch near Amberg to form the Pike River. This stream is included in the State Wild River program along with other streams in the Pike River system. A native brook and brown trout population provide a good sport fishery. Two impoundments, North Pond and Railroad Pond contribute to the warming of the water during the summer period., thereby degrading the trout habitat. Muskrat, mink, and beaver make use of this stream, although only small numbers of these furbearers are present. Waterfowl do make some use of this stream, but it is too narrow and swift for extensive waterfowl use. Nine road crossing provide 20.6 miles of public frontage. A total of 14 falls and rapids are present on this 30 mile, 38 foot wide river. Marinette County

maintains a park with camping units and a picnic site at Twelve Foot Falls, and a small picnic site at Carney Rapids. The watershed is primarily forested with scattered areas of agriculture.

Shinns Branch

Shinns Branch has hard, slightly acid, clear water. It is tributary to Sidney Creek, and has a native brook trout population. Small size (3.5 miles long, three foot average width) limit the wildlife value. One road crossing provides 4.9 miles of public access to the forested watershed.

Sidney Creek

Hard, slightly alkaline, clear water characterizes this stream that flows into North Pond. This 7.3 mile, 16 foot wide stream has a good population of brook and brown trout. Wildlife use is moderate, but waterfowl use is limited due to the small size. Two road crossings and 0.9 miles of public frontage provide public access. The watershed is primarily forested.

South Branch Harvey Creek

This stream joins the North Branch Harvey Creek to form Harvey Creek. It is 1.7 miles long, nine feet wide, and has a native brook trout population. The water is medium hard, slightly alkaline, and light brown. Small size limits the wildlife and waterfowl use. Conditional public access is possible form private forest cropland which adjoins the entire stream. The complete watershed is forested.

South Branch Pike River

This is a hard water stream having neutral, light brown water. This stream joins the North Branch Pike River near Amberg to form the Pike River and is part of the Pike River Wild Rivers System. A population of brook and brown trout provide a good sport fishery to this 18.9 mile, 41 foot wide river. Furbearers make moderate use of this stream, but waterfowl values are limited due to the steep gradient and relatively small size of the river. Four road crossings and 20 miles of public frontage provide access. The watershed is primarily forested, with limited areas of agriculture. Brock Pond, an impoundment of the river, maintains a head of approximately five feet. A total of 15 waterfalls and rapids are present on the river.

Springdale Creek

Springdale Creek is a hard water stream with slightly acidic, clear water. It is tributary to Sidney Creek. A native brook trout population is present. Wildlife values are limited due to the small size (2.8 miles long, seven feet average width). Access is available from 0.9 miles of public frontage. The watershed is forested.

Floodplains

Floodplains are often viewed as valuable recreational and environmental resources. These areas provide for storm water retention, ground water 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: providing floodproofing, repairing damage associated with flooding and high water, increased flood insurance premiums, extensive site preparation, and repairing water related damage to roads, sewers, and water mains.

As a result, the state of Wisconsin requires that counties, cities and villages adopt shoreland/floodplain zoning ordinances to address the problems associated with development in floodplain areas. Development in shoreland areas is generally permitted, but specific design techniques must be considered. Development in floodplain areas is strictly regulated and in some instances is not permitted. For planning and regulatory purposes, the floodplain is normally defined as those areas, excluding the stream channel, that are subject to inundation by the 100-year recurrence interval 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 encouraged.

The authority to enact and enforce these types of zoning provisions in counties is set forth in Chapter 59.97 of the Wisconsin Statutes and Wisconsin Administrative Code NR 116. This same authority is also vested to cities and villages in Chapter 62.23 of the Wisconsin Statutes.

Within the town of Goodman, there are approximately 7,637 acres of floodplains (Map 2.8). The floodplains are located adjacent to Sidney and MacIntire Creek in the northern part of the town, Chemical Creek and the North and South Branches of the Pike River in the central part of town, and the Harvey Creek area in the south.

Wetlands

Wetlands are areas where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophilic vegetation and which has soils indicative of wet conditions. Wetlands are important for groundwater recharge and provide habitat for a variety of plants and animals. They also provide natural open space, help maintain both surface and groundwater quality, and provide water storage areas for periods of flooding and high water. Whenever possible, wetlands should be left unaltered. Filling or draining of wetlands is also quite costly, destroys the productive capacity of the ecosystem and can adversely affect surface water quality and drainage.

