Geology in Michigan –
Fayette Historic State Park in Delta County, Michigan

By David Adler, CPG-11377

Figure 1: Source: https//snazzymaps.com/style/104137/default-w-out-labels.

Directions

Fayette is located on the west side of the Garden Peninsula in the south-central portion of Michigan's Upper Peninsula in Fairbanks Township, Delta County (see Figures 1 and 2).

Latitude 45° 43' 05.24" N; **Longitude** 86° 40' 09.05"W.

From the Mackinac Bridge in St. Ignace, take US Highway 2 (US-2) west for approximately 100 miles to Michigan Highway 183 (M-183) at Garden Corners. Turn left and proceed south on M-183 for approximately 17.5 miles to Fayette Historic State Park (see Figure 2). From the western Upper Peninsula, take US-2 east to Garden Corners and proceed south on M-183 to Fayette.

From Marquette, take U.S. Highway 41 (US-41) south to US-2 in Rapid River. Turn left (east) on US-2 and proceed approximately 22.5 miles to the intersection of M-183 and US-2 at Garden Corners. Turn right (south) onto M-183 and proceed southward to Fayette.

Fayette can also be reached by watercraft via Lake Michigan and Big Bay De Noc. Docking facilities are available at the state park. Additional marina information can be obtained at 1-800-447-2757 or www.midnrreservations.com. Transient and seasonal slips are available.

Some of the numerous nearby attractions include Big Spring (also known as Kitch-iti-kipi) at Palms Book State Park, and Indian Lake, both located northwest of Man-

