

## 5.0 NATURAL ENVIRONMENT

### 5.1 INTRODUCTION

Land development policies, explicit or implicit, that are meant to accommodate growth (plans and policies for land use location, roadways, sewer/water extension, etc), should be based upon and be compatible with certain natural resource considerations that support or can be damaged by land use activities. Natural resource elements are defined and identified by physiographic, geologic, vegetative, animal, and hydrologic characteristics. Consideration of natural resource elements should shape, structure, and provide the pattern for land development and related activities.

The protection of certain natural resources is necessary for the welfare of both people and the environment. By allowing natural processes, such as the hydrologic cycle/system, to function without impediment, property, water supply, and environment are protected. The protection of natural resources also preserves important ecological communities. Certain natural resources have more than merely aesthetic and leisure-time activity values. They are essential to long-term human survival and the preservation of life, health, and general welfare. As such, the protection and/or management of these natural resources clearly is in the public interest. The analysis of those natural resources found within a particular study area is done for the purpose of directing development away from those areas not intrinsically suitable for a particular use. Given the physical characteristics found within the study area, the intent is to at least guide development in a direction that is least disruptive. Many studies have been done to achieve this end. One such research effort was directed at identifying those resources of a region, which were considered critical to the overall ecological integrity of the region. Bayfield County has undertaken such an analysis and a document named “Bayfield County – Critical Resource Information Booklet” (April 1975) details the results of this analysis. Workgroups were formed consisting of business, government, and interested citizen representatives. Each workgroup dedicated their time to one particular critical resource. Eight such resources were analyzed:

1. Commercial Vegetation
2. Scenic Areas
3. Historical, Cultural, Architectural, and Archeological Resources
4. Natural Areas
5. Agricultural Land
6. Minerals and Special Geologic Features
7. Water Resources
8. Wildlife/Recreation

This document serves as a valuable starting point for those interested in ascertaining critical resource issues as identified by Bayfield County interested parties.

The following sections will provide further detail and an analysis of the significant natural resources found within and about Bayfield County.

## 5.2 TOPOGRAPHY

Bayfield County is located near the far northwestern corner of the state of Wisconsin and borders the southwestern shores of Lake Superior. Bayfield County is the second largest county in the state of Wisconsin and borders Douglas, Ashland and Sawyer Counties.

The county is 1,502 square miles in size. Of this total, approximately 85 percent is forested land. Much of the forested land, 468,300 acres, is publicly owned – most of it in the Chequamegon National Forest (252,500 acres). County forestlands encompass 166,100 acres and another 309,000 acres are privately owned.

The landscape of Bayfield County varies greatly from north to south. A range of hills 10 to 15 miles wide, known as the Bayfield Peninsula Ridge, lies in a northeast-southwest direction at the northeast corner of the county. The ridge is a terminal moraine left between two lobes of the retreating Wisconsin Ice Sheet.

To the southwest the hills drop abruptly to flat pine barrens, while to the northwest and southeast they reach Lake Superior. The sandy “Pine Barrens” is a flat plain extending in a belt 10 to 20 miles wide from Bayfield County across Douglas and northern Washburn into Burnett and Polk Counties. The name “Pine Barrens” is derived from the fact that the vegetation is largely jack pine savannah. The maximum elevation of 1,700 feet above sea level (USGS) is found at Mt. Telemark in the southeastern part of the Town of Cable, with additional high elevations found on the western most ridges of the Penokee Range located in the Town of Grand View in southeast Bayfield County. Immediately south of these ridges lay a series of morainic hills pitted with kettles. Lakes occupy many of the kettles and swamps and marshes are numerous and extensive. The Bibon Natural Area, a large area of tree/shrub swamp wetland, is located in the east central part of the county on the White River. The county minimum elevation is 602 feet above sea level at Lake Superior.

Lakes and ponds are particularly abundant in the southern and west central parts of the county. Large areas of the west central and north central upland are without surface waters because of the subsurface drainage through coarse-textured glacial drift and underlying sandstone. Bayfield County Land Cover is depicted in Maps 5.2 and 5.3.

Map 5.1- Topography

Map 5.2- Land Cover

Map 5.3- Land Cover 1850's and 1960's

### 5.3 GEOLOGY AND SOILS

#### *Geology*

Most of Bayfield County is underlain by ancient (Precambrian) sandstone and igneous rocks. Part of the county is underlain with Superior Red Sandstone, over which is a thick mantle of clay and gravel, forming an artesian slope. This produces an excellent source of underground water supply. Crystalline rock underlies part of the southern section of the county with granite outcroppings common along the Marengo River at the western edge of the Penokee Range.

Glacial deposits, reaching 300 feet over bedrock in some places, cover most of the county. Those deposits covering the Lake Superior lowland are generally shallow lake basin deposits. A large pitted outwash plain is located in the west central part of the county. This plain is continuous down through Douglas and into Washburn and Burnett Counties except for an end moraine that runs southeast/northwest across the county. A thin layer of drift covers the southwestern corner of the county.

The lower elevations around the fringe of the peninsula are covered with lake deposits consisting mostly of red clay, which form the base for productive soils in some areas. Steep topography and bedrock near or at the surface are found along Lake Superior in many places, providing for many scenic areas. Clayey lake deposits occurring further inland in the lowland west and southwest of Ashland and in the northwest part of the county provide for some of the most productive agricultural land in northern Wisconsin.

#### *Soils*

General Soil Characteristics - A wide variety of soils with varied suitability for agriculture, forestry, and other purposes exist in Bayfield County. Soil associations fall into five generalized categories:

#### Clayey Soils and Sandy Soils over Clay

Located around the fringe of the peninsula and in area to the west and southwest of Ashland, these soils contain the major agricultural areas of the county.