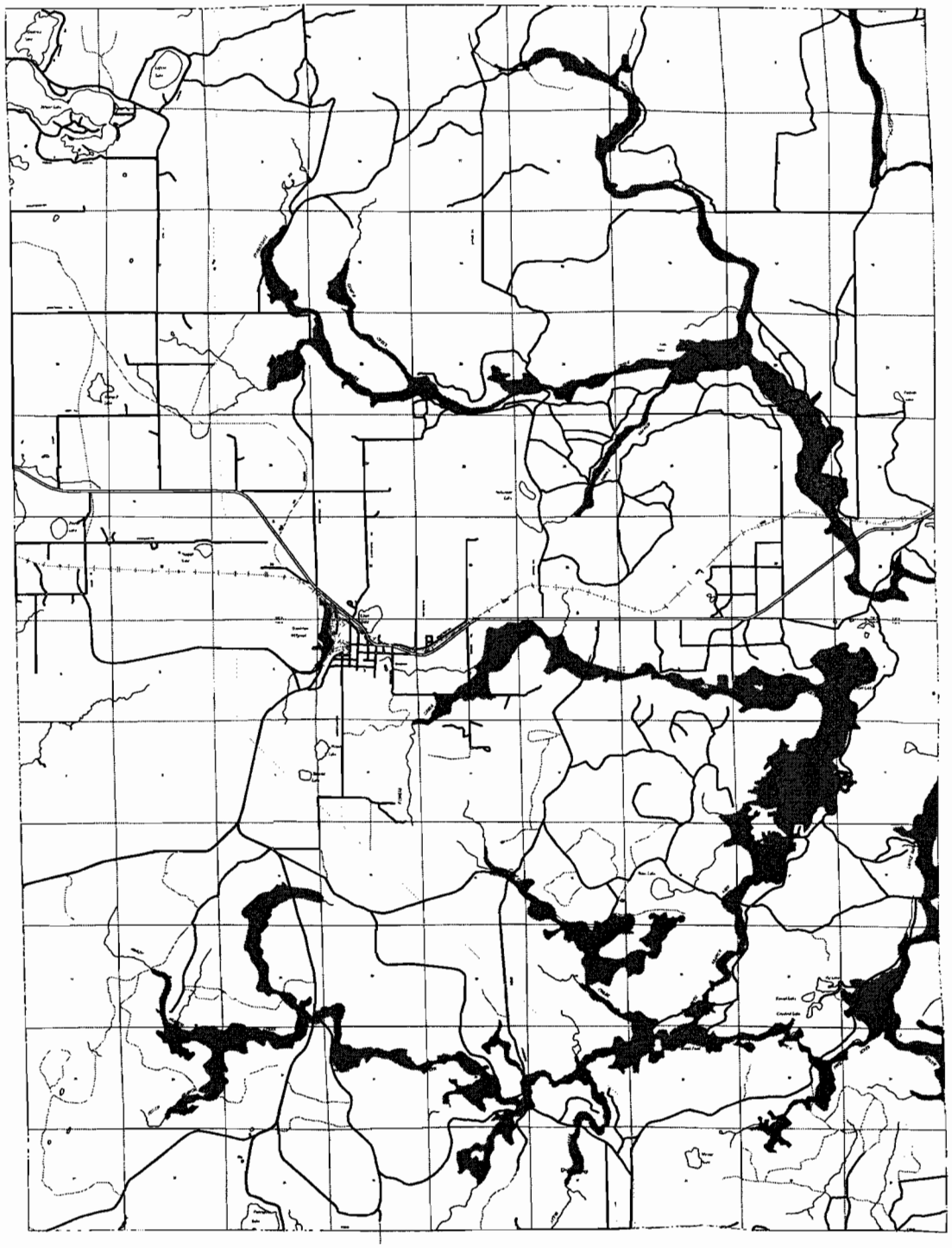
In 1972, Congress passed the Federal Water Pollution Control Act Amendments, also known as the Clean Water Act, "to restore and maintain the chemical, physical, and biological integrity" of the nation's waters. The Act defined "navigable waters" as "waters of the United States." Section 404 of the Clean Water Act established a permit program regarding discharges of dredged and filled material. In 1977, the U.S. Army Corps of Engineers issued final regulations on the Section 404 program and explicitly included "isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not part of a tributary system to interstate waters or to navigable waters of the United States, the degradation or destruction of which could affect interstate commerce." The basic premise of the program is that permits are required for the discharge of dredged or fill material into waters of the United States including wetlands. If a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded a permit may be denied. Activities that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. When a permit is applied for in conjunction with any of these activities, the applicant must show that he has: 1) taken steps to avoid wetland impacts where practicable, 2) minimized potential impacts to wetlands, and 3) provided compensation for any remaining unavoidable impacts through activities to restore or create wetlands. The permit process is often accompanied by a field review of the site.

Map 2.8

Floodplains

Town of Goodman

Marinette County, Wisconsin



100 - Year Floodplain

N

3000 0 3000 6000 Feet

Source: FEMA F.I.R.M.,1991; Bay-Lake Regional Planning Commission, 1999.

Wisconsin Administrative Codes NR 115 and NR 117 fall under the jurisdiction of the Wisconsin Department of Natural Resources 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 acres or more that are within the jurisdiction of county shoreland zoning ordinances. This wetland provision would be applicable in the town of Goodman. To protect wetlands in the incorporated areas, NR 117 was enacted in 1983 and requires that all shoreland wetlands of five acres or more be protected.

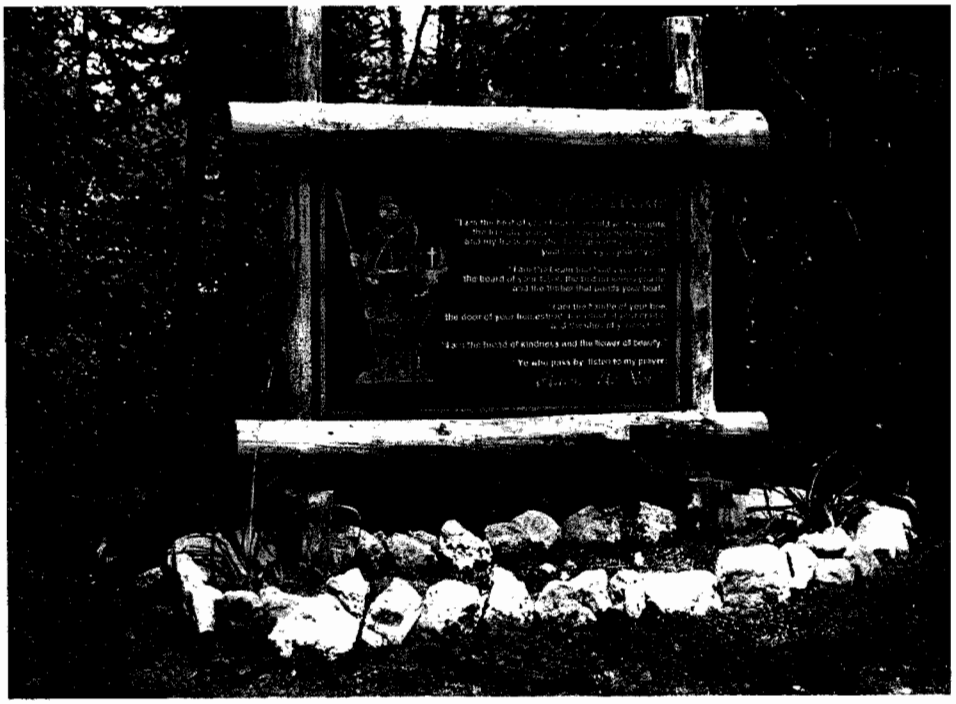
As a result of NR 115 and 117, many of the wetlands that remain today will be protected from future development.