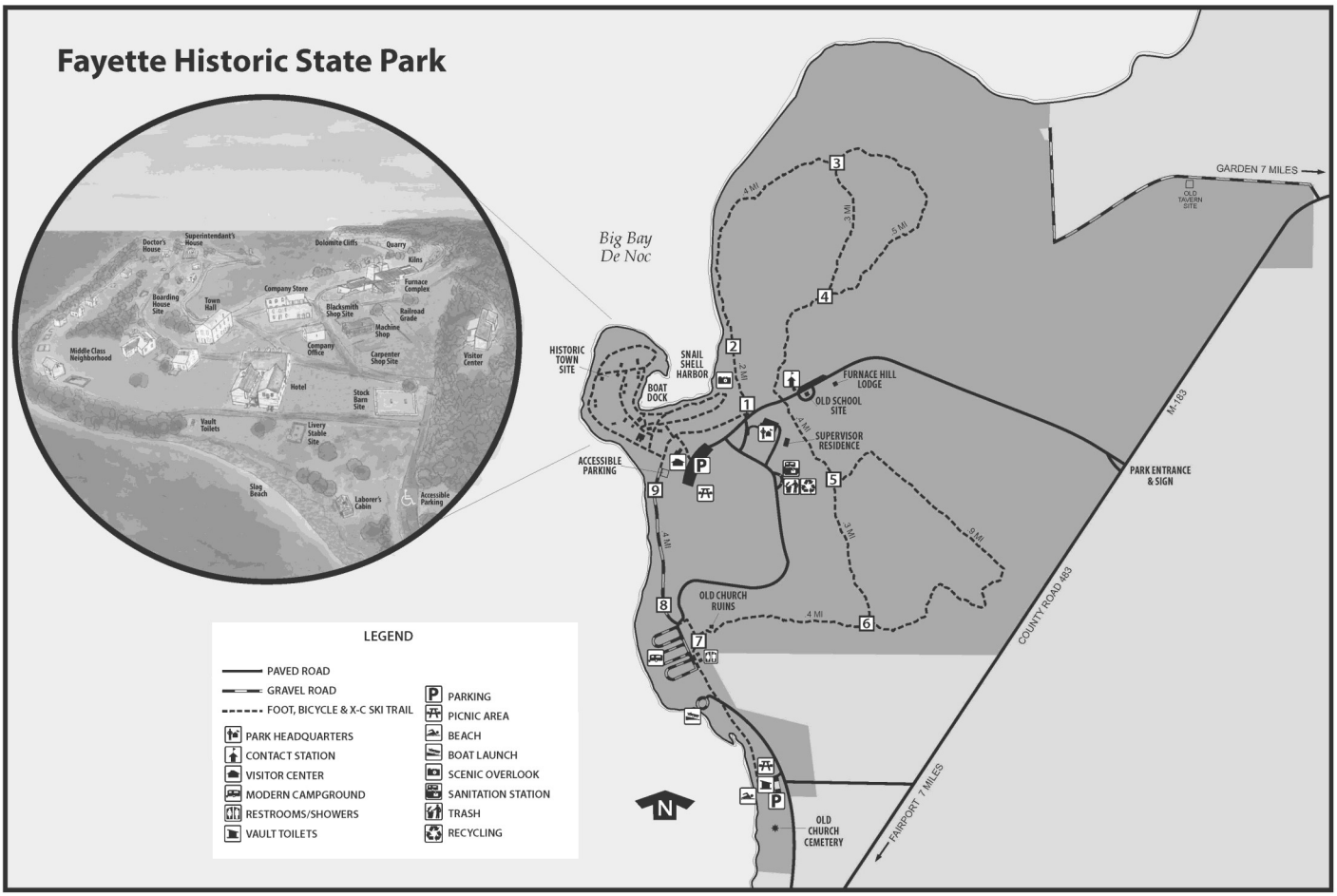

Figure 2: State Park and Vicinity Map. Source: Fayette Historic State Park.

istique; Peninsula Point Park and Lighthouse at the southern tip of the Stonington Peninsula; Seul Choix Pointe Lighthouse near Gulliver; the Stony Cut roadcut outcrop and rock quarry on M-94 north of Manistique; Sand Point Lighthouse in Escanaba; Thompson State Fish Hatchery in Thompson; Pictured Rocks National Lakeshore located east of Munising; and the Seney National Wildlife Refuge located northeast of Manistique (see Figure 1).

Introduction

Si Quaeris Peninsulam Amoenam Circumspice – If You Seek a Pleasant Peninsula, Look Around You. The state motto of Michigan is an apt description of the location of Fayette, once a vibrant 19th century iron ore smelting town and now a ghost town preserved as a historic state park. Iron mining in Michigan began in the mid-1840s near present day Negaunee in the Marquette Iron Range and quickly spread as other iron ore deposits were discovered to the west and southwest of Marquette and in the Menominee and Gogebic Iron Ranges of the Upper Peninsula. Taking advantage of its location, natural harbor, abundant nearby natural resources, and proximity to the mines of the Marquette Iron Range, Fayette was founded in the 1860s by the Jackson Iron Company of Negaunee. Throughout the 1870s and 1880s, Fayette was a bustling iron ore smelting town with two blast furnaces, several charcoal kilns, a rock quarry, and approximately 500 residents of various ethnic backgrounds.

Fayette produced over 229,200 tons of charcoal iron (also known as pig iron) from the late 1860s until 1891 when iron smelting operations ceased.

Fayette became a Michigan State Park in 1959. Over the years, preservation and restoration efforts have continued and amenities have been added and upgraded. Fayette has also been the site of ongoing archaeologic excavations and academic research. Today, Fayette Historic State Park has much to offer to visitors of all ages and interests, including spectacular dolomite rock cliffs that are part of the Niagara Escarpment, a prominent geologic feature that extends westward from Niagara Falls, through Ontario and the Upper Peninsula of Michigan, and onto the Door Peninsula of northeast Wisconsin.

Geologic Setting

Fayette is located on the northwest side of the Michigan Basin geomorphic province. The regional geologic setting is depicted on Figure 3. As shown on Figure 3, the eastern half of the Upper Peninsula is underlain by Paleozoic sedimentary rocks, primarily dolomites and limestones. Fayette and the Garden Peninsula are located at the west end of a broad east-west trending arcuate belt of Silurian bedrock that extends eastward into Ontario and southwestward into Wisconsin. The flanking lithologies to the northwest include Ordovician and Cambrian sedimentary rocks on the far northwest flank of the Michigan Basin, and Precambrian crystalline basement rocks of the Canadian Shield further to the northwest. The