#### Sandy Soils

Dominating much of the inland areas of the Bayfield Ridge and the Pine Barrens in the west central part of the county, these soils are poorly suited for agriculture but well suited for pine trees.

- Northwest Sands Area – The NW Sands Area is a unique region that stretches southwest to northeast through Burnett, Washburn, Douglas, and Bayfield Counties. This area is largely rural in character and many local residents have lived in the area for several generations. Soils in this region are very sandy and droughty.

Within the NW Sands Area, Precambrian and Cambrian bedrock are covered with 100 to 600 feet of glacial drift with the thickest deposits in the northern part of the area. The underlying bedrock is Cambrian quartzose and glauconitic sandstone and siltstone at the southern edge. In the northern part of the area (Bayfield County), the bedrock is

Precambrian basalt, uthic conglomerate, sandstone and shale, and feldspathic to quartzose sandstone.

The NW Sands Area consists of a large nearly level to hummocky pitted out wash plain. Soils are deep sands that tend to be low in organic material and highly porous. These soils are classified as Psammants and Orthods and support the dry forests, barrens, and limited agricultural lands of the region. The entire area is highly susceptible to groundwater pollution due to the sandy porous soil.

#### Loamy Soils of Uplands

Prevalent in much of the southern third of the county, these soils are generally not well suited for agriculture but are suited for softwoods and hardwoods with forestry being the dominant land use.

#### Silty Soils of Uplands and Flats

Found only in the southwestern corner of the county these soils are poorly suited for agriculture but are suitable for some forestry.

#### Wet Mineral and Organic Soils

Found only in two places in the southeastern corner of the county, these soils are unsuitable for agriculture but are suitable for some forestry.

### 5.4 CLIMATE

Bayfield County has a humid, continental type of climate. This means that the county has long, cold winters with rather short, moderately warm summers. However, this climate is modified somewhat by the tempering influence of Lake Superior and Chequamegon Bay and by local variations in topography. Lake Superior acts as a large storage basin for heat (or cold) and thus tends to increase the number of frost-free days along the lake, but it also acts as a coolant during the summer. As a consequence, the extreme northern part of the county, surrounded by Lake Superior on three sides, has longer growing seasons, cooler summers, and slightly more precipitation than is found in the southern part of the county. The 140 to 160 day growing season along the lake is as long as the growing season in the extreme southern counties of Wisconsin.

Chequamegon Bay is usually icebound from December until April, but Lake Superior itself normally does not completely freeze over. Mean snowfall in inches varies from 50 inches near Cable to around 75 along the Upper Bayfield Peninsula. Precipitation over the year (28.0 inches) averages slightly less than the state average; however, the most important aspect regarding precipitation is the amount that falls during the growing season. In this respect, Bayfield County averages more than the state average. Of the total average annual precipitation (28.0 inches), about 13 inches runs off into the stream drainage systems. Discharge rates for streams in Bayfield County are high and quite variable, probably due to a combination of weather, soil conditions, and topography.

The average annual temperature of Bayfield County is 41 degrees Fahrenheit with recorded extremes being 107 degrees Fahrenheit and -40 degrees Fahrenheit. The latest killing frost reported at the United States Weather Bureau Station at the Ashland Experimental Station was June 23 and the earliest was August 27.

Prevailing winds are westerly from early fall through early spring and easterly the remainder of the year. April is usually the windiest month with an average of 15 miles per hour. July and August are the least windy with averages of 11 miles per hour. Since 1916, only three tornadoes have been observed in Bayfield County.

## 5.5 FORESTLANDS IN BAYFIELD COUNTY

Bayfield County is the second largest county in Wisconsin and one of the most heavily forested. Over three quarters of the land area of Bayfield County is forested, and nearly 48 percent of the county is under public ownership. The majority of public forestlands in Bayfield County are located within the Chequamegon National Forest, a multi-use public forest managed primarily for timber resources and other forest products, recreation, fish and wildlife, and wilderness opportunities. Bayfield County's portion of the national forest is approximately 270,000 acres. Bayfield County Forest lands include approximately 167,000 acres of publicly owned and managed lands. Management objectives for county forestlands are similar to those of the Chequamegon National Forest. Other publicly owned forestland within Bayfield County includes several tracts owned and managed by the state of Wisconsin.

Forestry has been the dominant land use and continues to be an important part of Bayfield County's economy. Lumbering, the first major industry in Bayfield County, began during the latter part of the nineteenth century. By the early part of the twentieth century, most of the original virgin stands of white and Norway pine and other species had been removed. Much of this cutover land became undesirable because it was not reforested, was subject to wildfires, was not suitable for agriculture, and in many cases became tax delinquent. Ultimately much of the forestland was incorporated into the Chequamegon National Forest or into county forest. These lands plus lands owned by forestry industry companies and some other privately owned lands are now productive, managed forest stands. Publicly managed land are depicted in Map 4.1 in Chapter 4.