Within the Goodman planning area, there are approximately 9,713 acres of wetlands as identified by the Special Wetlands Inventory Study. (Map 2.9) Those wetlands identified within the town are uniformly distributed throughout the planning area, mostly in the southern two thirds of the town. The wetlands primarily lay adjacent to the major surface water features within the town.

Woodlands

The town is heavily forested, approximately 90 percent, with a mix of hardwoods and conifers. There are 62,620 acres of woodlands in the town of Goodman (Map 2.10). Of these wooded areas, the vast majority are upland (86 percent) while the rest are lowland coniferous swamps. Many tree species are present including hardwoods such as sugar maple, paper and yellow birch, red maple, black cherry, northern pin oak and others. Some common coniferous species are eastern hemlock, white pine, jack pine, red pine (planted and native), balsam fir, white spruce, black spruce and white cedar.

Figure 2.3 Sign at St. Hubert Shrine

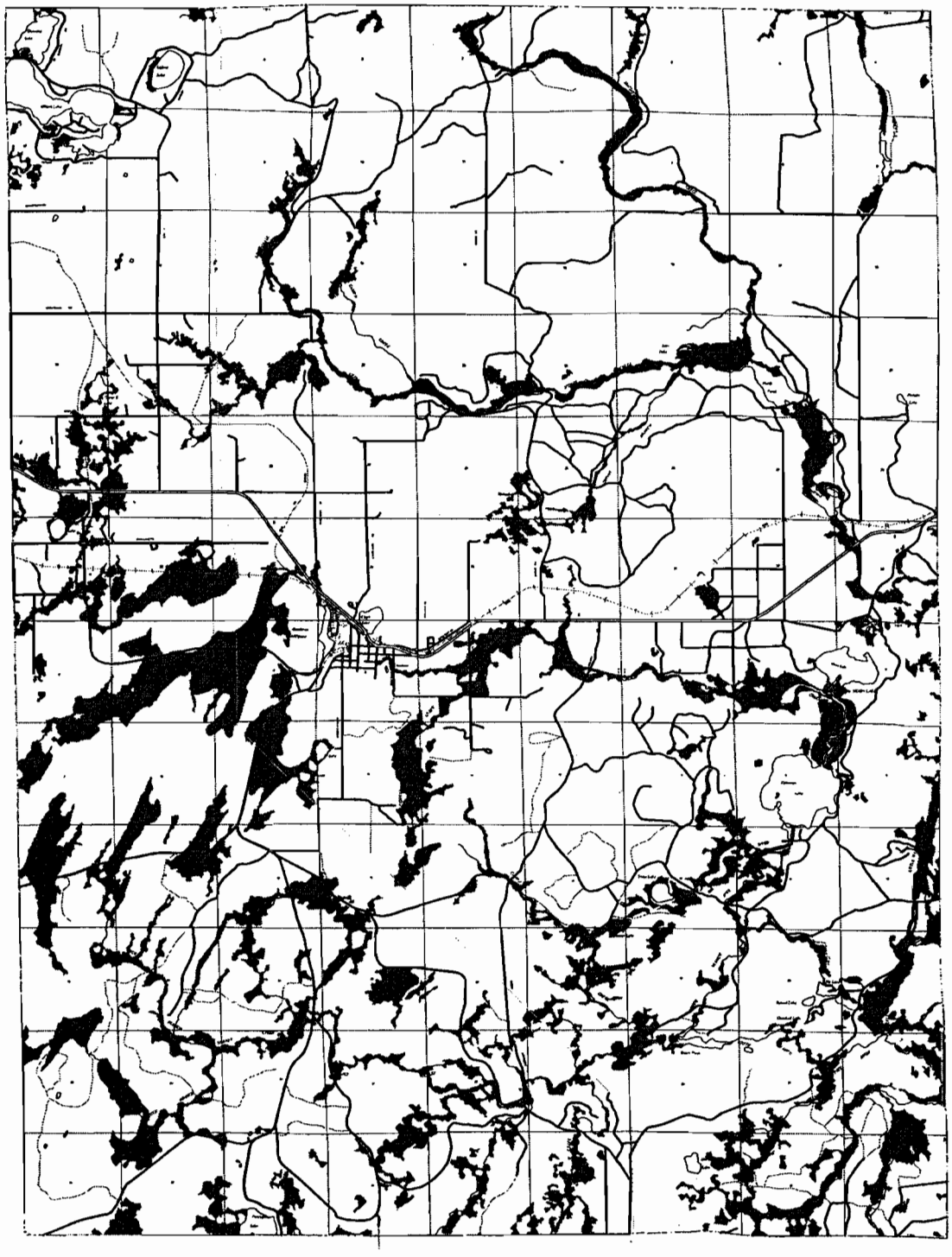


Map 2.9

Wetlands

Town of Goodman

Marinette County, Wisconsin



WDNR Wetlands

N

3000 0 3000 6000 Feet

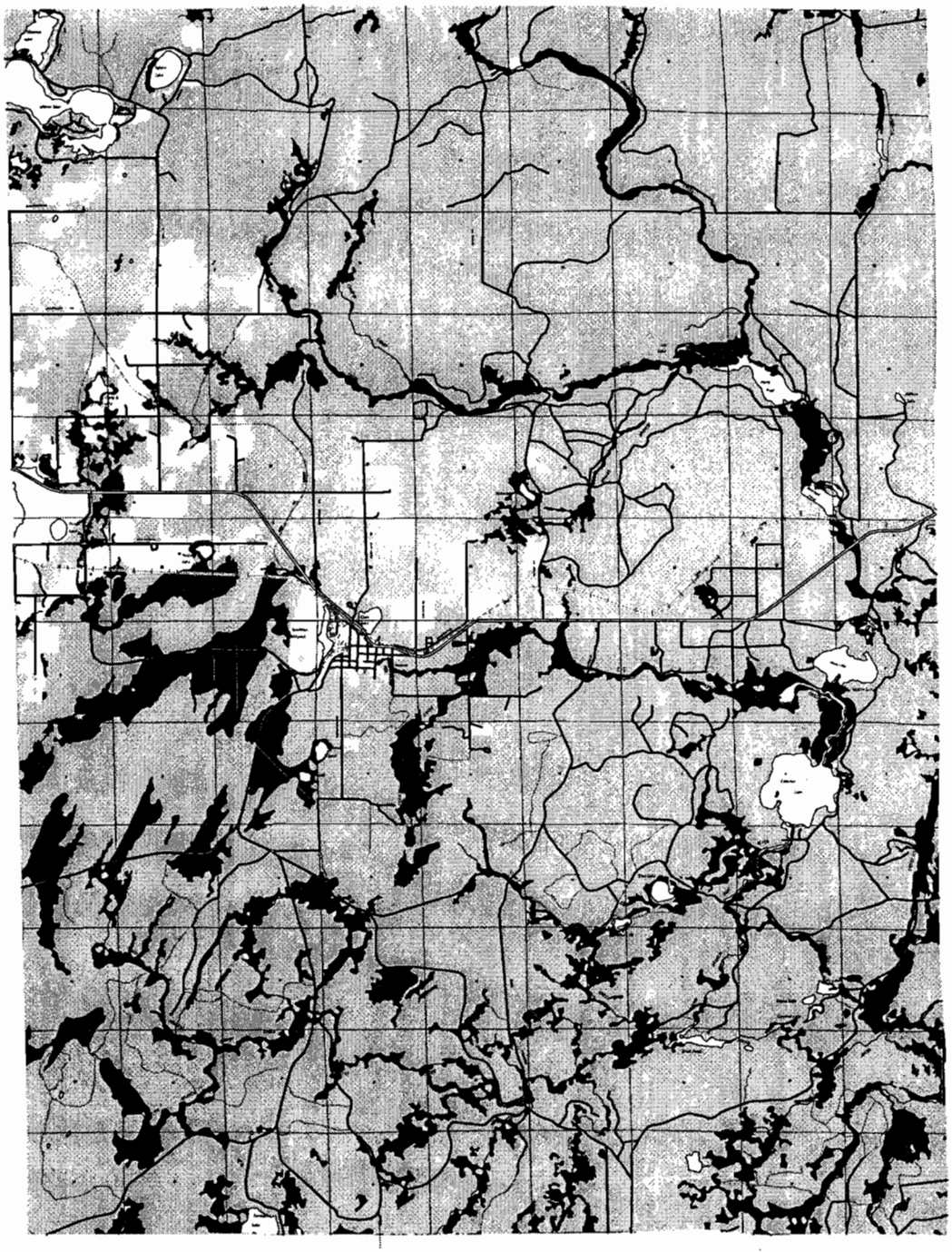
Source: WDNR, 1991; Bay-Lake Regional Planning Commission, 1999.

Woodlands

Town of Goodman

Marinette County, Wisconsin

Map 2.10



Lowland Woodlands
Upland Woodlands

N

3000 0 3000 6000 Feet

Source: WDNR, 1991;
Bay-Lake Regional Planning Commission, 1999.

Wildlife Habitat

The fauna that lives within the planning area is quite diverse. Many animals such as the white-tailed deer, black bear, bald eagle, grouse, coyote, gray wolf, porcupine, beaver, muskrat, gray and red squirrel, and chipmunks are some of the more well known species found in the area. The surface waters sustain a diverse community of fish providing many opportunities for sport fishing for locals and tourists alike. Migratory fowl also frequent the area during the summer months utilizing the lakes and streams to raise their young. Much of the land is undisturbed by mankind and thus very receptive to sustaining a diverse ecological system.

National, State & County Scientific and Natural Areas

State Natural Areas are designated by the WDNR Bureau of Endangered Resources as tracts of land in a natural or near natural state, which are managed to serve several purposes including scientific research, teaching of resource management, and preservation of rare native plants and ecological communities. Dunbar Barrens is currently the only designated State Natural Area within the town (Map 2.11). This 240 acre area is in the northeastern part of the town