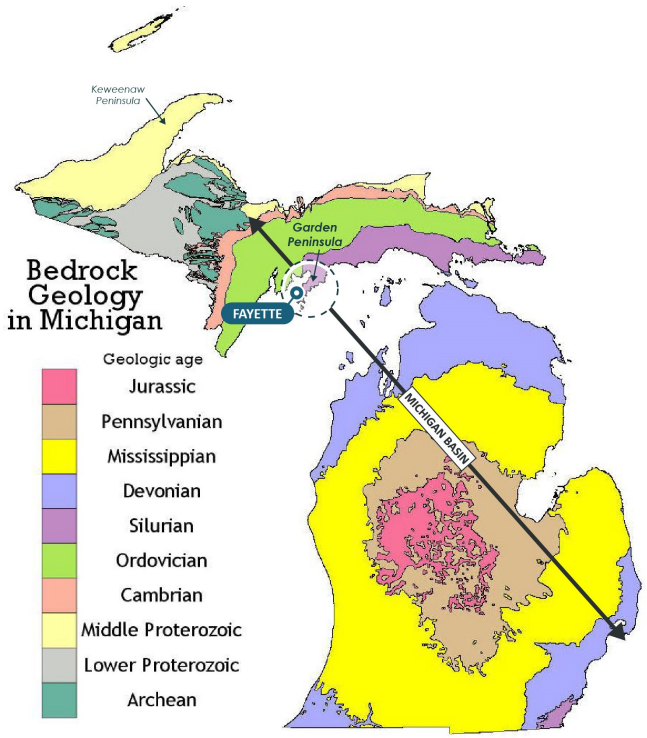

Figure 3: Bedrock Geology of the Michigan Basin and the adjacent Southern Canadian Shield. Source: Modified from Harrison, 2016.

Precambrian rocks include the economically significant metasedimentary iron ore deposits of Michigan's iron ranges and the volcanic and volcaniclastic copper deposits of the Keweenaw Peninsula and Ontonagon County.

The Michigan Basin contains several thousand feet of Paleozoic sedimentary rocks that overlie older Precambrian age crystalline basement rocks. The maximum thickness of accumulated Paleozoic sedimentary rocks in the Michigan Basin is approximately 15,000 feet in the Midland area near the center of Michigan's Lower Peninsula.

The Paleozoic sedimentary rocks include dolomite, limestone, shale and sandstone. Dolomite and limestone are the predominant Paleozoic lithologies of the Michigan Basin. Rock salt (halite) and gypsum deposits are economically significant in some areas of the Michigan Basin.

The Pleistocene age glacial drift that overlies the bedrock throughout most of the Michigan Basin is the result of advancing and retreating continental glaciers during the Wisconsin glacial stage of the Pleistocene epoch (approximately 35,000 to 10,000 years before present). The glacial landforms in Delta County are primarily the result of advance and retreat of the Green Bay glacial lobe. The Green Bay lobe advanced into what is now Delta County along a general north-south trending axis. During periods of relative stability while the Green Bay lobe was melting, large moraines were deposited in Delta County along the ice front (Sinclair, 1960). Most of the moraines are segments of the Marquette and Sturgeon morainic systems (Martin, 1957).

The glacial drift on the Garden Peninsula has been described by Jerome (2006) as bedrock-controlled ground moraine deposits. Western Michigan University (1981) and Sinclair (1960) describe the glacial and surficial geology in this area as rock at or near the surface. The glacial drift at Fayette is generally very thin to non-existent. Glacial striae on the carbonate bedrock surface in the region show a prominent northwest-southeast orientation (Western Michigan University, 1981).

The bedrock at Fayette has been mapped in numerous public domain sources as the Middle Silurian age Hendricks Formation of the Niagaran Series Burnt Bluff Group. The distribution of Silurian bedrock units in the Upper Peninsula is depicted on Figure 4. The generalized stratigraphy of the Silurian formations of the Upper Peninsula is shown on Figure 5. Rocks of the Niagaran Series, predominantly hard, resistant dolomites and limestones, form the prominent cliffs along the west side of the Garden Peninsula.