The following table details the various forest types found in Bayfield County:

**Table 5.1: Forest Type – Bayfield County Managed Forest Land<sup>1</sup>  
Total Acreage**

Forest Type	Bayfield County	Forest Type	Bayfield County
Aspen	61,965	Red Pine	11,018
Aspen (Off-Site <sup>2</sup> )	271	White Pine	2,307
White Birch	5,557	Black Spruce	701
Cedar	298	Swamp Conifer	509
Fir/Spruce	1,907	Swamp Hardwood	2,039
Hemlock Hardwood	137	Non-Commercial Swamp	148
Northern Hardwood	22,948	Non-Commercial Spruce	162
Oak	16,291	Non-Commercial Tamarack	28
Scrub Oak	9,004	Tamarack	445
Jack Pine	16,923		
		Total	152,658 Acres

**Table 5.2: Chequamegon National Forest- Forest Types  
Total Acreage**

Forest	Bayfield County	Forest	Bayfield County
Jack Pine	21,579	Mixed Swamp Conifer	2,368
Red Pine	39,045	Cedar-Aspen-Paper Birch	5
White Pine	6,672	Oaks	30,839
Hemlock	418	Lowland Hardwoods	2868
Balsm-Fir-Aspen-Paper Birch	2,761	Northern Hardwoods	106,106
Lowland Black Spruce	3941	Aspen	70,347
Balsam Fir	170	Paper Birch	10,710
Northern White Cedar	640	Lowland Non-Forested	12,725
Tamarack	1,648	Upland Non-Forested	11,483
White Spruce-Balsam Fir- Aspen	792	Other	833
Upland Black Spruce	13		
		Total	269,872 Acres

Source: US Forest Service Stand Database, 2002

<sup>1</sup> Bayfield County Forest Comprehensive 10 Year Land Use Plan. WI Department of Natural Resources – 9/29/95.

<sup>2</sup> Non-managed land.

## 5.6 COMMON PLANT COMMUNITIES

Forest vegetation of Bayfield County is diverse and includes many of the upland and lowland forest plant communities found elsewhere across northern Wisconsin. These forest communities result from the soils, climate, disturbance, fire history, and other natural forces that occur. Several forest plant communities are dominant and account for a large portion of the forested landscape.

### *Boreal Forest*

The southern range of the true boreal forest exists in the clay region of northern Bayfield County. This community is commonly associated with shade-tolerant, long-lived species of spruce, fir, white cedar, tamarack, white pine, and associated hardwoods of white birch, aspen, and red maple. Here, past and present agricultural practices often result in successful stages whereby spruce, fir, and tag alder begin to invade abandoned farm fields.

### *Northern Forest*

This biological community dominates western and central Bayfield County. This community contains mixed deciduous and coniferous forests. Second growth aspen is a significant component of this community. The climax habitat type is predominantly sugar maple; however, the drier conditions do not allow the sugar maple to develop to its full potential. Therefore, the more shade-intolerant species such as yellow birch, white ash, oak, and white pine will usually dominate the climax habitat type. Red oak and white pine experience excellent growth if they occupy a dominant crown position.

### *Penokee Range*

This biological community is similar to the Northern Forest community. It has shallow soils and exposed rock outcroppings but lacks the well-drained soils of the Northern Forest community and supports those species more adapted to drier conditions.

### *Pine Barrens*

This biological community is associated with jack pine, scrub oak, aspen, and red pine dominating glacial outwash sand plains. The climax forest will ultimately be red pine on the mesic sands, and scrub oak and jack pine will climax on the drier, nutrient-poor sands. Therefore, a climax forest would be a mosaic of trees, associated shrubs and openings throughout. There does exist some areas of better soils where hardwoods have been able to establish themselves.

### *Grassland*

The grassland community is characterized by the absence of trees and large shrubs and the dominance of small upland shrubs.

### *Wetlands, Bogs and Riparian Areas*

These communities are characterized by soils or substrate that are periodically saturated or covered by water and further identified by vegetation types, soil characteristics, and water quality.

### *Aquatic Communities*

These communities include springs, ponds, lakes, streams, and rivers. They are also characterized by water quality and hydrogeologic conditions.

## 5.7 WILDLIFE

Forests in Bayfield County are habitat for numerous species of birds, mammals, reptiles, amphibians, and insects. Each species or group of associated species does best under different conditions related to the forest types and management within each biological community found on the county forest.

Unlike vertebrate wildlife species, no complete list of insect species or native flora is available. It is safe to say that there are hundreds of individual species of insects, lichens, mosses, grasses, ferns, shrubs, and tree species that occur in the forest.

Each habitat type is important because of the variety it provides for wildlife diversity. Some types are more important to the wildlife resource because they are both abundant and used by many species. Such habitat communities include jack pine, aspen, or northern pin oak. Types of lesser abundance such as white pine, northern red oak, upland brush, spruce-fir, swamp conifer, and grass openings are also important because they may provide the only breeding habitat available for some species or offer a critical habitat type that is needed seasonally.

### *Wildlife Within Biological Communities*

#### Boreal Forest

Bayfield County lands present one of the few opportunities in the region to promote, manage, and maintain the boreal forest community in Wisconsin. Due to its low occurrence in Wisconsin, uncommon species are associated with this habitat, such as solitary vireo and Blackburnian warbler. In addition, snowshoe hare, ruffed grouse, woodcock, bobcat, and fisher, and pine marten are associated with boreal forests.

#### Northern Forests

This community provides the best opportunity to manage for deer, bear, ruffed grouse, and woodcock. The Lake States aspen forest types are vitally important habitat for at least 116 species of birds and numerous amphibians, reptiles, and mammals. A wide variety of non-game birds and mammals are associated with uneven aged hardwoods such as red maple, sugar maple, red oak, yellow birch, and hemlock. Red oak within the hardwoods community is important to many wildlife species. Red oak acorns provide food for many species of wildlife in fall and winter months when food is generally scarce. Maple and basswood forests provide the best opportunity to manage for interior forest species. Lowlands consisting of black ash, red maple, spruce, fir, and cedar forests provide winter food and cover for many wildlife species, especially deer, snowshoe hare, fisher, and bobcat.