and has unimproved access north of Hwy 8 and has state significance. This area is a rare community, very similar to the pine barrens of pre-settlement time. The area was logged in the late 1800's, followed by a period of grazing. Periodic fires have kept the area barren. The surrounding forest is comprised of Aspen, Oak, and Jack Pine. There is a well developed shrub layer and the herbaceous layer consists of strongly rhizomatous grasses and sedges. Common plants include rice grass, bearberry, blueberries, sweet fern, barrens strawberry and hawkweeds. Common birds species are upland sandpiper, eastern bluebird, vesper sparrow, field sparrow and clay-colored sparrow. There is a diverse and unusual lichen flora. A complete plant species list and breeding bird survey are on file.

Historic and Archeological Sites

In the town of Goodman there are only two listed historical sites, both sit within the community of Goodman (Map 2.12). The Goodman ranger station is located in section 34 of T36N, R17E. The building, which was owned by the Department of Natural Resources until recently, now has private ownership, and has been standing since 1936. The second site is Goodman Lumber Company, also in the community of Goodman. The mill was established in 1908, and was one of the first forests to adopt the practice of selective cutting and one of the first sustained yield forest operations in the country. There are no listed archeological sites.

Environmental Corridors

Many of the Commission's planning activities require delineation of environmental corridors (comprehensive plans, watershed plans, sewer service area plans, etc.). Environmental corridors 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. Typically, environmental corridors contain wetlands, water features, floodplains, natural and scientific areas, woodlands, parks and recreation areas, areas of steep slope, and other unique natural features which overlap or are contiguous. The concept of a corridor is based on the delineation of environmental features adjacent to waterways and water related resources.

The Commission has identified environmental corridors for the town of Goodman planning area to help in identifying areas that have the greatest need for protection. These corridors (Map 2.13) were delineated through the use of the Commission's Geographic Information System (GIS) to overlay a variety of features. The environmental corridors total 20,343 acres of land within the planning area and include: wetlands, floodplains, areas of steep slope (having a slope greater than 12 percent), water resources and a 75-foot setback from these water resources.