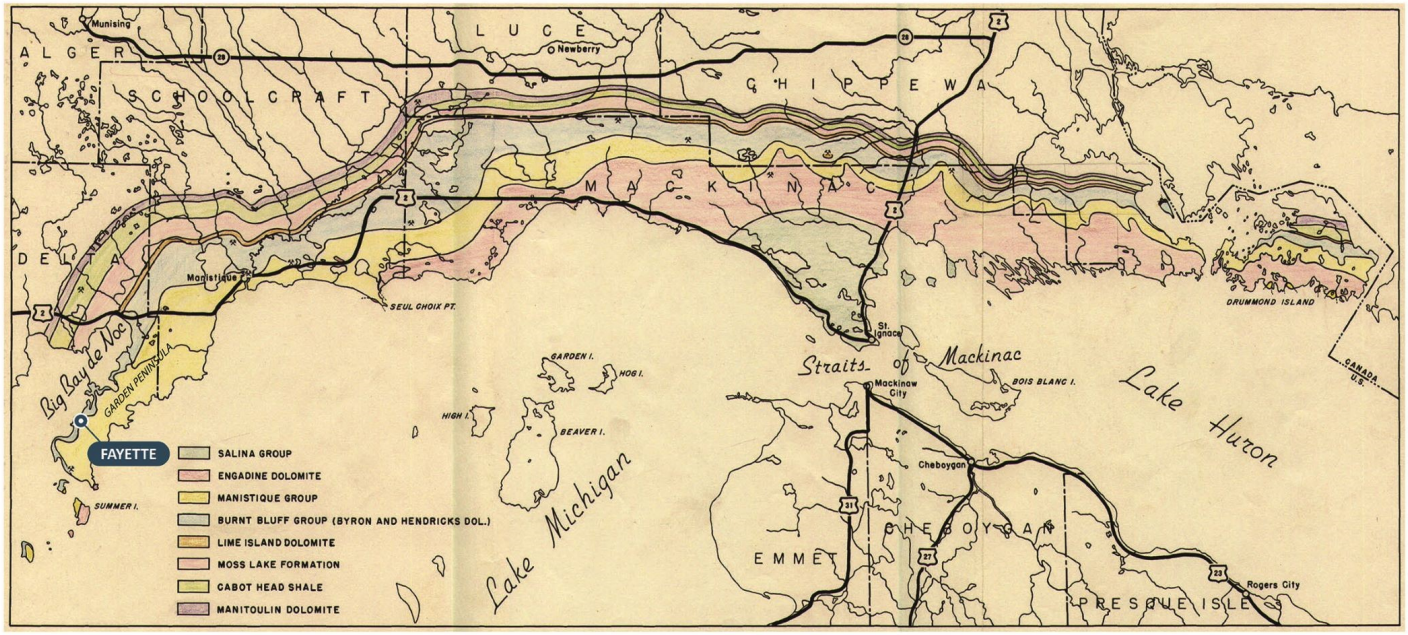

Figure 4: Distribution and configuration of the Silurian Bedrock Formations in Michigan's Upper Peninsula. Source: Modified from Ehlers and Kesling, 1957.

Series	Group	Formation	Thickness in Feet
Cayugan	Salina	St. Ignace dolomite	250 to 300
		Pte. aux Chenes shale	500 to 600
Niagaran		Engadine dolomite	200 to 250
	Manistique	Cordell dolomite	135 to 150
		Schoolcraft dolomite	40 to 60
	Burnt Bluff	Hendricks dolomite	60 to 120
		Fiborn Limestone member	18 to 50
		Byron dolomite	80 to 155
		Lime Island dolomite	15 to 35
Alexandrian	Cataract	Moss Lake formation	10 to 150
		Cabot Head shale	75 to 100
		Manitoulin dolomite	25 to 50

Figure 5: Classification and Thicknesses of the Silurian Formations of the Upper Peninsula. Source: Ehlers and Kesling, 1957.

The Hendricks Formation consists primarily of light gray to light buff colored thin to massively bedded fine to coarse crystalline dolomite with lesser amounts of high calcium limestone, magnesian limestone and dolomitic limestone strata (Ehlers and Kesling, 1957). The high calcium Fiborn Limestone Member occurs near the top of the Hendricks Dolomite. The Hendricks Dolomite is approximately 120-135 feet thick and is conformably underlain by the Byron and Lime Island Dolomites that comprise the lowermost formations of the Burnt Bluff Group. The Hendricks Dolomite is conformably overlain by the Schoolcraft Dolomite, the lowermost formation of the overlying Manistique Group carbonate rock formations. As shown on Figure 5, the Manistique Group includes, in ascending order, dolomites of the Schoolcraft, Cordell and Engadine Formations.