### Pine Barrens

Pine barrens provide habitat for sharp-tailed grouse, upland sandpipers, badgers, pocket gophers, and coyotes. Various habitat types within the Wisconsin pine barrens community, including pine and oak savannas, support at least 20 species of birds, 30 mammals, 134 plants, 25 reptiles and amphibians, and 33 butterflies and moths. Many barrens species are rare since less than 1 percent of the original barrens of Wisconsin exist today. The open nature of barrens provides abundance of forage for deer, while pine stands provide thermal cover during winter.

### Grasslands

Grasslands of various types provide essential habitat for some species of songbirds, raptors, amphibians, reptiles, deer, woodcock, waterfowl, and other species. Grasslands larger than ten acres attract many songbirds and raptors that will only nest in large open areas with grass cover and few trees. Smaller grasslands in forested areas provide feeding areas for deer, forest songbirds, and mammals. Many species of wildlife use all sizes of grasslands, including red-tailed hawks, leopard frogs, and woodcock.

### Wetlands and Riparian Areas

Forest areas of Bayfield County contain a multitude of natural wetlands comprised of cattail marshes, sedge meadows, ephemeral forest ponds, bogs, lakes, and streams. These wetlands and riparian areas provide habitat for a vast number and variety of wildlife, plants, and insects.

## 5.8 ENDANGERED AND THREATENED SPECIES

The timber wolf is the only known endangered wildlife species with a viable population in the county. There are two historic wolf territories located partially on county lands, with as many as nine plus wolves known to reside in the county in 1993. This comprised nearly 20 percent of the state's wolf population at that time. It was estimated in 1996 that the total wolf population in the Northwest Wisconsin core and buffer zones was in the neighborhood of 100 animals. (See Map 5.4 on following page.) The population of wolves appears to be still on the rise. Currently wolves are listed as threatened in Wisconsin but endangered on the federal level. It is anticipated that wolves will be delisted as endangered in Wisconsin when the federal government reclassifies them as threatened.

An endangered species that may exist in the forests of Bayfield County is the pine marten, which is expected to eventually establish a resident breeding population. Three known federally threatened species in the forest are bald eagles, ospreys, and wood turtles. Eagles and osprey were "delisted" from endangered to threatened since the last county ten-year forest land use plan was written. In addition, there may be several threatened and endangered species of plants and insects in the forest.

Elk have been reintroduced into the county and are beginning to establish viable populations in the Chequamegon National Forest area. The current elk range is approximately 43 square miles and encompasses an area that includes Sawyer, Price, Ashland, and Bayfield Counties. Map 5.5 indicates the core and buffer ranges that were initially determined in the Wisconsin Elk Suitability Analysis, developed by the Great Lakes Indian Fish and Wildlife Commission and the

Wisconsin Department of Natural Resources. This analysis was submitted as the initial project proposal in November 1999.

One listing of endangered resources that are present on county-owned lands (see Appendix A.1) is available from the Wisconsin Natural Heritage Inventory (NHI). NHI is a database of rare, threatened, and endangered species and natural communities throughout Wisconsin broken down into their constituent watershed or county areas. This list is a summary of information regarding endangered resources from NHI and is available at the Wisconsin Department of Natural Resources website (<http://www.dnr.state.wi.us>) Bayfield County species that are present in this inventory are listed in Appendix A.1.

Map 5.4 – Wolf Habitat Range

Map 5.5 – Clam Lake Elk Range

## 5.9 WATER

### *Outlying Waters: Lake Superior*

The formation of the Lake Superior Basin was a complicated process of volcanism, bedrock faulting, and glacial action. Many of the geologic events that influenced the location, depth, and shape occurred as much as a half-billion years ago. Following that time, the earth cooled and shrank resulting in a huge depression in the earth's surface between two parallel fault lines. This was followed by long periods of weathering and glacial action and eventually resulted in the present lake basin configuration.

The Bayfield County mainland shore bordering Lake Superior is 86.2 miles in length, more than one-third of Wisconsin's Lake Superior shore. Four of the Apostle Islands (Eagle, Sand, York and Raspberry) are within the county's boundary. The combined area of the four islands is 3,470 acres, 1,025 acres of which is in public ownership. They have a total shoreline of 18.5 miles, of which 6.5 miles is public frontage.

A survey of the south Lake Superior shoreline published by the Department of Resource Development recognizes 13 different Lake Superior shoreline types. Bayfield County has a total of 10 different shore types. This indicates from the standpoint of visible physical features that Bayfield County is conceivably the most scenic of the four Wisconsin counties bordering Lake Superior. The reddish-brown sandstone bluffs and caves of the Bayfield Peninsula are probably the most unique and interesting of all formations found along the south shore. They combine steep topography, exposed rock bluffs, established vegetation, and water in a most beautiful setting. The shoreline of Bayfield County is also very irregular with sand beaches located within the many bays. Clay bluffs with narrow sand beaches on the lake edge are also common. The Fish Creek Sloughs, which lie west of Ashland just inside of the Bayfield County line, provide a marked visual contrast from either the sandstone or clay bluffs. The entire Bayfield County shore is continuously changing due to the fierce wave action that erodes and undercuts the many bluffs that border Lake Superior.

### *Inland Surface Waters*

The total inland surface water area of the county is 23,676 acres. Of this figure, 22,685 acres are the surface water area of 966 natural lakes and impoundments, and 991 acres are the surface area of 125 streams. Total stream length is 531.1 miles, of which trout streams comprise 429.8 miles. Frontage on both sides of streams totals 1,062.2 linear miles, with 381.9 miles in public ownership. Total lake shoreline totals 732.1 miles, of which 258.7 miles is in public ownership. Even though stream frontage is greater than lake frontage, the ratio of water area to frontage on streams is much less than that on lakes. In comparison, there is 5,656 feet of stream frontage per surface acre of water and 170 feet of lake frontage per acre of lake surface.