Town of Goodman Water Quality Data Inventory

The Marinette County Land & Water Conservation Department (LCD)has collected data about lakes for a county wide lake classification projects. In the past year the LCD has inventoried about 70 lakes in the county during the summer of 1999. Characteristics of the lakes inventoried included: total phosphorus, Secchi disk depths, developed lots, flora species present, and TSI numbers based on total phosphorus and Secchi disk. Twenty-two lakes in the town of Goodman have been looked at. Only lakes greater than five acres were inventoried. Some lakes could not be tested for all criteria because permission was not granted by the landowners surrounding the lake. The complete results are located in Appendix B.

The Wisconsin Department of Natural Resources started a monitoring study in the 1970's to inventory all the lakes in the state. The result of this study was the Surface Water Features manuals for each county. The data from that study was previously stated in the "Water Resources" section of this chapter. The DNR also put together a report called the *Upper Green Bay Basin Water Quality Management Plan* in 1993, that inventories some of the lakes in the town. The goal of this report was to identify areas of water quality concerns and identify management objectives for the water resources of the Upper Green Bay basin. Eight lakes in the town of Goodman were looked at: Coleman, Hilbert, LaFave, Moon, North, Oneonta, Porcupine, and Railroad. Of these, only one was classified with a trophic class. Moon Lake was identified as a mesotrophic lake. The results of this study for the town of Goodman are also located in Appendix B.

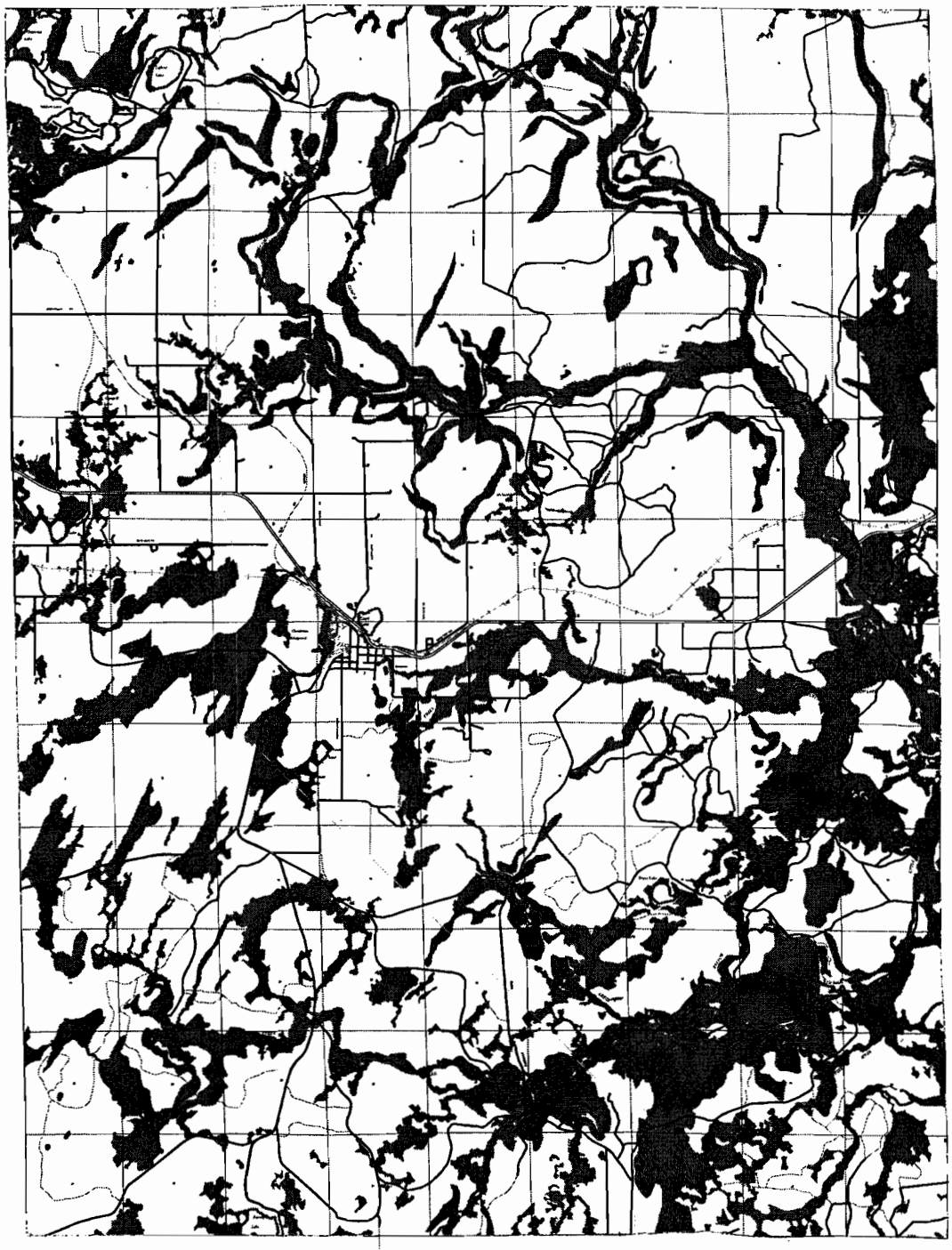
A detailed description of the more developed lakes are listed below in table form with a short description of what each element means to the overall quality of the lakes. Data from the Surface Water Features was not repeated because it was stated above. Where data was not available a "-" is used.

Map 2.13

Environmental Corridors

Town of Goodman

Marinette County, Wisconsin



Environmental Corridors

N

3000 0 3000 6000 Feet

Source: WDNR, 1991, FEMA FIRM, 1991; Bay-Lake Regional Planning Commission, 1999.

Trophic Classification of a Lake

Lakes can be divided into three general categories based upon their fertility: oligotrophic (low fertility) mesotrophic (medium fertility) and eutrophic (high fertility). Oligotrophic lakes are generally cold, clear and free of weeds or large algae blooms. Although they do not generally support large fish populations, they do have an efficient food chain supporting a desirable fishery of predatory fish. Mesotrophic lakes are an intermediary stage between oligotrophic and eutrophic lakes. The bottoms of these lakes generally lack oxygen during the later months of summer, limiting cold water fish. Eutrophic lakes are high in naturally occurring sediments such as nitrogen and phosphorous. They are likely to be weedy and/or experience large algae blooms. They support large fish populations, but are susceptible to "winterkill" due to a lack of dissolved oxygen in the later winter months.