The Hendricks Dolomite is exposed at Fayette along the shoreline between the state park swimming beach and the historic townsite, as well as in the prominent cliffs that overlook Snail Shell Harbor to the north-northeast of the historic Fayette townsite (see Figure 2). When water levels in Lake Michigan and Big Bay De Noc are low enough, the Hendricks Dolomite beds can be closely observed and examined by walking along the shoreline from the swimming beach to the townsite, a distance of approximately 1 mile. The Hendricks Dolomite was quarried from the cliffs just east of the townsite in the 1870s and 1880s for use as flux in the iron ore smelting process.

Most of the beds of the Hendricks Dolomite are exposed in the prominent cliffs that overlook Fayette on the east side of Snail Shell Harbor. These picturesque cliffs also referred to as the Middle Bluff, contain exposures of most of the Hendricks strata as well as some of the overlying Schoolcraft Dolomite. As shown on Figure 6, the contact between the Hendricks Dolomite and the overlying Schoolcraft Dolomite occurs along the tree line. A hiking trail maintained by the state park allows access to the top of the Middle Bluff cliffs. There are several overlooks along this trail with spectacular views of Snail Shell Harbor, the historic Fayette townsite and the headland of Burnt Bluff in the distance to the south-southwest (see Figure 7). According to Dorr and Eschman (1970), the concave terrace on Burnt Bluff was carved by higher waters of one of the post-Algonquin Glacial Great Lakes stages. The older Glacial Lake Algonquin shoreline is visible at the top of the Burnt Bluff ridge.

Figure 6: The Hendricks Dolomite and overlying Schoolcraft Dolomite exposed at the Middle Bluff cliffs overlooking Snail Shell Harbor and the Historic Fayette townsite. The Fayette dolomite quarry was located at the base of the cliffs just right of the area shown . Photo by Dave Adler.

Figure 7: View of Historic Fayette townsite from the Middle Bluff cliffs hiking trail. Note Burnt Bluff bedrock headland in the background. Photo by Dave Adler.

The cliffs of the Middle Bluff are an exposure of the Niagara Escarpment, an eroded bedrock cuesta consisting of prominent weather resistant Silurian rock outcrops that rise 250-1,000 feet above the surrounding lowlands. The Niagara Escarpment extends for several hundred miles from near Rochester, New York to the U.S.- Canada border near southwestern Lake Ontario, through the Bruce Peninsula and Manitoulin Island in Ontario, then along the southern Upper Peninsula of Michigan, onto the Door Peninsula of Wisconsin, and southward towards Milwaukee (see Figure 8). The carbonate rocks of the Niagara Escarpment were formed in shallow inland seas of the Middle Silurian. The most well-known exposure of the Niagara Escarpment is located along the New York State - Ontario border where the Niagara River has cut a

Figure 8: Geographic extent of the Niagara Escarpment. Source: Wikipedia, 2022.

gorge through the escarpment forming the recessed cataracts known as Niagara Falls.

History

Douglas Houghton reported the presence of iron ore along the south shore of Lake Superior during his exploration of the resources of the Upper Peninsula in the early 1840s. William Burt, a government surveyor, is credited with the discovery of iron ore in the Upper Peninsula in 1844 near what would become the town of Negaunee. Indigenous Americans had long known of the presence of iron ore in the region.

In 1845, the Jackson Mining Company, with the help of Native Americans, discovered iron ore at another location that would later become Negaunee. This deposit, mined from an open pit, became the Jackson Mine. Iron mining on Michigan's Marquette Iron Range had begun. Soon other mining entities formed and other nearby deposits were discovered and exploited. The Cleveland Iron Mining Company began producing iron ore near Ishpeming in 1848. In the early 1850s, the city of Marquette started to become the center of iron mining activity in the region, including construction of the Marquette Iron Company forge and the first ore dock for shipping iron ore.

The Jackson Mine smelted its early ore using a primitive Catalan forge at a site on the Carp River located east of Negaunee. In the 1860s, the demand for iron ore increased substantially with the onset of the Civil War. The Jackson Iron Company (successor to the Jackson Mining Company) looked for better and more efficient means to smelt its iron ore and transport its finished product, known as pig iron, to the market centers located in Ohio and Illinois. Jackson Mine Manager Fayette Brown arrived at Snail Shell Harbor on the Garden Peninsula in February 1867 and found conditions there favorable for iron smelting and transport. The recently completed Peninsula Railroad provided a means of transporting ore from the mines in Negaunee to the Lake Michigan port of Escanaba. The ore could then be shipped from Escanaba to the deep, protected anchorage in Snail Shell Harbor, a distance of only 25 miles. The land surrounding Snail Shell Harbor would become the company smelting town of Fayette, Michigan.