The surface water area of natural lakes accounts for 99 percent of the total lake surface area in the county, while 1 percent is in impounded waters. Most of the lakes are small with 672 or 70 percent being less than 10 acres, comprising only a fraction (8%) of the total surface water area of county lakes. There are 41 lakes and impoundments (4%) over 100 acres in size that comprise 57.5 percent of the total surface lake acreage of the county. Namekagon Lake, having surface water acreage of 3,208.3 acres, is the largest lake in Bayfield County.



Lake depths vary considerably from shallow ponds to deeper bog lakes with their characteristic steep-sloping shores. Cisco Lake, with a maximum depth of 105 feet, is the deepest lake in Bayfield County and the seventh deepest lake in Wisconsin.

A total of 112 streams or 90 percent of the 125 permanently flowing streams in Bayfield County average less than 20 feet in width. The Namekagon and White Rivers are the two largest streams in the county with average widths of 58 and 44 feet, respectively. Stream gradients vary from a steep 250 feet drop per mile of Birch Run Creek to the 6 feet per mile gradient of the Namekagon River. Generally, those streams that flow into Lake Superior from the Bayfield Ridge have higher gradients than other streams in the county.

The lakes of Bayfield County fall into four main types when classified by water source and chemistry: hard water drainage, soft water drainage, hard water seepage, and soft water seepage lakes. In addition to these four classes, four other subtypes of lakes have been added for more descriptive purposes. They are drained lakes, acid bog lakes, alkaline bog lakes, and spring ponds.

The most common type of lake in Bayfield County is the soft water seepage lake. There are 634 such lakes and they range in size from 0.1 to 262.5 acres in size. These lakes are typically clear, slightly acid, and relatively infertile waters. The acid bog lakes, numbering 180, are the second most numerous type of lake. These are highly acid in pH, darkly colored, and also have low productivity. The acid bog type lake, averaging 3.5 acres in size, has the smallest average size of the eight recognized types. A total of 41 spring ponds or limnokrenes average next to the smallest at 3.8 acres per lake. These shallow, detritus, and silt-filled ponds are extremely important in providing the essential spring water flow needed for trout habitat. A total of 30 soft water drainage lakes have an average size of 210 acres. They have the largest average size of the various lake categories.

In the Bayfield County Critical Resource Information Booklet<sup>3</sup>, various lakes and streams have been identified as “potentially critical resources”. These lakes and streams can be found in Appendix A.2.

## 5.10 WATERSHEDS

Surface waters of Bayfield County drain into six major basins: the Bayfield Peninsula Northwest Watershed, the Bayfield Peninsula Southeast Watershed, the Fish Creek Watershed, the Iron River Watershed, and the Upper Chippewa and St. Croix river basins, both of which ultimately drain into the Mississippi River. Several short rivers with relatively steep gradients drain directly into Lake Superior while the White River drains into the Bad River before flowing into Lake Superior. The St. Croix River drains an area in the southern part of the county. Two of the basin’s rivers have their headwaters in Bayfield County, the Namekagon River, which begins at Lake Namekagon, and the Eau Claire River that begins at the Eau Claire Lakes. Only a small part

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<sup>3</sup> Bayfield County Critical Resource Information Booklet, Institute for Environmental Studies, University of Wisconsin-Madison, April 1975.

of the county in the extreme southeastern corner drains into the Upper Chippewa basin. The first four watersheds are described in detail below and are depicted on Map 5.6.

### *Bayfield Peninsula Northwest Watershed*

This watershed includes the western half of the Bayfield Peninsula and Sand Island of the Apostle Islands. The National Park Service from its City of Bayfield office manages Sand Island. The U.S. Forest Service manages portions of the watershed as part of the Chequamegon National Forest.

A number of streams draining the Bayfield peninsula have coastal wetlands at their mouths. Two sites in this watershed, the Flag River and Cranberry River, are part of the South Shore of Lake Superior Fish and Wildlife Area, a Wisconsin Department of Natural Resources (WDNR) land acquisition project. The project was approved in 1992 with an acquisition goal of 8,690 acres. The project goal is to maintain and enhance highly valuable coastal wetlands and watersheds supporting migratory trout and salmon species.

Saxine and Mawikwe Creeks and an unnamed stream at T51N R5W S19 form small areas of coastal wetlands at their mouths in Mawikwe Bay. Other than these coastal wetlands, the Mawikwe Bay shoreline is primarily sand beach. The western arm of the bay forms Mawikwe Point, off of which lake trout spawn. The Lake Superior Binational Program identified these small tributaries to Mawikwe Bay as important to the integrity of the Lake Superior ecosystem for coastal wetlands and fish and wildlife spawning and nursery grounds.

The shoreline from the mouth of Saxine Creek in Mawikwe Bay east beyond the watershed boundary between Sand Bay and Little Sand Bay is under federal protection as part of the Apostle Islands National Lakeshore. This area includes some unique land features, including undercut cliffs that form sea caves. Little Sand Bay is a small inlet between Big Sand Bay and Point Detour. It sports a small area of coastal wetlands, a sand beach, and hemlock and cedar. The National Park Service owns this area and tour cruises operate from a small marina in the area. This area is identified by the Lake Superior Binational Program as habitat important to the integrity of the Lake Superior ecosystem for coastal wetlands and rare communities.