The Trophic Status Index (TSI) numbers provide general indicators of a lake's trophic class. There are three types of TSIs. TSI (TP) is an indicator based on the total amount of phosphorus available in the lake as indicated by lake monitoring. TSI (CHL) is an indicator based on the amount of Chlorophyll a, a measure of the amount of algae present, and TSI (SD) is a measure based on the Secchi depth, and indicator of water clarity. Table 2.1 shows the ranges for TSI values and their associated trophic state.

Table 2. 1: TSI Values, Water Chemistry, and Trophic State (Adapted from Carlson, 1977)

TSI	Secchi (ft.)	Total Phosphorus (mg/l)	Chlorophyll a (mg/l)	Trophic State
0	210	0.75	0.04	Oligotrophic
10	105	1.5	0.12	
20	52	3	0.34	
30	26	6	0.94	
40	13	12	2.6	Mesotrophic
50	7	24	6.4	
60	3	48	20	Eutrophic
70	1.6	96	56	
80	0.83	192	154	
90	0.42	384	427	
100	0.21	768	1183	

Source: Bay-Lake Regional Planning Commission, 2000; Carlson, 1977.

Dissolved Phosphorus

Dissolved Phosphorus is the form of phosphorus that is dissolved in the water and is readily available for aquatic plant uptake. Phosphorus is a vital element that contributes to both the fertility and growth of plants in lakes. None of the lakes within the town of Goodman have been tested for dissolved phosphorous.

Total Phosphorus

Total phosphorus is the total phosphorus available in a lake for aquatic plant growth. It is the sum of dissolved phosphorus and the phosphorus contained in suspended plant and animal material in the water. The concentration of phosphorus varies widely over the year, due to such things as thermal stratification and settling of organic matter from the lake surface to the bottom. In addition to naturally occurring in nature, phosphorus enters lakes through many human activities. These include livestock wastes, sewage effluents and applications of agricultural fertilizers. Table 2.2 lists water quality compared to the amount of total phosphorus in the lake.

Table 2. 2: Water Quality Index by Total Phosphorus

Water Quality Index	Total Phosphorous (mg/l)
Very Poor	>150
Poor	55-150
Fair	32-55
Good	16-32
Very Good	2-16
Excellent	<2

Source: MMA, Inc., Bay-Lake Regional Planning Commission, 2000.

Within the town of Goodman, twelve lakes have been tested for the total phosphorus available in the water. Table 2.3 lists the total phosphorus found in the five most developed lakes and the TSI number that corresponds to it.

Table 2. 3: Total Phosphorus, Water Quality Index and TSI

Lake	Total Phosphorus (mg/l)	Water Quality Index	Total Phosphorous Trophic Status Index (TP)
Hilbert	9.0	very good	45.2
LaFave	7.0	very good	43.3
Mirror	11.0	very good	46.8
Oneonta	14.0	very good	48.6
Petryk	13.0	very good	48.1

Source: Marinette County LCD, 1999; Bay-Lake Regional Planning Commission, 1999.

All five of the lakes have a "very good" water quality index in terms of total phosphorus.

Chlorophyll a Pigment Concentration

This parameter is used as an estimation of algae, or phytoplankton biomass, in lakes. Lakes that appear to be clear or blue will generally have chlorophyll levels less than 10 micrograms per liter (mg/l). Within the state of Wisconsin, the average concentration of chlorophyll a in lakes was 14.8 mg/l with sixty-five percent of the lakes having a value of less than 10 mg/l. None of the lakes in the town of Goodman were tested for chlorophyll a levels

Secchi Depth

Secchi depth is a good indicator of a lake's overall water quality. It measures color and turbidity while taking into account algae growth as well. Table 2.4 shows the water quality corresponding to the Secchi depth.

Table 2. 4: Secchi Depth and Water Quality

Water Clarity	Secchi Depth (ft.)
Very Poor	3
Poor	5
Fair	7
Good	10
Very Good	20
Excellent	32

Source: MMA, Inc., Bay-Lake Regional Planning Commission, 1998.

Seven of the lakes in the town have been tested for Secchi disk depth by the LCD. Below are the results of five of those lakes, including the water clarity interpretation and the TSI number that

corresponds to it. All the lakes were tested in the 1975 study to complete the Surface Water Features of Marinette County study.

Table 2. 5: Secchi Depth, Water Quality and TSI

Lake	Feet	Interpretation	Secchi Depth Trophic Status Index (SD)
Hilbert	16	Good	37.1
LaFave	15	Good	38.1
Mirror	10	Good	43.9
Oneonta	7.5	Fair	48.1
Petryk	8	Good	47.1

Source: Marinette County LCD, 1999; Bay-Lake Regional Planning Commission, 1999.

All of the developed lakes in the town of Goodman have a "good" Secchi disk reading, except for Oneonta, which is on the border between having a "fair" and a "good" reading.

pH

pH is a measure of the hydrogen ion concentration in lakes. This parameter has been shown to have important consequences in aquatic ecosystems. Different pH values will support different compositions of both plant and animal species in a lake. Some factors that affect the pH of lakes include bedrock composition and acid rain. A pH less than 7 is considered acidic; a pH of 7 is considered neutral and more than 7 is considered alkaline. The lakes in the town have not been recently tested for pH. Table 2.6 lists the effects on fish species at different pH levels.

Table 2. 6: Effects of Acidity on Fish

pH	Effect
6.5	Walleye spawning inhibited
5.8	Lake trout spawning inhibited
5.5	Smallmouth bass disappear
5.2	Walleye, lake trout disappear
5.0	Spawning inhibited in many fish
4.7	Northern pike, suckers, sunfish disappear
4.5	Perch spawning inhibited
3.5	Perch disappear
3.0	Toxic to all fish

Source: Olszyk, 1980; Bay-Lake Regional Planning Commission, 1999

Fecal Coliform

Fecal coliform are coliform bacteria originating from animal feces. A high count of fecal coliform (greater than 200 colonies per 100 ml sample) usually indicates raw sewage is entering the lake. There is currently no data on the amount of fecal coliform entering any of the lakes within the town of Goodman.