Figure 9: Fayette townsite, Snail Shell Harbor, and the Middle Bluff cliffs. Photo provided by Fayette Historic State Park.

Fayette's location and natural resources made it a desirable place for iron ore smelting. Nearby were abundant resources of timber to produce charcoal to fuel the blast furnaces. There was also a source of dolomite rock in the

Figure 10: Remains of the Fayette blast furnaces. Photo by Dave Adler.

prominent Middle Bluff cliffs above Snail Shell Harbor for use as flux to separate impurities from the ore during smelting. The three key ingredients, ore, fuel, and flux were all available at Fayette. Its proximity to Lake Michigan meant that the charcoal pig iron produced at Fayette could be economically transported to markets located in the lower Great Lakes region.

Figure 11: Kiln used for converting wood to charcoal. Photo provided by Fayette Historic State Park.

Recognizing its potential for iron ore smelting operations, Brown purchased the land at Snail Shell Harbor. Construction of smelting facilities began at Fayette in May 1867. By December of 1867, the first blast furnace, a shipping dock, and eight charcoal kilns had been constructed and were surrounded by the growing town of Fayette. A second blast furnace was completed in 1870. The dolomite rock used for flux was quarried from the base of the cliffs on the east side of the harbor. Other smelting components including steam engines, a stack house, steam hoist, casting house, steam powered crushers, charcoal kilns, lime kiln, blacksmith shop, sawmill, machine shop, roundhouse, carpentry shops, a scale pit, and company offices were built and put into operation. New, larger hot blast ovens were added in 1881. The constant production of charcoal from nearby timber resources became a local cottage industry established to fuel Fayette's blast furnaces.

As Fayette's iron ore smelting operations grew and improved throughout the 1870s and 1880s, so did the town of Fayette. The population of approximately 500 residents included many immigrants from Canada and Europe. In addition to the iron ore smelting operations, Fayette had a school, a hotel (the Sheldon/ Fayette House Hotel), a company store, town hall, town doctor, icehouse, opera house, baseball team, a half-mile racetrack, a church (The Church of St. Peter), a narrow-gauge railway, an Odd Fellows Lodge, a drama society, agricultural society, barbershop, livery, art gallery, jailhouse, and a life insurance agency.

Figure 12: Remains of the Fayette Machine Shop. Photo by Dave Adler.

By 1891, smelting operations at Fayette were in decline. Local sources of wood, especially hardwood for making charcoal used for fueling the furnaces, had become depleted. The costs for use of more distant wood sources made smelting less profitable. In addition, market factors had changed and evolved with the rise of larger and more modern smelting operations in the lower Great Lakes, including coal or coke fueled smelters that produced a product of comparable quality. In addition, the Jackson Company's facilities at Fayette were aging and in need of significant upgrades. The Jackson Iron Company closed its iron ore smelting operations at Fayette in 1891 after producing over 229,000 tons of charcoal pig iron. Fayette was the second largest iron smelting

Figure 13: The Fayette House Hotel. The hotel was enlarged and renamed as the Shelton House in 1882. Photo by Dave Adler.

Figure 14: The Fayette Town Hall building. Concerts, lectures, and dances were held here. Photo by Dave Adler.

operation in the Upper Peninsula in the 19th century.

The Jackson Iron Company's holdings would eventually be acquired by the Cleveland Cliffs Iron Company. Commercial fishing activities continued after cessation of smelting. Most of the town's residents moved on. A series of private entities attempted to revive Fayette as a resort area with only limited success. In 1916, Fayette became a private summer resort. It was later acquired by the Escanaba Paper Company and was subsequently obtained by the State of Michigan in exchange for timberland. Fayette became a Michigan state park in 1959 in conjunction with the Michigan Conservation Department, which would become the Michigan Department of Natural Resources. The once bustling 19th century industrial community of Fayette was listed on the National Register of Historic Places in 1970.