The lower reaches of this watershed, like most in the basin, have unstable red clay soils that are easily eroded if the soil is disturbed. Forestry activities in red clay soils need to employ best-management practices that are even more protective of riparian areas.

Map 5.6 – Watersheds

### *Bayfield Peninsula Southeast Watershed*

This watershed includes the eastern half of Bayfield Peninsula and all the Apostle Islands except Sand Island. All of the Apostle Islands except for Madeline Island are under the management of the National Park Service, which operates an office in the City of Bayfield. The U.S. Forest Service manages a significant central core of the peninsula as part of the Chequamegon National Forest, and the Red Cliff Band of Lake Superior Chippewa manage the Red Cliff Indian Reservation tipping Bayfield Peninsula. Other significant landholders in the watershed include Bayfield County forestlands.

This watershed exhibits the highly erodible red clay soils typical of the southern Lake Superior basin. Any land use that disturbs soil or soil cover can contribute to severe erosion. Best Management Practices applied to forestry and agricultural uses are necessary in these soils. Additionally, silvicultural activities should be even more curtailed in riparian areas to prevent severe erosion.

Several streams draining Bayfield Peninsula have coastal wetlands at their mouths. Two sites in the Bayfield Peninsula Southeast Watershed that drain to Chequamegon Bay, Pikes Creek and the Sioux River, are part of the South Shore Fish and Wildlife Area, a WDNR land acquisition project. These two wetland areas are threatened by degradation from land use practices.

Some 900 permit applications for 40-acre Chequamegon Bay bottom parcels have been made for the purpose of removing submerged, waterlogged wood that was lost during the region's intensive logging past. WDNR foresees few problems as long as logging does not disturb contaminated sediments and if enough logs remain behind to provide a substrate for the organisms upon which fish feed.

The Lake Superior Binational Program identified several areas important to the integrity of the Lake Superior ecosystem. Most are discussed under individual narratives for streams. In the Chequamegon Bay north of Washburn, whitefish spawn in the fall off the exposed scenic and rocky cliffs of Houghton Point. The area is deemed important for its fish and wildlife habitat and nursery grounds.

### *Fish Creek Watershed*

The watershed boundary used to be drawn to include Beartrap Creek, Wood Creek Slough, and Kakagon River sub-watersheds. The ecological significance of the Kakagon Sloughs, their hydrologic connection with the lower Bad River and the fact that the drainage is largely within the Bad River Indian Reservation led to a move of the watershed boundary. These drainages were shifted into the Lower Bad River Watershed where they could more effectively be managed as a hydrologic unit.

The Lake Superior fish contaminant monitoring strategy recognizes that a number of game species caught by anglers should be analyzed for human health purposes, though they are not part of a long-term trend program. These species are recommended for inclusion in sampling schedules depending on funding and workload in the district. This includes brown trout, splake, yellow perch, northern pike, and smallmouth bass from Chequamegon Bay.

### *Iron River Watershed*

The Lake Superior Binational Program has identified the Iron River and its watershed as important to the integrity of the Lake Superior ecosystem. Upstream areas of the watershed contain sand barrens, which are important parts of this critical habitat area. Wetland areas exist in the lower river, Iron Lake, and Muskeg Creek areas. Key habitats for this area are coastal wetlands, diversity, rare habitats, fish and wildlife spawning, and nursery grounds.

Much of the stream bank mileage in the Iron River watershed is in private ownership, though some of the headwater areas of creeks identified as critical habitat are in county forestland. Parts of the watershed would benefit from protection under Wisconsin's Stream Bank Protection Program that, under the Stewardship Program, includes easement and state purchase opportunities for protecting rivers.

## 5.II WETLANDS

Wetlands serve several important environmental functions including flood control, water quality improvement, and groundwater recharge as well as providing habitat for fish and wildlife. The Bayfield County Wetlands Map 5.7 included with this report delineates wetlands (two acres and more) mapped by the WDNR on its Wisconsin Wetland Inventory Maps and may not reflect all areas considered wetlands by the United States Department of Agriculture (USDA) or the U.S. Army Corps of Engineers.

A complex set of local, state, and federal regulations place limitations on the development and use of wetlands. The Department of Natural Resources regulates the placement of structures and other alterations below the ordinary high water mark of navigable streams and lakes. The Corps of Engineers has authority over the placement of fill materials in virtually all wetlands. The USDA incorporates wetland preservation criteria into its crop price support programs. Prior to placing fill or altering wetland resources, these agencies must be contacted to receive authorization.

The latest forest inventory in Bayfield County estimates that there are 80,387 acres of all types of wetlands that exist in the county.

The Wisconsin Department of Natural Resources has put together a wetland inventory with various wetland classification categories. The following table is a breakdown of the various types of wetlands that occur in Bayfield County.

Table 5.3: Wetland Acreage<sup>4</sup>

Wetland Type	Acres
Aquatic Bed	3.72
Emergent	3,035.62
Flats	29.92
Scrub/Shrub	24,032.63
Forested	51,633.92
Open Water	1,516.60
Rare Wetland Types	
Red Clay	134.86
Ridge/Swale	0
Total Wetland Acreage	80,387.27 Acres

For further information on priority coastal wetland sites in Bayfield County, one may consult the “Priority Wetland Sites of Wisconsin’s Lake Superior Basin”. This document is an excerpt from the “Wisconsin’s Lake Superior Coastal Wetlands Evaluation: A Report to the Great Lakes National Program Office of the U.S. Environmental Protection Agency”, which was the source for Table 3. This document was produced to give users a concise reference for locating sites in the Lake Superior Basin considered to be the most significant for protection and management and familiarizing themselves with their features. Intended audiences for this document are state and federal agencies, local units of government, tribal governments, and private conservation organizations. The document should be viewed as a dynamic one that will need updating and amending over time. For further details on specific watershed wetland areas, please see Appendix A.3.