Color

The color of the lake is dependent on the amount of material dissolved in the water. For the most part, concern over color is mainly aesthetic. However, color also can affect heat absorbency and light penetration of lakes, therefore affecting the depth at which plants can grow. In the following table the range and color content of lakes is described. The lower the color, the less brown the water is. Table 2.7 lists the lake color in developed lakes in the town.

Table 2. 7: Lake Color, Town of Goodman Lakes

Lake	Color
Hilbert	Clear
LaFave	Clear
Mirror	Light Brown
Oneonta	Light Brown
Petryk	Clear

Source: WDNR 1971; Bay-Lake Regional Planning Commission, 1999.

Turbidity

The turbidity of a lake is the measure of the amount of organic and inorganic matter that is suspended in the water. Turbidity directly affects heat absorbency and light penetration of lakes, therefore affecting the depth at which plants can grow and thereby decreasing the amount of dissolved oxygen in the water. The level of turbidity can be measured using either Jackson Turbidity Units (JTU) or Nephelometric Turbidity Units (NTU). The two measurements can be assumed to be the same. The average level of turbidity in Wisconsin lakes has been measured at 3.1 JTU. There is no available data on turbidity for the lakes within the town of Goodman.

Dissolved Oxygen (D.O.)

Dissolved oxygen is vital for both fish and other aquatic life. It is the amount of oxygen in the water that is available to these species. Most sport fish species cannot survive long with D.O. levels below 5 mg/l. Few fish tolerate levels below 2 mg/l. The total amount of oxygen that water holds inversely varies with the temperature of the water. For example, water at 33 degrees Fahrenheit contains approximately 14.2 mg/l at saturation, while water at 75 degrees is saturated at 8.4 mg/l. Lakes acquire oxygen from two sources, exchange with the atmosphere and oxygen production by aquatic plants. This means oxygen is produced only in the upper area of the lake. In stratified lakes this oxygen rich layer gets circulated to the bottom every spring and fall. This is called turnover. More nutrient (eutrophic) stratified lakes suffer oxygen depletion at a much faster rate than less nutrient (oligotrophic) lakes (Marinette County LCD, 1999). The lakes within the town of Goodman were not sampled for dissolved oxygen.

The purpose of gathering lake water quality data is to assign a trophic class level to the lakes in order to determine the best means of managing the lake. Based on numbers in table 2.1, a trophic class can be predicted for each of the lakes. Table 2.8 lists the predicted trophic class for the most developed lakes in terms of Secchi disk and total phosphorus.

Table 2.8: Trophic Class, Town of Goodman Lakes

Lake	Trophic Class (Secchi Disk)	Trophic Class (Total Phosphorus)
Hilbert	Oligotrophic	Mesotrophic
LaFave	Oligotrophic	Oligotrophic
Oneonta	Mesotrophic	Mesotrophic
Mirror	Mesotrophic	Mesotrophic
Petryk	Mesotrophic	Mesotrophic

Source: WDNR 1980, 1993; Bay-Lake Regional Planning Commission, 1998.

Hilbert Lake

The Secchi disk readings for Hilbert Lake were 16 feet and a TSI 37.1. These numbers are on the border between oligotrophic and mesotrophic. The phosphorus readings were 9 mg/l and a TSI of 45.2. These numbers indicate the lake being mesotrophic. Hilbert Lake is the biggest and most

developed (85 percent) lake in the town, and it is unlikely to see much more development. Care should be taken to keep the existing undeveloped shoreline natural and to restore developed shoreline to reduce sediment loading impacts from development.

LaFave Lake

LaFave Lake has Secchi disk readings (15 feet, TSI of 38.1) and phosphorus readings (7 mg/, TSI of 43.3) that indicate that the lake is oligotrophic. The lake is fairly developed (63 percent), and shows little impact from the development based on these numbers. There is a large wetland on the western side of the lake, which may help to reduce the nutrient loading into the lake. This wetland should stay intake to help keep the higher water quality.

Mirror Lake

Mirror Lake is a mesotrophic, or moderately nutrient rich lake in terms of both Secchi disk and total phosphorus. The Secchi disk readings were 10 feet, and 43.9, while the phosphorus readings were 11 mg/l and 46.8. The lake is not very developed (33 percent) due to the fact that the northern and western shoreline is owned by the county.

Oneonta Lake

Oneonta Lake has the highest TSI readings of the five lakes (SD of 48.1, TP of 48.6). These numbers are on the high end of a mesotrophic lake. The lake is fairly developed (65 percent), and has a nice size, undeveloped wetland on the south end of the lake. The east and west sides of the lake are steep slope, and if houses are built on top the slope, runoff is increased down the slope into the lake if vegetation is removed. The wetland should remain intact, and care should be taken when new development occurs on steep slope to remove as little vegetation as possible.

Petryk Lake

Petryk Lake is a mesotrophic lake in terms of both the Secchi disk readings (8 feet, TSI of 47.1) and total phosphorus (13 mg/l, TSI of 48.1). These numbers are on the high end of being mesotrophic. Only three percent of the lake is developed, and it is unlikely that any more will be developed because the whole lake is surrounded by a wetland. The two developed lots on the lake are unlikely to impact it very much.

The data previously listed, where available for the town of Goodman lakes, was obtained from the following resources:

Carlson, R.E. A Trophic State Index for Lakes. Limnology and Oceanography; 25(2): 379-82. 1977.

Marinette County Land & Water Conservation Department, Lake Classification Study-Draft Reports, 1999.

Olszyk, D. 1980. Biological Effects of Acid Rain. Testimony, Wis. Public Service Commission Docket No. 05-EP-2. 5 pp.

Wisconsin Department of Natural Resources. 1975. Surface Water Resources of Marinette County. Madison, Wisconsin.

Data Needs

In order to determine what is happening to the lakes within the town of Goodman basic water data information is needed in order to determine a trend in water quality. The Wisconsin Department of Natural Resources has developed criteria for developing a long term trend lake monitoring program.