Figure 15: The Fayette company store and warehouse complex was enlarged in 1870 and again in 1886. Photo by Dave Adler.

Historic State Park

The ghost iron ore smelting town of Fayette is now part of Fayette Historic State Park administered and operated by the Michigan Department of Natural Resources. The park is open on a year-round basis, although some of the park's facilities and activities are seasonal. The entire park encompasses 711 acres. The historic townsite of Fayette, surrounded by Snail Shell Harbor and the Middle Bluff dolomite cliffs, is the central feature of the park. An aerial view of the historic townsite, the harbor, cliffs, and Big Bay De Noc is shown in Figure 9.

Figure 16: New England salt-box style managers' homes. Photo by Dave Adler.

Fayette has five miles of maintained trails for hiking, snowshoeing, and cross-country skiing, including the trail that leads to the top of the Middle Bluff dolomite cliffs where there are excellent views looking down on the townsite and Snail Shell Harbor from the top of the cliffs. Other facilities and amenities at Fayette Historic State Park include:

- A swimming beach on Lake Michigan (Big Bay De Noc)
- A visitor center and gift shop
- A modern campground
- Showers
- A picnic area
- A marina with docking facilities
- A boat launch
- Guided and self-guided tours, including tours for school groups

Figure 17: Company-owned doctor's house. This home was occupied by Dr. Curtis J. Bellows from 1870-1882. Photo by Dave Adler.

- Visitor events including Heritage Days historic period reenactments
- Educational and outreach programs

Historic structures

Fifteen transient slips are available for boats up to 60 feet in length at the marina in the protected waters of Snail Shell Harbor. The slips are equipped with 30/50-amp electrical pedestals for overnight or day-use activities. There is also a lodge available for rent at the state park. The Fayette Furnace Hill Lodge sleeps up to 10 people. Some of the campsites at the campground have 50-amp electrical service.

Figure 18: The Superintendent's house was originally constructed in 1867 and was enlarged to include 11 rooms in 1875. Photo by Dave Adler.

The historic Fayette townsite is a living museum with many restored buildings from the iron ore smelting period of 1867-1891. There are upwards of 20 preserved historic structures at the park, including the remnants of the blast furnaces that were the central component of the iron ore smelting operations. Some of the restored/preserved building interiors have historic exhibits. Examples of some of the historic structures that can be seen at the park are depicted on Figures 10 through 20.

Archaeological excavations and associated research have been ongoing at Fayette since its inception as a state park in 1959. These activities offer continuing research and educational opportunities for students as well as amateur and professional archaeologists and anthropologists. Prehistoric artifacts made of copper, flint, and hematite have been found at Fayette. Archaeological research focusing on the Superintendent's house indicated that prehistoric people used the hillside next to the house as a warm weather campsite approximately 2,000 years ago. Prehistoric pictographs have also been found nearby at the Burnt Bluff rock cliffs located approximately three miles southwest of Fayette.

After Fayette became a state park, more comprehensive efforts were made to develop a systematic approach to investigating its history. An initial site survey was followed by test excavations. Numerous artifacts were discovered and collected for further study. Most of the artifacts were dated from the period of 1860-1910 (Friggens, Halsey, and Leiby, 2000). The information obtained from

Figure 19: View north of Snail Shell Harbor, Big Bay De Noc, and the Middle Bluff cliffs from the Fayette townsite. Photo by Dave Adler.

the examination and study of these artifacts was beneficial to the interpretation of Fayette's history and to the restoration of the historic townsite. Ongoing archaeological research, including underwater investigation, has been conducted by personnel from the Michigan United Conservation Clubs, the Michigan History Division of the Michigan Department of State, the Illinois State Museum, Michigan Technological University, and the Office of the State Archaeologist of Michigan, among others.

Figure 20: The Fayette blast furnaces and part of the historic townsite. View southeast from the boat dock area. The dolomite quarry was located just left of the area shown. Photo by Dave Adler.

Fayette is an important part of Michigan's iron mining heritage and one of the best examples of a post-civil war iron ore smelting industrial community. It is also an interesting and beautiful place to visit, offering year-round outdoor recreation opportunities and a glimpse of the way life was in the Upper Peninsula in the latter half of the 19th century.

Acknowledgements

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