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<sup>4</sup> Priority Wetland Sites of Wisconsin’s Lake Superior Basin, 1997

## Map 5.7- Wetlands

## 5.12 FLOODPLAINS

Areas susceptible to flooding are considered unsuitable for development because of risks to lives and property. Effective in the early 1990's, the Flood Insurance Rate Maps (FIRM) for Bayfield County are one source for identifying areas subject to flooding. These maps can be viewed in the Zoning Administrator's office at the County Courthouse in Washburn. The FIRMs are intended to be interim maps prior to the completion of a more detailed study and may not include all flood hazard areas in the county. A color map entitled "Bayfield County Flood Hazard Areas" highlights the floodplains regions based on the Flood Insurance Rate Maps. Map 5.8 depicting floodplains can be found on the following page.



## Map 5.8 – Floodplains

### 5.13 GROUNDWATER

Groundwater is found under almost all of Bayfield County and serves as the water supply source for almost the entire county; Washburn uses groundwater for its primary water supply while Lake Superior is a backup source. Both glacial deposits and bedrock are groundwater sources. Relatively high-yielding surficial sand and gravel deposits are found in a small area near Lake Owen. Most other wells in glacial drift draw from isolated and commonly small, buried sand and gravel deposits. Wells adequate for domestic use can generally be obtained from these deposits in much of the county. Areas with little or no available groundwater from glacial drift include areas where drift is thin over bedrock in the southern part of the county and an area of clayey till with little sand and gravel in the extreme northwestern part of the county. High yields are available in a few areas in sandstone along the eastern part of the Peninsula; both Bayfield and Washburn draw their water supplies in these areas. Where the glacial drift is unproductive or thin over bedrock some low yielding wells draw from the lava flows and crystalline rocks.

Groundwater quality is generally very good. Pollution from human activity is not a problem. The chemical quality of the water is also very good, although locally there can be problems. Differences in groundwater quality are due to the composition, solubility, and surface area of the particles of soil and rock through which the water moves and to the length of time the water is in contact with these materials. Generally, the lowest concentrations of dissolved solids and hardness are found in groundwater from sand and gravel deposits where the rapid groundwater movement through the permeable sediments results in low dissolved solids. Higher concentrations are usually found in the bedrock aquifers, particularly sandstone, although their concentration in specific areas is unpredictable. Objectionable quantities of iron and manganese can be found locally in all groundwater aquifers in the county.

The “Bayfield County Water Table Depth” map (Map 5.9) and the “Groundwater Contamination Susceptibility Model” map (Map 5.10) are included at this point. These maps show the various water table depths in the county and delineate those groundwater areas that are most susceptible to groundwater contamination.

## Map 5.9- Groundwater Contamination Susceptibility

## Map 5.10- Water Depth

#### 5.14 SCIENTIFIC, NATURAL RESOURCE AND SPECIAL USE AREAS

Bayfield County has several scenic and natural resource areas with unique qualities. Some of the most interesting areas include the Northern Great Lakes Visitor Center, the Apostle Islands National Lakeshore, the Chequamegon National Forest, the St. Croix-Namekagon National Scenic Riverway, the White River-Bibon Natural Area, Totagatic Lake, and the Fish Creek Slough, among others. Several special and historic use sites also exist such as logging camps, CCC camps, and sawmills.

##### *Northern Great Lakes Visitor Center*

The Northern Great Lakes Visitor Center is a four-season facility, capturing the unique qualities of the multi-state Great Lakes region. The Objects Theater, engaging exhibits, and special programs are designed to tell the stories of the region's cultural and natural history. The center is located in the approximate center of the Northern Great Lakes region. The center provides an overview of the historical interaction of human cultures with the land and natural resources of the region from the Ice Age to the present. It is located off U.S. Highway 2 on County Road G, 2.5 miles west of Ashland.

##### *Apostle Islands National Lakeshore*

Congressional action created the Apostle Islands National Lakeshore in 1970 in order to set aside the area for public recreation and preservation. The area includes 20 of the 22 islands in the archipelago, including all four of the islands in Bayfield County, Eagle, Raspberry, Sand, and York.

The Lakeshore area also includes the Red Cliff Unit, a strip of shoreline along the Bayfield Peninsula from one-quarter to one-half mile wide and covering about 2,500 acres of land. This area offers spectacular cliffs and caverns eroded from solid rock by wave action. Behind the shoreline stands a dense, second growth, northern hardwood forest.

##### *Chequamegon National Forest (US Forest Service)*

Bayfield County contains approximately 265,000 acres (out of a total of 840,000 acres) of the Chequamegon National Forest. The forest is important for commercial, recreational, and scientific purposes.

The Chequamegon National Forest provides endless trails for the outdoor enthusiast. There are many miles of maintained recreational trails throughout the county, providing opportunities for snowmobiling, cross-country skiing, ATVing, biking, and hiking. The North Country National Scenic Trail passes through the Cable area from northwest of Drummond to north of Clam Lake and runs through approximately 48 miles of the Chequamegon National Forest.

##### *St. Croix-Namekagon National Scenic Riverway (Nation Park Service)*

The Namekagon River in Bayfield County flows for 15 miles from Lake Namekagon to the Sawyer County line. The St. Croix-Namekagon River system was one of the original 12 rivers in the county designated under the National Wild and Scenic Rivers Bill of 1968.