At a minimum the WDNR recommends testing surface total phosphorous five times per year, with one being during the spring turnover; Secchi disk readings as much as possible, but a minimum of five times per year; and test for chlorophyll a four times per year. These tests will

allow for a Trophic State Index (TSI) to be developed and approximate the relative age of a lake, as well as provide a base level of information to determine water quality trends over a period of time. Table 2.9 lists the entire process for long term monitoring of a lake, as prescribed by the Wisconsin Department of Natural Resources:

Table 2. 9: Long Term Trends Lake Monitoring Methods Summary

Parameter	Approximate Date of Collection					Remarks
	Spring Turnover	Mid June	Mid July	Mid August	February	Sampling site should usually be located at the deepest point for natural lakes and large reservoirs
Complete water chemistry	X					Two depths: 1 foot from the water surface and 2 feet above the lake bottom. Eighteen constituents:NO2-N + NO3-N, NH3-N, KJN-N, Cl, Org.N, Dissolved P, Ca, Mg, Na, K, pH, SO4, total alkaline, Fe, Mn, color, turbidity, total dissolved solids, volatile solids, and suspended solids.
Total Phosphorous	X**	X***	X***	X***	X**	** = 2 depths: 1 foot below water surface and 2 feet above the lake bottom. *** = Third additional depth at the top of the hypolimnion
Water Temperature, dissolved oxygen, pH and specific conductance	X	X	X	X	X	Profile - 1 foot below water surface and proceed to lake bottom using 3-6 foot intervals, depending on existing conditions and/or total lake depth. pH and conductance dependent on meter availability.
Chlorophyll a	X	X	X	X	X	One depth - 1 foot below water surface and at depth of observed metalimnion oxygen maxima
Secchi disk depth	X	X	X	X		Minimum frequency - Weekly by local observer is better
Lake water level	X	X	X	X		Minimum frequency - Weekly by local observer is better
Fish survey						Netting during spawning season, boom shocking after September 1. Shocking every other year. Gill netting every sixth year
Perch (Hg)				X		
Macrophyte			X	X		Survey every third year (general abundance and location by species)
Phytoplankton	X	X	X	X	X	Water collected at 1 foot depth with Kemmerer (identification and general abundance).
Zooplankton	X	X	X	X	X	One vertical tow with a plankton net (identification and general abundance).
Macroinverte-brates					X	Late winter sampling in lake and in stream.

Source: Wisconsin Department of Natural Resources, 1998.

CHAPTER 5 - FINDINGS

INTRODUCTION

The purpose of this study is to inventory the existing natural features and land use and based on that determine the needs for water quality data. The following findings and recommendations will help future planning and proper management of the land and water based natural resources. Based on the information contained within this report, recommendations regarding future development and planning activities have been developed which, if implemented, should assist in lessening any negative impacts on the water quality associated with increased shoreline development. These recommendations are broken down into several categories with specific recommendations contained below them.

Water Quality Data Needs

The Marinette County Land and Water Conservation Department has a good start in obtaining complete, up to date data on the lakes within the county. Other data that should be collected include pH, fecal coliform, chlorophyll a, and turbidity. If possible, data should be gathered four to five times a year, as indicated by the DNR The most complete data set to be gathered is listed in the Chapter 2, Long Term Trends Lake Monitoring Chart. If all of the data within the table cannot be gathered then at a minimum Secchi disk readings, temperature, chlorophyll a, total phosphorous and dissolved oxygen should be obtained as much as possible. In time, this data will show trends, so that any developmental impact on water quality within the town can be identified early. This will allow ample time to try to fix any problems that might have occurred.

In order to maintain the water quality within the town of Goodman, the county should use the U.S. Forest Service's Best Management Practices in conjunction with the Shoreland/Wetland Ordinance Permitting Process to control shoreline erosion.

Land Use and Zoning Recommendations

Comprehensive Land Use Planning

The town of Goodman should initiate a long-term *Comprehensive Land Use Plan* or Marinette County should update their 1990 Marinette County Community Development Plan. Such a plan should incorporate, at a minimum:

- An analysis of past/projected demographic trends;
- An inventory of existing natural features and current development patterns;
- An inventory of existing community facilities/public services;
- A formally adopted land use plan for a 20 year period which is recommended to include measures to:

  Promote logical contiguous development;

  Avoid negative environmental impacts (identify conservancy areas);

  Minimize conflicting land uses;

  Establish housing development densities;

  Promote rural cluster developments rather than sprawled/scattered single family homes on larger lots.

Provide public access to recreational/natural areas;

Provide for efficient transportation;

The local land use plan should be checked for consistency with county comprehensive plans as well as with land use plans for adjacent civil divisions.

Ordinances

- Local and county-wide ordinances should be periodically reviewed and updated on a regular basis to reflect changes in the physical, social, and economic trends;
- Continue education efforts with regard to the water quality benefits of the 75-foot building setback from the town's shorelines.
- Encourage residents to maintain more than the minimum vegetative screening as called for in the Marinette County Shoreland/Wetland Ordinance.
- Provide consideration to a setback area around wetlands for development, to maintain or improve the water quality of the lakes in the town of Goodman.
- Encourage Marinette County to develop separate ordinances on rivers and tributaries designated as wild and scenic, and other cold water streams to ensure protection.
- Create a land division ordinance that would require public access to lakes as they become developed.

Public Access Recommendations

- Continue routine maintenance on the boat landings and improve as necessary.
- Improve "wilderness type" access points.
- Obtain land when available to create access points on lakes as they develop.

Future Planning Needs

- Future planning needs within the town of Goodman include developing a vision for the next twenty years in the form of a comprehensive land use plan.
- Complete an Economic Development Plan for Goodman to encourage development in the town's existing industrial park.
- Develop a town wide survey to get a better understanding of the issues and needs of the residents, both seasonal and year round.
- Apply for future grants to sample lakes for lacking water quality data.

Other Recommendations Based on Nominal Group

- Study methods to attract more permanent residents.
- Protect natural resources through education of seasonal and year round residents.
- Increase Marinette County Sheriff's patrols during peak seasons.
- Increase communication between full time and seasonal residents.