The Namekagon River is a unique resource and offers excellent recreation opportunities that will now be protected through shoreline purchase and easements. The river is an excellent

canoeing stream during medium and high water levels and offers good brown trout fishing on that portion in Bayfield County.

***White River-Bibon Natural Area (State of Wisconsin)***

The White River flows for 70 miles through the center of Bayfield County originating in the Pike Lake Chain and emptying into the Bad River just south of Lake Superior. It is a highly scenic stream in one of Wisconsin's least developed river systems and provides excellent trout fishing and canoeing. The White flows through the Bibon Natural Area, the largest wetland in the county. The White River-Bibon Natural Area offers a unique wilderness area that presently contains significant acreage of county- and town-owned lands.

***Totagatic Lake***

Totagatic Lake is located in the extreme southwest portion of the county. The lake has 537 surface acres of water with a maximum depth of eight feet and is drained by the Totagatic River. To the north, west, and south of the lake remains a large wilderness area known to residents as "Tobitic". The lake is one of the better known wild rice producing lakes in northwestern Wisconsin. The rice attracts large numbers of migratory waterfowl.

***Fish Creek Slough***

The Fish Creek Slough is a large open and wooded marsh in both Bayfield and Ashland Counties where Fish Creek enters Chequamegon Bay, Lake Superior. Features such as submergent and emergent aquatics to lowland shrub and forest communities, in addition to wildlife habitat, give the area high priority for preservation.

***Moquah Barrens State Natural Area (MBSNA – US Forest Service)***

A natural preserve protected to study forest succession in the absence of fire. The MBSNA provides a unique habitat for many biological communities. MBSNA provides habitat for sharp-tailed grouse, which have been reintroduced to the area.

***Rainbow Lake Wilderness Area (US Forest Service)***

One of the first wildernesses designated in 1975, the Rainbow Lake Wilderness Area encompasses 6,583 acres of unique natural features, abandoned railroad grades, and numerous trails. Wilderness area is open to non-motorized and non-mechanized uses.

***Porcupine Lake Wilderness Area (US Forest Service)***

Federally designated wilderness area, The Porcupine Lake Wilderness Area includes a mix of forest habitats, topography, lakes, and wetlands. The North County Trail bisects the wilderness.

***Lost Creek Wild Area (Bayfield Co.)***

A 225-acre special use area with four waterfalls located within a one and a half mile stretch of Lost Creek. Walking trails provides access to falls areas.

***Onion River Wild Area (Bayfield Co.)***

Special use area consisting of 1,840 acres within the Onion River Watershed. This area is managed to protect water quality and to preserve the unique fishery.

### *Sultz Swamp Wild Area (Bayfield Co.)*

Special use area consisting of 650 acres of wetland and highland communities.

### *Logging Camps*

A 1969 document called “Report on the History of Logging and Logging Camps on the Washburn District of the Chequamegon National Forest” by Gordon Swenson, describes 84 different logging camps that have been utilized over the years. Many of these camps were used as far back as the late 1800’s. Some of the camps have been usurped by other land uses with little trace of their existence left. Others still exhibit varying stages of the camps.

### *County Sawmills*

Another publication written by Mr. Sorenson describes the sawmills that were built in the county to process the wood coming from the logging efforts at the camps. Approximately 40 such mills are detailed in this report which is entitled “Bayfield County Saw Mills” (date unknown). Location maps of the sawmills are also included in this interesting historical document.

### *County CCC Camps*

A third document by Mr. Sorenson reports on the “History of the Civilian Conservation Corps Camps in Bayfield County” (date unknown). The report describes the history of eight CCC camps located throughout Bayfield County and a map shows their locations.

## 5.15 HISTORICAL AND ARCHITECTURAL SITES IN BAYFIELD COUNTY

### *Historical Sites*

Historical sites and buildings abound in Bayfield County. Too numerous to mention all of them here, information on these sites may be found in the 1998 publication, “Special Sesquicentennial Edition, Historical Happenings”, This document was prepared by the Bayfield County Historical Society, an affiliate of the State Historical Society of Wisconsin. Eighty-five different sites are described in this edition with historical pictures and a map included. Descriptions of sites going back to the mid-1600’s can be found in this publication.

An example of some of the sites includes:

- City of Bayfield

Most of the City of Bayfield has been designated a historic district in the National Register of Historic Places. The Bayfield District, encompassing approximately 46 blocks, is the 17<sup>th</sup> district in Wisconsin to be selected for the National Register. The area was selected because it exemplifies a typical northern Wisconsin lumbering and fishing community. Bayfield is located on Chequamegon Bay on Lake Superior.

- Cornucopia

St. Mary’s Russian Orthodox Church  
Tragedy of the Siskiwit Marker

- Port Wing

School Consolidation Official Marker  
South Shore Community School, State Highway 13 (razed)

- Russell

Red Cliff Indian Reservation (created 1854)

- Washburn

Washburn City Hall, 119 Washington Avenue  
Washburn Public Library, 307 Washington Avenue  
Bayfield County Courthouse, 117 East 5<sup>th</sup> Avenue  
Washburn Historical Museum and Cultural Center, 1 East Bayfield Street  
Madeline Island Official Marker, Highway 13, 5 miles north  
DNR Washburn Ranger Station, 203 E. Bayfield Street

- Ashland Vicinity

Radisson and Groeseilliers Fort Sites Official Marker, Highways 2 and 13

### *Archeological Sites*

The Wisconsin State Historical Society lists several sites. The location of each is not made public in order to protect the rights of private landowners and to eliminate excavation by artifact hunters or other non-professional archeologists not associated with the State Historical Society.